

2001 DEER UPDATE STUDY

FINAL REPORT

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Abstract

The Statewide 2001 Database for Energy Efficiency Resources (DEER) Update Study provides estimates of energy savings and peak load impacts for residential energy-efficiency measures and estimates of full and incremental costs for currently available residential and commercial technologies and energy-efficiency measures. This study represents the third update to the original 1992 Measure Cost Study (XENERGY, 1992) and the first update of the residential energy savings estimates developed in 1994 (NEOS, 1994). The key purpose of this study is to create a common set of cost and savings data across the state's major utilities to improve the consistency of information and assumptions used in energy-efficiency analyses. Energy savings estimates for the residential measures were developed with engineering spreadsheet analyses or with DOE-2 simulations, depending on the characteristics of the measure. DOE-2 simulations were conducted for 59 measures for single-family homes and 51 measures for multi-family homes across 5 unique prototypes, 10 climate zones, and 4 vintages. Measure costs were estimated using over 8,000 cost quotes collected from distributors, contractors, and retailers throughout California. Cost data were collected from 318 sources. Cost estimates were segmented based on a number of characteristics including distribution channel, volume, vintage, size, and efficiency. Recommendations for future work are provided.

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1.1 SCOPE AND OBJECTIVES

This report presents the results of the *Statewide 2001 Database for Energy Efficiency Resources (DEER) Update Study*, commissioned by the California Energy Commission.¹ The study was performed by XENERGY Inc., with subcontractor support provided by ADM Associates and VaCom Technologies.

The two primary objectives for this study:

1. Develop cost estimates for residential and commercial energy-efficiency measures
2. Develop per-unit energy savings and peak kW reduction estimates for residential measures

Access to a common set of cost and savings data has helped to improve the consistency of information and assumptions used in energy-efficiency analyses conducted in the state since these types of studies were first commissioned in the early 1990s. The 2001 DEER follows three previous measure cost studies conducted in 1992, 1994, and 1996 (XENERGY, 1992, 1994, 1996) and the *Energy Technology Savings Study* (NEOS, 1994).

Note that industrial and agricultural measure costs are not included in the scope of the current study, nor are nonresidential energy savings estimates.

Note that none of the measure costs presented in this study should be perceived as the final word on a particular measure's cost, particularly those with low sample sizes. The comprehensive data set presented here is meant as both a starting *and* comparative point for the many cost analyses needed by utilities and regulators in California. In most regulatory proceedings, utility staff with access to supplemental or superior data may use those sources in place of the data in this study.

1.2 SUMMARY OF PROJECT TASKS

A summary of the project tasks included within the DEER 2001 Update Study is shown in Table 1-1. A number of memoranda and two project planning reports (for Tasks 3 and 5) were

¹ The Commission created a Study Review Team that included representatives from each of the major utilities and other interested parties. The Review Team provided input and comments on all major deliverables. In particular, we would like to acknowledge the review effort of Cathy Chappell of Heschong-Mahone (Heschong-Mahone represented the utility new construction program on the DEER Review Team). Ms Chappell provided extensive comments throughout all phases of the study, which were extremely helpful to the project team. Helpful comments and input were also received from Ramin Faramarzi of Southern California Edison, Andrew Sickels and Mark McNulty of San Diego Gas and Electric Company, Ed Hamzawi of Sacramento Municipal Utility District, Mary O'Drain of Pacific Gas and Electric Company, and others.

submitted to the Commission contract manager and study review team throughout the project. This report is the deliverable for Task 10 – Final Report.

**Table 1-1
Summary of Project Tasks**

Task #	Task Description
#1	Monthly Reports
#2	Revised Measure List
#3	Cost Sampling and Analysis Plan
#4	Cost Data Collection
#5	Savings Estimation Method and Base Estimates
#6	Draft Measure and Baseline Cost Data
#7	Draft Measure Savings/Peak Estimates
#8	Final Measure Cost and Savings Data
#9	Draft Report
#10	Final Report
#11	Contract Summary

1.3 DEVELOPMENT OF MEASURE LISTS

Under Task 2 of the DEER Update 2001 Study, the Review Team worked together to develop a list of measures to be included in the study. The process for determining whether to include a measure consisted of the following steps:

1. At the outset of the study, each participating organization submitted to XENERGY a list of measures to be considered for inclusion in the Study.
2. XENERGY combined the lists to create a single master list and eliminated duplicates.
3. XENERGY then made draft recommendations for which measures to include and exclude, with comments explaining proposed exclusions.
4. Next, reviewers provided input through two rounds of Review Team discussions addressing which measures should be included or excluded, and whether any additional measures should be added.
5. The Commission and Review Team approved the final list of measures for the study.

1.4 ISSUES AND RECOMMENDATIONS FOR FUTURE STUDIES

In this section we discuss a few key issues associated with the measure cost portion of this study and previous California measure cost studies. We also provide a few recommendations for future measure cost studies.

Critiques of the Consumer Price Index provide an interesting backdrop for the California measure cost studies. Despite decades of experience and multi-million dollar budgets, obtaining accurate estimates of changes in prices over time remains a daunting challenge, even for the federal government's armada of statisticians.² It should not be surprising, then, that the California measure costs studies face difficulties in their quest to accurately estimate incremental costs for large numbers of energy-efficiency measures.

There are two key related limitations to accurate estimation of incremental measure costs: sample size and the amount of research budget available per measure type. The primary objective of each of the four California Measure Cost Studies, including the current one, has been to develop cost estimates for a large number of individual technologies. Cost trend analysis has been a secondary objective. Within the fixed budget scope of these studies, these two objectives are somewhat at odds, to the extent that the primary objective results in project breadth (i.e., many technologies are included), while the second objective would be better served by greater depth for fewer, select technologies (via larger sample sizes, analysis of market share, more in-depth engineering specifications for custom measures, interviews with key market entities, etc.).

As mentioned above, the current study provides cost estimates for several hundred technologies. Thus, despite the fact that over 8,279 raw cost observations were collected, the number of observations per technology remains relatively small. The number of observations per Technology Sub-Type ranges from a low of 1 for a few technologies, to a high of 1,800 for residential refrigerators. The average number of observations per Technology Sub-Type is 36; the median, however, is only 8. Measures with small sample sizes tend to be more complex (commercial refrigeration) or are associated with industries with only a few major manufacturers or distributors (commercial chillers and packaged units). More complex measures require more resources to improve cost estimates. In contrast to mass market measures like appliances for which hundreds of observations can be collected via in-store surveys, these more complex measures require more of an engineering design approach in which a detailed system specification is developed or costs are developed from small samples of actual projects.

We believe that the measure cost studies conducted to date have done a good job of characterizing incremental costs for measures that lend themselves to relatively low cost sampling of prices through vendor and retail store surveys – that is, for measures that tend to be mass market and “widget” oriented (e.g., residential appliances and commercial lighting equipment). More complex “custom” measures, such as those that typically occur in programs like the California utilities' Nonresidential Standard Performance Contract programs and the California Energy Commission's Innovative Peak Load Reduction Program, have been problematic because they require much more time and effort to adequately address per measure

² See, for example, “Panel is Expected to Recommend a New Price Index, to Better Reflect Actual Buying”, New York Times (National Edition), page 11, December 1, 1996.

than do the mass-market widgets. As a result, we recommend conducting one or more supplemental measure cost studies that focus on these types of custom nonresidential measures.³

1.4.1 Supplemental Work on Custom Measures

Two possible approaches to better estimating costs for custom measures include *Project-Specific* and *Prototypical* methods. Under the *Project-Specific* approach, research would be focused on ascertaining the actual incremental costs for a selected set of projects in SPC/custom-measure programs. This research could be done retrospectively, for past projects, or on a real-time basis for projects being proposed. Although appealing in concept, both the retrospective and real-time approaches have limitations. In the retrospective case, program applicants may not have priced out base case alternatives or kept adequate records. In the real-time case, applicants may consider the request for incremental measure costs an additional burden of participation and distraction from other critical path activities. In addition, in both cases, costs may vary significantly from site to site for similar measures because of site-specific factors that are not related to energy efficiency. In addition, vendors may not be able to unbundle their invoices in a way that is required to isolate the cost of the high-efficiency portion of a particular project. Nonetheless, the project-specific approach could be focused on a sample of projects that are mostly retrofit cases (i.e., for which there is no base case to price) and are determined to have relatively reliable cost data. This approach might work well for industrial VSD or compressed air applications, for example.

Under the *Prototypical* approach, research engineers would specify a hypothetical application of a set of measures of interest and request price quotes from vendors. This approach has the disadvantage of not being based on actual projects (which is true of most of the measure cost study estimates); however, the advantage is that the costing process and results could be done relatively cleanly without the variation associated with individual sites. This approach has been accepted on the previous MCS for measures such as chillers and daylighting. It might work well for measures such as high efficiency cooling towers, which involve several distinct components that must be integrated into a system.

1.4.2 Inclusion of Qualitative Methods to Aid Trend Analysis

As noted above, the scope of the California measure cost studies has been on data collection and analysis of large numbers of items. As a result, these studies emphasize *breadth* over *depth*. If cost trend analysis is an important market evaluation goal, then future research should include both qualitative and quantitative analyses developed from interviews of manufacturers, wholesalers, contractors, store owners and the like. For example, in Section 3.3.5 we discuss the fact that we are uncertain of the validity of our incremental cost estimates for residential refrigerators, despite a very large sample size of 1,800 refrigerators. The incremental costs for high-efficiency units above the 1993 national standards appear to have increased as compared to

³ Examples of such types of measures include compressed air system upgrades, cooling tower approach temperature, waste heat recovery, industrial process improvements, integrated building/system design, etc.

our 1996 estimates. We hypothesize that this is because the base case units that are near the 1993 standard were being dumped by retailers in late 2000 in anticipation of the new federal standards that went into effect in July 2001. To resolve this question, we would not need more price data but rather a qualitative interview with store managers and manufacturers.⁴

1.4.3 Create an “On-Going” Process for Updating Costs

All of the previous measure costs studies have been discrete studies that ended with their final reports. While this is common in many research projects, it results in an important limitation to the value of this particular study. Incremental measure costs are a critical input to tests that are used in energy-efficiency regulatory process to determine program cost effectiveness. Because measure costs are difficult to estimate and change over time, they should not be unnecessarily static. To the extent that the costs in the current study are used as a regulatory benchmark of costs, a process should be put in place that allows these benchmark costs to be updated between major study efforts if new information justifies revision.

1.5 GUIDE TO THE REPORT

A guide to the information presented in each section of this report is provided in Table 1-2. Because of the wide scope of technologies and segments for which cost estimates are provided in this study, the variety of methods employed to develop these estimates, and the range in sample sizes for specific technologies, we strongly recommend that users of these cost data read the documentation provided in this report thoroughly. In particular, it is critical to understand the various “defining fields” that are associated with each cost estimate. These fields are described in Section 3.2, Guide to the Recommended Cost Tables of this report. Other key sections include the discussion of methodologies in Chapter 2 and the discussion of sources and cost trend results in Chapter 3. Chapter 4 provides the measure cost tables.

Chapter 5 documents the methods employed to develop the residential energy and demand savings estimates and Chapter 6 presents the tables of savings estimates for single-family and multi-family homes.

⁴ We actually plan to pursue resolution of this issue through a separate study that is focused on evaluation the Statewide Lighting and Appliance programs; however, in principal, such qualitative research should be budgeted and planned for within the scope of the California measure cost studies.

Table 1-2
Guide to Sections and Appendices

- 1 Overview**
Introduction to the report.
 - 2 Cost Analysis Methods**
Data collection techniques and sources plus a summary of the methods used to develop recommended cost values.
 - 3 Cost Results**
Selected incremental measure cost trends, documentation of methods used for each technology type, and a guide to the Recommended Cost Tables in Section 4.
 - 4 Recommended Cost Tables**
Recommended values for the full and incremental measure costs.
 - 5 Residential Energy Savings Methods and Results**
Guide to the Residential Energy Savings tables presented in Section 6. The section also provides documentation on how the energy savings were developed.
 - 6 Residential Measure Energy Savings Tables**
Absolute and percentage savings estimates for the residential measures.
- A Sources**
List of Sources used for the Study.
- B Abbreviations and Acronyms**
List of terms.

2.1 INTRODUCTION

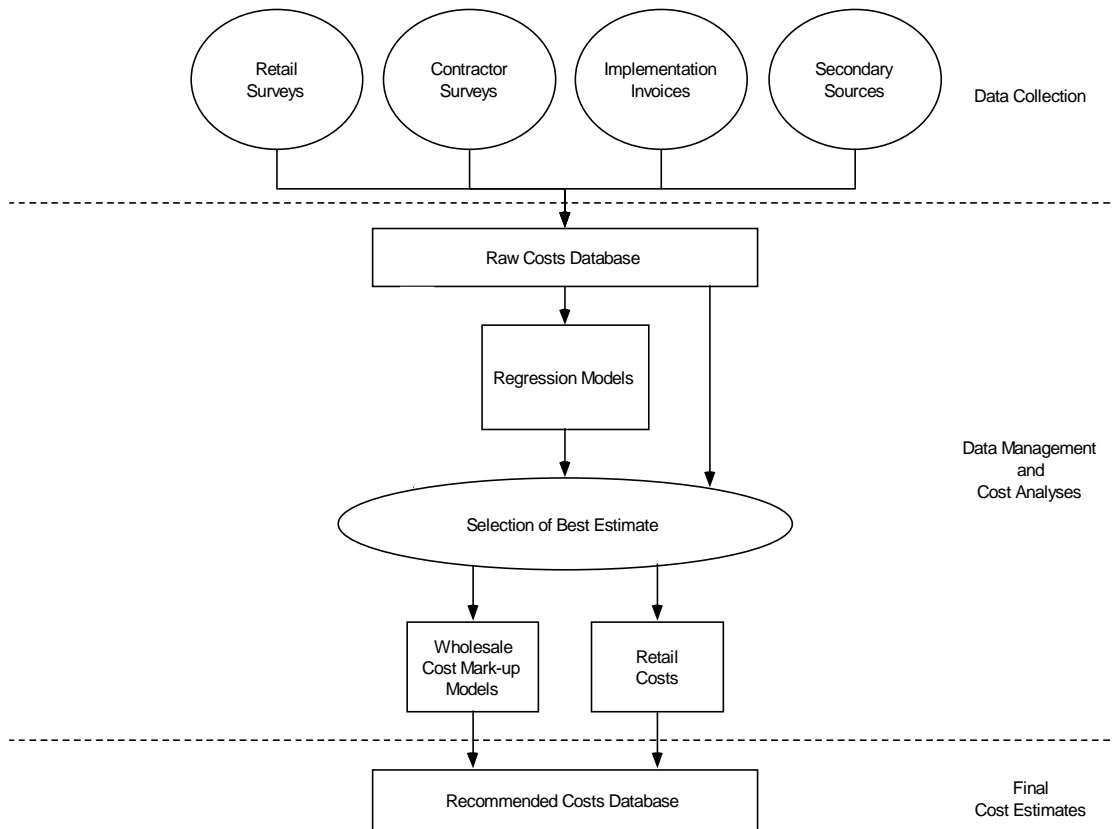
In this section we provide an overview of the methods used to collect and analyze the technology and measure cost information developed during the 2001 Database for Energy Efficient Resources Update Study (DEER). The methods employed are generally identical to those developed and utilized for the 1996 Measure Cost Study (MCS); however, the methodological discussion presented in the 1996 MCS report is repeated here for the benefit of those readers who may not have read that earlier report.

Data to support development of the measure costs provided in this report were collected from 318 sources. The sources included manufacturers, wholesale distributors, contractors, retail stores, websites, and utility program records. A total of 8,279 cost observations were collected. Costs were segmented based on a number of characteristics including distribution channel, volume, vintage, size, and efficiency.

The basic analytical flow of information, analyses, and results is shown conceptually in Figure 2-1. The process began with raw cost data collected from a variety of sources. These raw cost data were then entered into a database. Next, the raw cost observations were analyzed by technology and measure type using techniques ranging from simple averaging to more complex regression models. Because some of the data were collected at the wholesale level, end-user¹ costs for these measures were estimated by applying estimates of average contractor mark-up rates (see Table 2-2 later in this chapter). The final stage of the analysis involved selecting the best estimate for inclusion in the database of recommended values. Each of these key stages of the study is described in more detail in the remainder of this chapter.

¹ "End-user" market is used here to refer to prices paid by customers to either retail stores or contractors.

Figure 2-1
Developing the Recommended Costs from Raw Data



2.2 DATA COLLECTION METHODS

Because of the large number and variety of technologies and measures for which cost estimates were developed on this project, no single data collection strategy would have been sufficient by itself. Instead, different data collection strategies were developed to respond to the unique barriers to data collection associated with each type of technology or measure. Our resulting portfolio of sources consisted of:

- cost quotes from manufacturers;
- cost quotes from wholesale distributors;
- cost surveys of retailers;
- cost surveys of contractors;
- cost data in utility program files;
- costs obtained from implementation work performed by the contract team; and
- secondary sources and reports.

A mapping of data collection sources to technology types is provided in Table 2-1. Each of the source types is described in more detail in the subsections that follow.

Table 2-1
Summary of Data Sources Used

Sector/Measure Category	Cost Quote Surveys		Utility Data	Secondary Sources
	Manufacturer/Wholesale	Contractor/Retail		
Residential				
Central AC & Heat Pumps	✓	✓		
Furnace	✓	✓		
Room AC & Window Heat Pumps		✓		
Appliances		✓		
Water Heaters	✓	✓		
Evaporative Cooling Systems	✓	✓		
Window Upgrades	✓	✓		
Glazing Retrofit Film	✓	✓		
Shell Insulation	✓	✓		
Duct Repair		✓		✓
Sunscreens		✓		
Infiltration Reduction		✓		
Lighting	✓	✓		
Low Income Weatherization/Repair			✓	
Commercial and Industrial				
Lighting Controls	✓	✓		
HVAC Equipment	✓	✓		
HVAC Controls		✓		✓
HVAC Maintenance		✓		
Glazing Retrofit Film		✓		
Window Upgrade	✓	✓		
Refrigeration	✓	✓		
Lighting	✓	✓		
Variable Speed Drive		✓		

2.2.1 Retail Data Collection

Many of the base case and energy-efficient technologies within the scope of this study are normally purchased directly by end users from retail stores. In order to obtain prices for these products, surveys were implemented at 62 retail stores throughout the state in late 2000. The surveys were concentrated in the San Francisco Bay Area, Greater Los Angeles Area, and San Diego, with a few surveys in the Central Valley as well. Surveys were conducted at appliance,

hardware, and department stores, and included wholesale-type home improvement outlets. The technologies and measures included in the retail surveys are listed below:

- Refrigerators
- Clothes Washers
- Dish Washers
- Room Air Conditioners
- Water Heaters
- Compact Fluorescent Lamps
- Halogen Lamps
- Incandescent Lamps
- Whole-House Fans
- Other Measures (water heater wraps, pipe insulation, low-flow showerheads, furnace filters)

The retail data collected typically included manufacturer names, model numbers, energy cost and consumption (from DOE Appliance Labels), normal price, sale price, and a variety of other attributes unique to each technology.

Approximately 5,300 price observations were collected from the retail surveys.

2.2.2 Wholesale Data Collection

Many of the costs collected during this study and the 1996 MCS were obtained from wholesale distributors. There are two principal reasons for this. First, one of the objectives of the DEER project is to develop price estimates for both the wholesale and end-user markets for selected technologies. Understanding differences in wholesale and end-user prices is important for analyzing program delivery strategies that address different levels of the product distribution chain. Second, even in those cases in which the objective was to estimate end-user prices exclusively, we have found that obtaining wholesale-level prices combined with the application of retail/contractor mark-ups is a more cost-effective and, in most cases, more accurate method of estimating end-user prices. This is particularly true when the primary research objective is the estimation of the *incremental* costs of high-efficiency products above base case (typical) practice. This method is most effective for technologies that are typically purchased and installed for end-users by contractors.

There are several reasons why wholesalers provide more useful data for estimating incremental costs than direct contractor surveying. First, contractors generally are focused on providing cost bids only for specific jobs. Many contractors are small businesses that have little time for anyone who is not a prospective customer. For most, there are no incentives and only high costs

associated with participating in a research study. This is especially true in this study because the goal is to develop cost estimates for a large number of size and efficiency ranges. For example, in the case of residential central air conditioners, we collected prices for 5 sizes and 4 efficiency levels. Experience has proven that very few contractors are inclined to take the time necessary to provide price quotes for that many units unless a potential sale is at stake. In addition, in some markets, such as commercial HVAC, the contractors do not have in-house price lists from distributors. The contractors themselves often must obtain price quotes from distributors on a daily, as needed, basis.

Another approach is to use invoices from contractors for actual jobs. Although we have used this approach in isolated cases in this study, it has significant limitations. The main difficulty is that invoices of actual contractor prices embed all of the site-by-site variances in installation. The magnitude of the variance is usually much greater than the incremental cost of the high-efficiency technologies that are pertinent to the study, which makes isolation of those increments very difficult, if not impossible, in practice. Another limitation to this approach is that even in cases where contractors are required to itemize their costs according to some specification, they may choose to apply very rough prorations to their total invoices.

Wholesale equipment prices, on the other hand, generally provide smoother, more consistent data for analyzing incremental costs of high-efficiency equipment. In addition, the number of distributors is much smaller than the number of contractors. Thus, fewer sample points are needed to estimate wholesale prices than contractor-level prices.

One of the difficulties in obtaining wholesale prices, however, is that a distributor often has multiple price lists. These different lists are used to provide price quotes to different levels of preferred customers. The more business a contractor does with a particular wholesaler the lower the price the contractor will obtain. The price list that offers the most difficulty is the so-called “Suggested Retail Price List.” For many products, this price list significantly overstates the actual prices paid by end users. The key to collection and analysis of wholesale prices, therefore, is making sure that one clearly understands which price list has been obtained. Ascertaining whether the price list is “wholesale high volume,” “wholesale low volume,” or “retail list” is critical to developing meaningful average prices. Averaging retail list prices with true wholesale prices produces spurious results.

The technologies for which wholesale costs are most important in this study include:

- Commercial Lighting;
- Commercial HVAC Equipment;
- Commercial Refrigeration;
- Commercial and residential windows; and
- Residential HVAC Equipment.

2.2.3 Contractor Data Collection

It is very difficult in practice to obtain large numbers of price quotes by surveying contractors directly. Nonetheless, important information can be obtained from this level of the product distribution chain. In this study we chose to focus our contractor surveys on information that could be provided easily, with a minimal effort by contractors, but that would be useful to us in developing the final recommended values of installed costs. Through subcontractors who have special knowledge of the HVAC, refrigeration and lighting markets, we obtained hourly rates, average equipment markup percentages, and high volume discount percentages for contractors.

We used contractors to obtain quotes for evaporative cooling, furnaces, residential A/C, window films, and a few other measures to fill in the gaps where we were unable to obtain complete information from distributors or manufacturers. This strategy proved more successful in obtaining contractor participation than querying them directly for cost quotes for many combinations of size and efficiency ranges.

2.2.4 Cost Data from Utility Program Files and Databases

Another historically useful source of cost data for this project has been utility program records. In this year's study, this source proved particularly important for the low-income measures. PG&E and SCE were able to provide prices paid to and bid by contractors for virtually all of the measures implemented in their low income programs.

2.2.5 Secondary Sources

The final sources of cost data included in this study came from several secondary sources. These sources included cost guidebooks such as R.S. Means for labor-hour estimates used to develop installation costs and a few select reports and interviews with individuals who had information on measures for which it was difficult to obtain meaningful price estimates from other sources. No equipment costs were taken from Means or other generic industry cost sources.

2.3 DATA MANAGEMENT

The data management structure developed for this DEER study and the previous MCS has two distinct components. These components consist of the following two databases:

- **Raw Database:** Stores a record of each unique cost observation collected in its raw state (i.e., without any error checking)
- **Recommended Values Database:** Best point estimate of full and incremental costs based on regression models, summary database, and other analyses.

One of the challenges faced by this project involved developing a database structure that would allow us to track thousands of cost observations for hundreds of different technologies. Tracking cost data poses some unique difficulties in relation to tracking more traditional types of utility industry survey information. The variety of technologies available in the marketplace and the

fact that differences between technologies are not easily standardized make the cost data tracking issue challenging.

We have included all the price observations we collected in the database of raw entries. This database contains the costs themselves and descriptive characteristics such as vintage, volume, fuel type, and distribution channel. Four key fields define the organizing structure of the database: end use, technology category, technology type, and technology sub-type. Technology categories differentiate equipment, controls, maintenance, and shell measures. Technology types differentiate technologies within end uses and technology categories. For example, within Lighting-Equipment, the technology types are differentiated based on the different types of lighting systems available, e.g., fluorescent, incandescent, metal-halide, halogen, etc. Within each technology type are sub-types that require further categorization. For example, within fluorescent lighting there are ballasts, lamps, systems, and reflectors.

The database also contains attributes that are unique to a particular technology. For example, the database contains fields that track attributes only associated with window measures; i.e., frame type, number of panes, air fill, shading coefficient, u-value, and visible light transmittance. In addition to these tables, two other tables are used to organize information within the raw costs database. These include the database of company names, used to track the source that provided each cost observation, and an index of the complete hierarchy of measures used by the form to navigate through the various measures.

The Recommended Values Database has an identical structure to the Raw Costs Database, but also includes a report to display the measure cost information in organized tables. Chapter 4 of this report is a direct output of the Recommended Values Database report.

2.4 EXAMPLE OF COST MODELS

After all of the raw cost observations were collected, several types of analyses were conducted, depending on the technology, to develop our recommended estimates of full and incremental costs. In some cases, the averages provided the best possible estimates of the costs of base and high-efficiency technologies. In other cases, however, using the average cost would have led to significant errors because simple averages do not control for important differences between base case and high-efficiency technologies. In addition, where sample sizes were small, using the average price could result in significant bias from outliers. Another problem with comparing the average “base” technology price to the average “high-efficiency” technology price has to do with whether the sample of sources is identical for both cases. That is, if there is not a matched pair of costs for the base case and high-efficiency option from every source, the difference in the averages could be significantly biased due to differences in prices between the sources having nothing to do with efficiency.

To minimize the effects of such potential biases, we conducted individualized cost analyses for every technology in the study. Where large enough samples were available, regression models

were developed in which prices were predicted as a function of several technology attributes that often went beyond the typical size and efficiency parameters. In cases where such models could not be developed, we analyzed the raw data directly to determine if there were any significant biases in the average cost estimates. In these cases sometimes we excluded outliers or developed average incremental costs using only matched pairs of base case and high-efficiency technology costs that were obtained from the same sources. We refer to this method as “Weighted Average,” insofar as exclusion of outliers weights the data towards a value that we believe is more representative of the true incremental costs. In other cases, our examination simply confirmed that the straight average cost was unbiased and no further analyses were conducted. We refer to these cases as the “Unweighted Average” method. As discussed in Section 2.2.2, we used wholesale price observations as our primary data source for many technologies. For these technologies, we developed our best estimate of the wholesale price, and then applied a markup percentage to generate an estimate of the expected retail or contractor-level price. In summary, the methods used for the Recommended Values were categorized as follows:

- Regression Model
- Regression Plus Markup
- Unweighted Average
- Unweighted Average Plus Markup
- Weighted Average
- Weighted Average Plus Markup

The mark-up values used are shown in Table 2-2.

Table 2-2
Whole-to-Retail Markup Values

Sector	Markup Factor
Lighting – High Volume	1.2
Lighting – Low Volume	1.4
Commercial Refrigeration	1.1 to 1.35 (varies by measure)
All Other	1.3

In the remainder of this chapter, we present an example of one of the regression models developed as part of the 2001 DEER study, along with an explanation of how the results of such models are used to provide the final recommended values. The example case is for residential package air conditioners.

We began with the hypothesis that cost is correlated with both capacity and efficiency for packaged air conditioners. Since there is a cost associated with selling a unit of any size, we also postulated a constant in the regression formula. The generic form of the regression is:

$$\text{Eqn. 1} \quad \text{Cost} = C_1 + (\text{Size in tons}) \left(\begin{array}{l} C_4 \text{ if SEER} = 12.0 \\ C_2 + C_3 \text{ if no furnace} + C_5 \text{ if SEER} = 13.0 \\ C_6 \text{ if SEER} = 14.0 + \end{array} \right)$$

Using a spreadsheet multivariable linear regression tool, we obtained the regression results shown in Table 2-3. The coefficients can be mapped into equation 1 to yield a formula for obtaining costs for any size and efficiency unit within the range of raw data used in our study. Obviously costs for units with capacities larger than our largest units in the study or smaller than the smallest units in our study will not be well predicted by Equation 2. The regression covers all efficiency ranges. For units with seasonal energy efficiency ratings greater than 14, the C6 variable should be used. Costs will likely be underestimated for extremely high-efficiency units in the 16+ SEER range.

Table 2-3
Regression Results for Residential Packaged Air Conditioning Systems

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.877617382
R Square	0.77021227
Adjusted R Squ	0.759474526
Standard Error	255.1966689
Observations	113

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	23357017.05	4671403.411	71.7294286	1.40731E-32
Residual	107	6968411.358	65125.33979		
Total	112	30325428.41			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	741.10	97.76	8.03	1.37E-12	590.99	978.57
Size	282.74	27.28	8.34	2.74E-13	173.53	281.68
Eff12*Size	92.55	15.09	6.13	1.47E-08	62.64	122.47
Eff13*Size	121.66	17.81	6.83	5.35E-10	86.35	156.96
Abv14*Size	324.20	27.68	11.71	6.88E-21	269.33	379.07
NoFurnace*Siz	-208.30	37.02	-5.63	1.48E-07	-281.68	-134.92

$$\text{Eqn. 2} \quad \text{Cost} = \$741 + (\text{Size in tons}) \left(\begin{array}{l} \$92 \text{ if SEER} = 12.0 \\ \$282 - \$208 \text{ if no furnace} + \$122 \text{ if SEER} = 13.0 \\ \$324 \text{ if SEER} = 14.0 + \end{array} \right)$$

3.1 INTRODUCTION

In this section, we provide a description of the cost estimates and trend analyses developed for the 2001 DEER study. The key results are in the form of database tables presented in Chapter 4.

3.2 GUIDE TO RECOMMENDED COSTS

The tables of Recommended Values in Chapter 4 provide full and incremental cost estimates for each of the studied technologies by size, efficiency, vintage, and volume. More than 1,100 cost estimates are provided for 147 technology groups. All of the costs in the tables are in 2001 dollars. Information important to understanding the costs in Chapter 4 is shown at the top of each table, where the associated cost units, sector, size, efficiency, and other attributes are displayed. These tables also list the methods used to develop the recommended cost values for each subtype (e.g., regression model, wholesale plus markup), which are discussed in Section 2.

Note that there are fewer incremental than full-cost estimates for two reasons. First, because some of the items are retrofit-only measures, their costs only appear as full costs. Second, some of the costs in the tables are provided for components of installed systems. There may be no relevant “incremental costs” for such components. For example, costs for residential insulation are provided in two ways: material only and installed systems. Material-only costs are provided for fiberglass batts and rigid board. Installed costs, on the other hand, are provided for insulation *systems*, defined as ceiling insulation, wall insulation, and floor insulation and are further segmented by the type of insulation material used. This is because most insulation contractors price their jobs as fully loaded installed costs; material and labor are not usually broken out separately.

3.2.1 Using the Recommended Cost Tables

A number of descriptive fields provided for each of the costs in the Recommended Values Tables are quite important to the interpretation and proper use of these data. The key fields are listed below, summarized in Table 3-1, and then subsequently described in more detail in the remainder of this subsection.

Vintage and CostType. These two descriptors are discussed together because they are closely related. **CostType** indicates whether the cost shown for the item is a *base-case*, *high-efficiency*, or *incremental cost*. If the cost shown is a base-case or high-efficiency cost, then the data presented are full costs. If the cost is incremental, the base case system from which the increment is derived is shown in the “Base Description” field. Note that incremental costs are calculated simply by subtracting the labor, equipment, and installed costs of the base item from the high-efficiency item. Also note that the incremental costs provided in this report are for first

Table 3-1
Definition of Field Codes Used in Section 4

Field Name	Description and Definitions
Banner	The banner shown is used to summarize the grouping of the technologies presented. The sorting variables in the banner are as follows: <i>End Use Technology Category Technology Type Technology Sub-Type</i> .
Method	The general methodologies used to develop the Recommended Values are listed in this field. These methodologies are defined in Section 2 of this report.
CostUnit	The cost units of the values shown, e.g., \$/Unit, \$/SF, \$/Ton, \$/HP, etc.
No. Obs.	Number of raw cost observations available for analysis. This count of observations is done at the Technology Sub-Type level.
Sector	Commercial or Residential.
Channel	Distribution channels include: <ul style="list-style-type: none"> • Contractor • Retail • Wholesale (including manufacturers' reps)
Vintage	The vintage codes are defined as follows: <ul style="list-style-type: none"> • NEW = New only • RET = Retrofit only • ROB = Replace-on-Burnout only • All = All vintages • N/R = New and retrofit • N/B = New and Replace-on-burnout • B/R = Replace-on-Burnout and retrofit
CCIGNum	The most closely matching measure identification number from the California Conservation Inventory Group's previous studies of measure costs and savings (see XENERGY, 1992 and 1994; NEOS, 1994). If no matching number is available from these studies, the field is coded with a new value. The complete list of CCIG numbers is shown in the index to Chapter 4.
Base Description	Description of base technology. If "N/A", then item is a replacement technology.
Replacement Description	Description of replacement technology. If "N/A", then item is a base technology.
Volume	Volume levels associated with the cost estimates are defined as follows: <ul style="list-style-type: none"> • H = High volume • L = Low volume • T = List price
CostType	Indicates whether the cost shown for the item is a <i>base case</i> , <i>high-efficiency</i> , or <i>incremental cost</i> . If the cost shown is a base case or high-efficiency cost, then the data presented are full costs.
Labor Cost	Cost associated with labor to install technology or measure. Note cost units.
Equipment Cost	Cost associated with equipment portion of technology or measure. Note cost units.
Installed Cost	Installed cost of technology or measure including labor and equipment. Note cost units. Also note that costs are provided for some technologies and measures only in terms of installed costs. This is true generally in cases where the primary data was collected as installed costs from contractors.

costs only and *do not include differences in ongoing operations and maintenance (O&M) costs*. No estimation of ongoing O&M costs was made in this study.

The **Vintage** field indicates whether the cost estimate should be used in new, retrofit, or replace-on-burnout contexts. In general, the new and replace-on-burnout vintages are associated with incremental costs because a customer's analysis of efficiency alternatives is typically made when an equipment purchase must be made anyway. The decision in these cases is one of comparing a high-efficiency option with a standard or lower efficiency option (defined as the base case).

Note that labor costs are usually a wash in such cases; that is, there is often no incremental labor cost associated with installing the high-efficiency option.¹ Conversely, many other efficiency decisions are made on a retrofit basis. In these cases, costs for efficient measures are usually evaluated on a full-cost basis.²

It is particularly important to note the specific vintage associated with each lighting cost in the Recommended Values Table, since the same technologies can be used in several different vintage scenarios. Another important point to note is that, whenever possible, we have sought to provide as much information as possible, rather than limit the information presented on an a priori basis. As a result, full costs are sometimes presented in addition to incremental costs, even though the measures for which they are presented are normally implemented on a replace-on-burnout basis. This is the case, for example, with HVAC equipment. Our presentation of full costs (in addition to incremental costs) for these measures is purely informational; it is not meant to imply that full cost analysis is typical or appropriate for such measures.

Channel and Volume. **Channel** refers to the distribution channel upon which the cost estimate is based. In the Recommended Values Tables the principal channels are “contractor” for most commercial measures, and “retail” for many of the residential measures. The **Volume** field indicates whether the cost estimate is associated with high or low volume purchases (see methodology discussion in Chapter 2 of this report). Volume differentiation is developed for several technologies by applying different markup percentages to wholesale prices. In cases where both high- and low-volume cost estimates are provided for the same technology, these can also be considered proxies for the very real range in pricing that occurs in retail markets. Note, however, that the high and low volume costs are not meant to define the full range of prices customers might face (i.e., they are not minimums and maximums), but rather are intended to reflect the typical ranges. “High volume” is defined as the quantity of items that must be purchased to obtain a substantial discount from list prices. So for fluorescent lamps, this would be on the order of 1,000 or more.

CostUnit indicates the units in which the cost estimates are presented. It is important to check this variable as some costs are presented in standard engineering units such as \$/ton, \$/horsepower, \$/square foot, etc. Costs that have not been normalized are presented in \$/unit.

Number of Observations. The number of raw cost observations available for analysis is shown in this field. It is important to note that in the Recommended Values Table this count of observations is done at the Technology Sub-Type level. Technology Sub-Types are specific

¹ For example, the labor cost for installing a pre-assembled high-efficiency fluorescent fixture in a new office building costs no more than installing a standard-efficiency fixture. Similarly, most decisions to install high-efficiency HVAC equipment are made when a customer’s existing system has reached the end of its useful life; thus, the replace-on-burnout costs are calculated on an incremental basis.

² A common example of full-cost analysis occurs in early replacement (i.e., retrofit) of commercial lighting systems. Other examples include measures that are full cost by definition in that they are usually installed on top of existing energy-using equipment. Such measures are often control related (variable-speed drives) though not always (window films).

segmentations of more general Technology categories. For example, *Four-Foot Fluorescent Lighting* is a Technology Type that includes the following Technology Sub-Types: *Ballast*, *Lamps*, and *Reflectors*.

Method. The general methodologies used to develop the Recommended Values are listed in this field. These methodologies are defined in Section 2 and include regression, regression plus markup, weighted average, unweighted average, weighted average plus markup, and unweighted average plus markup.

A final issue that merits discussion regarding the recommended cost values is whether a particular item presented represents a system or a component. A component typically requires combination with other components to form a useful system. This issue pertains primarily to lighting technologies such as fluorescent lamp and ballast combinations. For example, T-8 lamps cannot be directly retrofitted in place of existing T-12 lamps if the existing ballast is retained; rather, these efficient lamps require a ballast conversion as well. As a result, efficient lighting costs are normally evaluated at a system level in which different lamp and ballast combinations are compared. A variety of such system combinations are provided in this study; in addition, we also provide lighting component costs for items such as fluorescent and HID lamps, ballast, and fixtures. Note that this information is provided for *informational* purposes and is not meant to represent that component-for-component changes are necessarily feasible or practical. *The users of this document should consult with appropriate lighting engineering staff to make determinations of the specific combinations that are appropriate for each organization's analyses.*

3.2.2 Items with Low Sample Sizes

Although extensive efforts were made in this study to collect as much primary data as possible, individual samples sizes were limited in some cases due to several factors.³ First, the fixed cost nature of this study requires prioritization of resources among the many technologies covered. Thus, some of the items have low sample sizes because they were lower priority items (e.g., timeclocks and commercial washing machines). Another class of technologies with low sample sizes is commercial HVAC equipment. Several commercial HVAC equipment types have low sample sizes because: 1) obtaining large numbers of quotes from contractors is difficult in practice; 2) there are a limited number of manufacturers of some types of high-efficiency equipment (e.g., commercial packaged units and chillers); and 3) there are few vendors with direct experience implementing some measures, particularly measures with low current market penetration. None of the measure costs presented in this study should be perceived as the final word on a particular measure's cost, particularly those with low sample sizes. The comprehensive data set presented here is meant as both a starting *and* comparative point for the many cost analyses needed by utilities and regulators in California. In most regulatory proceedings, utility staff with access to supplemental or superior data may use those sources in place of the data in this study.

³ Note that this has been true on all of the previous California Measure Cost Studies as well.

3.3 SELECTED COST TREND COMPARISONS

This section provides cost trend results for selected technologies and measures. Note that this section provides cost trends for only a subset of the technologies and measures for which costs have been developed. In addition to some of the aforementioned limitations associated with changes in methods, measures, and sources between the different studies, the inclusion of only a subset of measures in this cost trend comparison section is also a function of the scope and resources associated with the current study. As discussed below and elsewhere in this report, increasing the amount of cost trend analysis in the California measure cost studies requires either an increase in project budget or a refocusing of data collection efforts on fewer technologies and measures.

The statistical robustness of the comparisons of incremental costs is limited somewhat by the relatively small sample sizes available for many of the technologies. The primary objective of each of the California Measure Cost Studies, including the current DEER Update 2001 Study, has been to develop cost estimates for several hundred individual technologies. Cost trend analysis has been a secondary objective. These two objectives exist somewhat at odds because the primary objective demands extensive project breadth (i.e., many technologies are included), while the second objective requires technology-specific depth via larger sample sizes, analysis of market share, interviews with key market entities, etc.

Based on the cost comparisons made to date, it is not clear whether the overall costs of energy efficiency have changed significantly over the period of analysis. Meaningful trends, we believe, can only be analyzed on a technology-by-technology basis. For individual technologies, our estimates of some costs have dropped, while our estimates of others have remained relatively unchanged. The choice of which technologies to select was based primarily on the consistency of sources and analysis methods used across the multiple studies.

The remainder of this section discusses incremental cost changes for selected technologies. The incremental cost trends are presented for the following technologies:

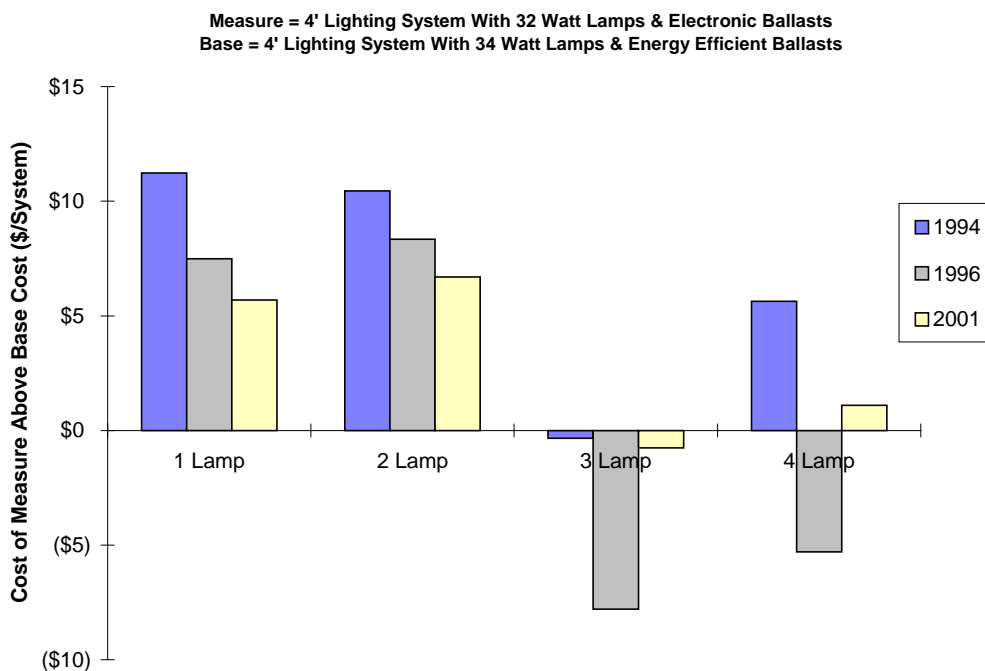
- Four-foot, four-lamp, fluorescent lighting systems including ballast, lighting occupancy sensors, and compact fluorescent lamps;
- Centrifugal water-cooled chillers, air-cooled split DX systems, and room air conditioners;
- New commercial windows and new residential windows;
- Residential insulation;
- Window film;
- Forty-gallon gas storage water heaters;
- Washing machines.

3.3.1 Lighting

Fluorescent Fixtures & Ballasts

Figure 3-1 shows the incremental cost between a system with T-8 lamps plus electronic ballasts and a base-case system with 34W T-12 lamps plus magnetic energy-efficient ballasts. This cost trend shows that the dramatic decrease in incremental costs for the T-8/EB system we identified in the 1996 Measure Cost Study have sustained. This decrease was one of the key market effects identified in the 1998 *Commercial Lighting Market Effects Study*.⁴

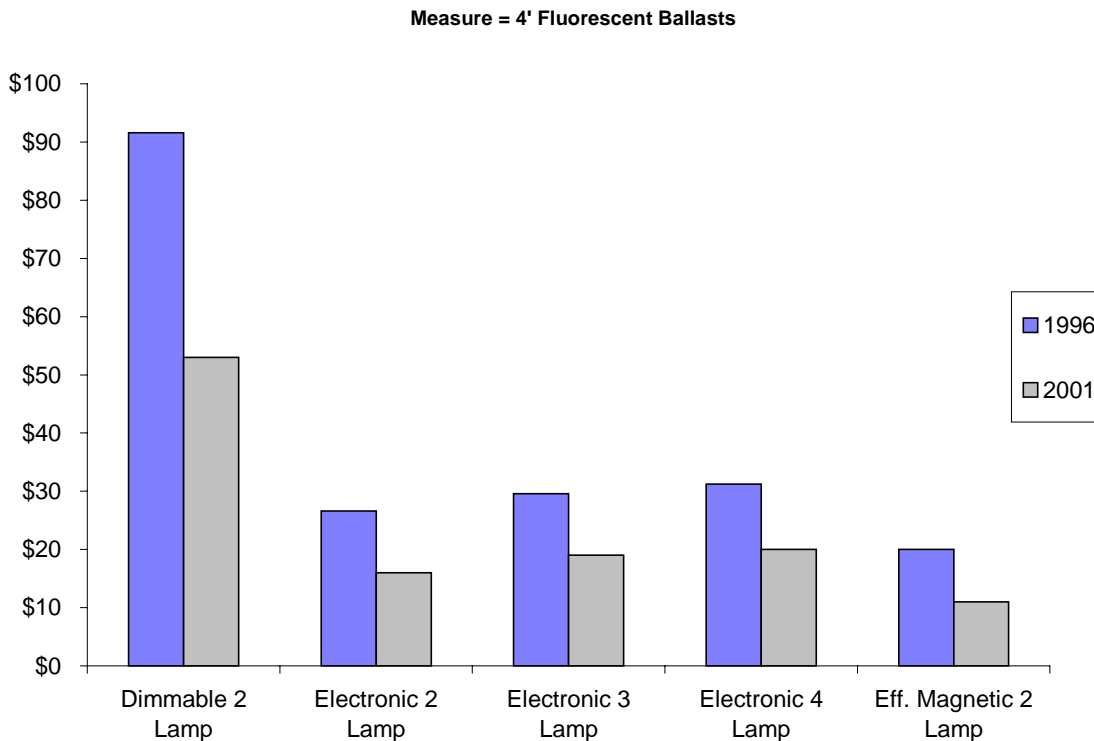
Figure 3-1
Incremental Costs for Fluorescent 4-Foot Fixtures, 1994 to 2001



Interestingly, both magnetic and electronic ballasts have continued to decrease in cost since the 1996 study (Figure 3-2). Magnetic ballasts (certainly a mature technology in 1996) decreased in absolute costs from \$20 to \$11 between 1996 and 2001. Two-lamp electronic ballasts dropped from \$27 in 1996 to \$16 in 2001, while 4-lamp electronic ballast costs dropped from \$31 to \$20. Dimmable ballasts decreased from \$92 in 1996 to \$53 in 2001. The magnetic ballast market appears to have responded to the dramatic decrease in electronic ballast costs that occurred in the mid-1990s with significant cuts in magnetic ballast prices, while the electronic ballast market appears to have responded in kind by continuing to decrease its prices.

⁴ XENERGY, Inc., 1998. *PG&E and SDG&E Commercial Lighting Market Effects Study*, prepared for Pacific Gas and Electric Company and San Diego Gas and Electric.

Figure 3-2
Full Costs for Fluorescent Four-Foot Ballasts, 1996 and 2001



In Figure 3-3, we show the change in estimated incremental costs for 4-foot, 4 lamp ballasts. The 3-lamp and 4-lamp high-efficiency system and ballast comparisons can have negative incremental costs because a single electronic ballast is able to drive 3 or 4 lamps, whereas 2 magnetic ballasts are needed for the same function. Just as with the complete fixtures described above, this cost trend shows that the dramatic decrease in incremental costs for T-8/EB systems that we identified in the 1996 Measure Cost Study have sustained.

The reason that the incremental costs for the 3-lamp and 4-lamp systems increased between 1996 and 2001 is that the large drop in magnetic ballast prices has a two-fold effect in the base system costs (e.g., the combined price of two 2-lamp magnetic ballasts dropped \$18 as compared to the \$11 drop in the single, 4-lamp electronic ballast price).

Linear Fluorescent Lamps

Four-foot fluorescent lamps followed the trend of fixtures and ballasts, as illustrated in Figure 3-4. Both base-case and high-efficiency tubes appear to have decreased in price between 1996 and 2000. Fluorescent T-12 lamps in 1996 cost \$2.19 and are now priced at \$1.10. Similarly, T-8 lamps decreased from \$3.04 in 1996 to \$2.10 in 2001. It appears that T-8 competition to the base-case market product may have led to a decrease in T-12 lamp prices.

Figure 3-3
Incremental Costs for Fluorescent 4-Foot Ballasts, 1994 to 2001

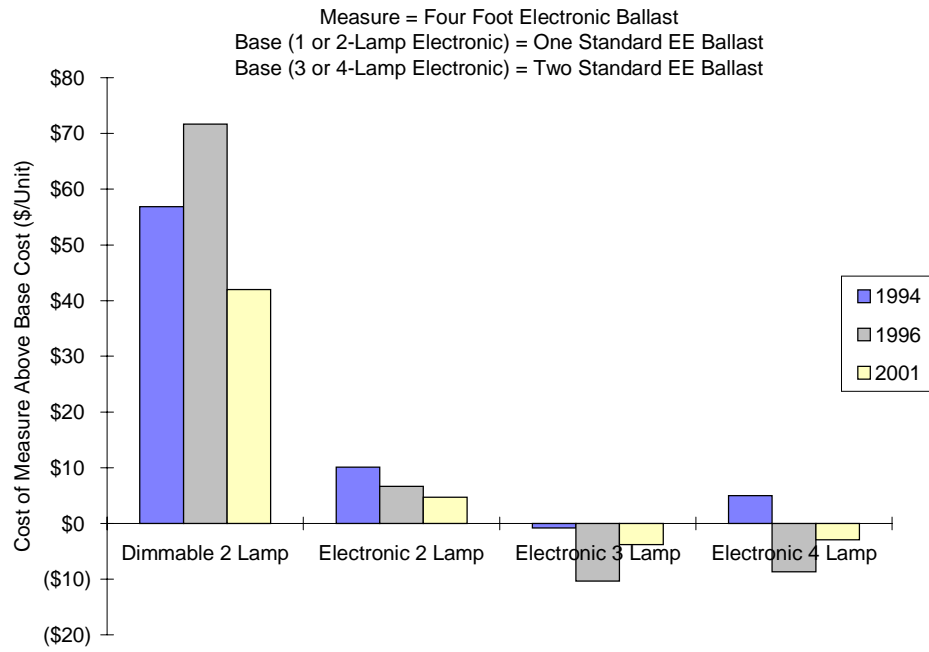
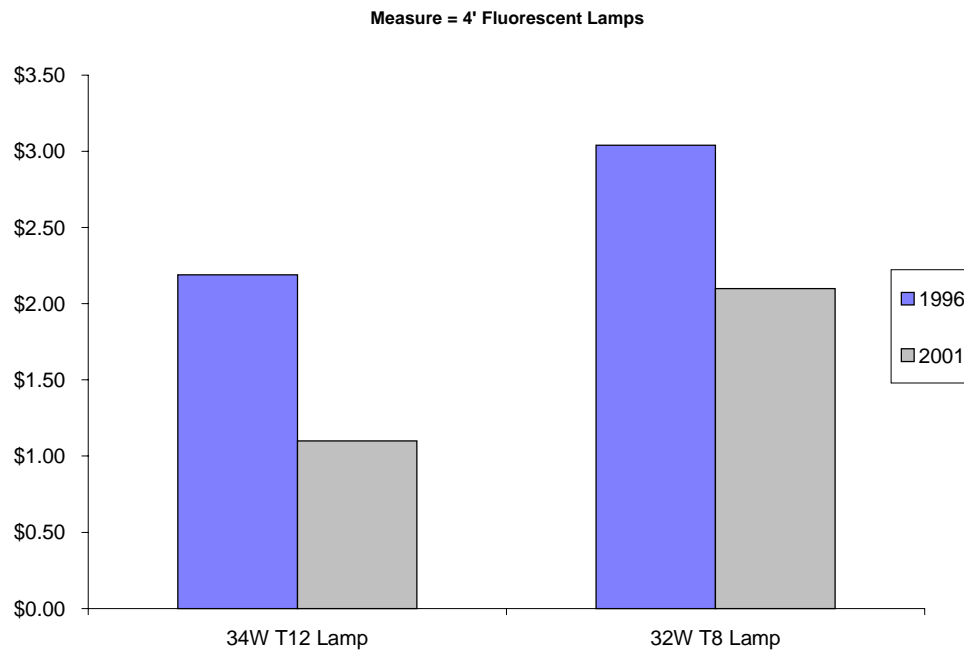


Figure 3-4
Full Costs for Fluorescent 4-Foot Lamps, 1996 and 2001

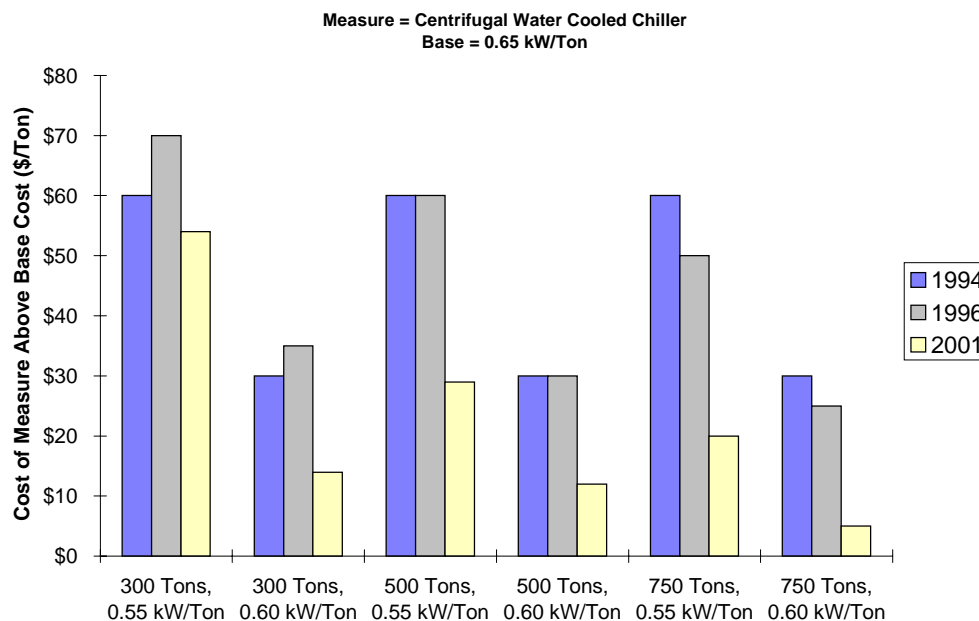


3.3.2 Heating & Cooling

Water-Cooled Centrifugal Chillers

The estimated incremental costs for water-cooled centrifugal chillers are shown in Figure 3-5. The figure compares incremental costs between the 1994, 1996 and 2001 studies across size and efficiency ranges. The data indicate that the incremental costs for moderately efficient, water-cooled, centrifugal chillers (i.e., 0.60 kW/ton units) have dropped significantly in the past 5 years, compared with base-case chillers (i.e., 0.65 kW/ton units). This drop may reflect the fact that 0.65 kW/ton units are not a stable base case, that is, the market for chillers has moved more and more toward the moderate and higher efficiency units.⁵ Incremental costs for the higher efficiency 0.55 kW/ton units appear to have decreased as well, though more for the larger than smaller units. Although interesting, we must advise caution in reviewing these data—the chiller market is dominated by only three to five manufacturers. Cost quotes were obtained in this study, as in the previous measure cost studies, from three. To fully assess whether incremental costs have decreased in this market would require more in-depth analysis, including qualitative interviews with manufacturers, distributors, and contractors.

Figure 3-5
Incremental Costs for Water-Cooled, Centrifugal Chillers, 1994 to 2001

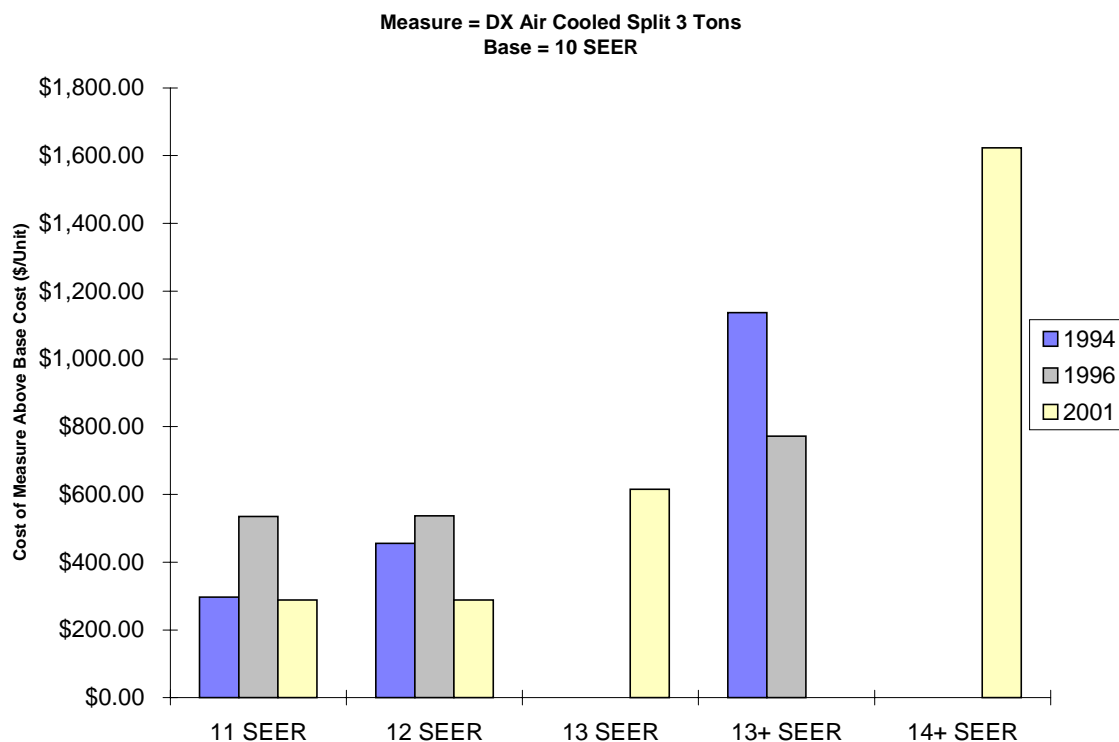


⁵ More information on the trend toward high-efficiency chillers and their relative market share should be available from the Statewide Nonresidential Market Share Tracking Study. This study is being managed by the California Energy Commission and is currently in progress.

Residential Central Air Conditioners

In Figure 3-6, we present changes in incremental costs for residential central air conditioners. The incremental costs for each year were calculated using regression models. For 2001 results, the costs for 11 SEER and 12 SEER units are shown to be equal. This is because, statistically, there was no observed difference in price between the two efficiency levels in our data set (we had many more 12 SEER than 11 SEER units in our data set). In addition, note that in the previous 1994 and 1996 studies, the cost of 13 SEER units was not broken out from the cost of 14 SEER and above units. The current study makes this distinction. Based on these considerations, the best category for longitudinal comparison is the 12 SEER unit. The incremental cost for this efficiency level has dropped as compared with the 1996 results.

Figure 3-6
Incremental Costs for 3-ton Residential AC, 1992 to 2001



Residential Room Air Conditioners

Room air conditioners have increased in cost since the 1996 study by about 4 percent per year, meaning that the actual costs have remained flat after adjusting for inflation. For example, a standard-efficiency 9.0 EER 12-kBtuh unit in 1996 cost \$463, and in 2001, the same unit cost \$582. Prices on high-efficiency units also increased, from \$499 for a 10.0 EER unit in 1996 to \$614 for the same unit in 2001. Newer technology, however, has increased the efficiency of

current room AC units. In this 2001 study, we are able to report costs on units at 10.5 EER (\$712) and we have added a category for 11.0 EER and up (\$987). Those two efficiency levels were not found during research for the 1996 study.

3.3.3 Building Shell

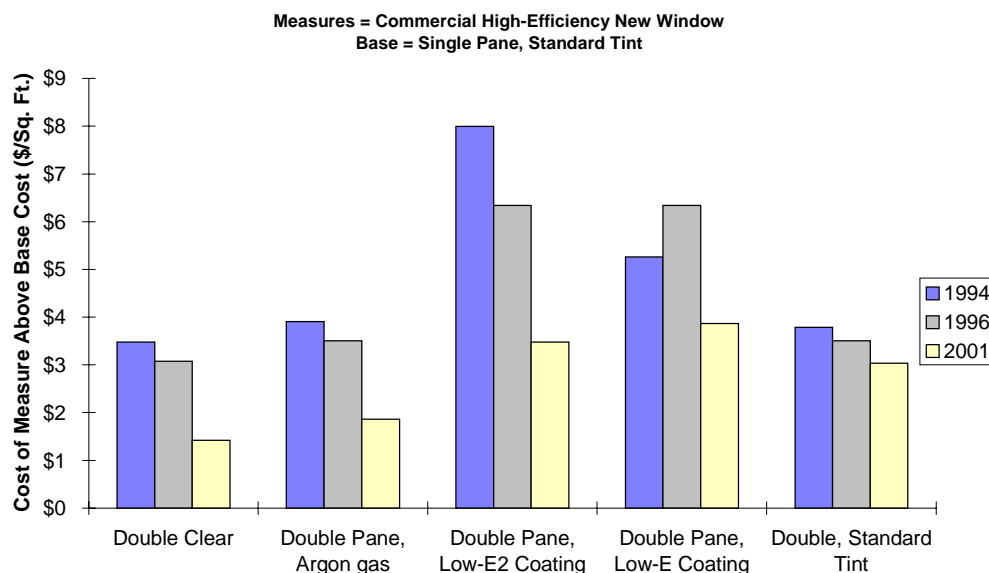
Commercial and Residential Windows

Incremental cost trends for efficient window upgrades are presented in Figures 3-7 and 3-8 for commercial and residential windows, respectively. Window costs were developed by collecting costs for a wide variety of windows and closely tracking their key attributes, such as frame type, air fill, number of panes, shading coefficient, u-value, and visible light transmittance. A shading coefficient was used because the more useful solar heat gain coefficient is not available for isolated window components (e.g., glass alone).

Because of the number and variety of possible combinations, cost models were developed. The cost models effectively smooth out inconsistencies in the average costs that are attributable to the fact that different sources provided costs for different windows.

High-volume costs for commercial windows were developed using estimates based on site-built construction, where window assemblies are constructed at the job site. In contrast, costs for the residential windows were developed based on finished product delivered and installed.

Figure 3-7
Incremental Costs for Commercial High-Efficiency Windows, 1994 to 2001



The availability and costs of low-E window coatings have changed since the 1996 Measure Cost Study. Winter low-E windows are increasingly difficult to get in California and the summer low-E² windows are increasingly common. The cost of low-E² windows has dropped considerably in the past 5 years, and, since the bulk of our data collection period ended, we have evidence that prices have dropped even further. During the data collection period of this study, the incremental cost of low-E² coatings was found to be \$2.22 per square foot above the cost of clear windows for homes. Since our data collection period ended, however, we have obtained two quotes for actual residential retrofits that show less than \$1.10 per square foot incremental cost, and a representative of a major manufacturing firm said that the incremental cost for low-E² will continue to drop in the next couple of years.

The most important trends in residential window costs are the standard use of vinyl frames rather than metal and the increasing use and decline in cost for summer low-E² windows. Vinyl frames have taken over as the standard from metal frames and the incremental cost between the two is now minimal. Low-E² is now widely available for the California residential market and, as noted above, the price of the product appears to be decreasing. Changes to California's Title 24 energy code that went into effect June 1, 2001 effectively requires low-E² windows in 11 of the 16 standard climate zones.

We also found that argon-filled windows for residential applications were decreasing in popularity; therefore, we were unable to obtain many price points compared to other window technologies (we gathered 19 price quotes for low-E² window assemblies and only 5 for argon fill). A couple of contacts mentioned that they did not recommend argon-filled windows because there was no guarantee that the gas was actually in the window or that it would remain inside the panes for the life of the product. Our incremental costs for the argon-filled windows, consequentially, have greater potential error than those for low-E² or for vinyl frames. Costs were not collected for low-E² windows in the previous Measure Cost studies.

Residential Insulation

Residential insulation prices have increased somewhat over the past 5 years. However, after adjusting for inflation we do not believe there is a meaningful difference between the 1996 and current cost estimates. Figure 3-9 compares costs for the most common insulation materials: R-13 batts (wall), R-19 batts (floor), R-30 batts (ceiling), and blown-in R-38 ceiling insulation. These prices are for installed insulation, low volume, and new construction.

Window Film

Costs for standard window film did not substantially change from 1996 to 2001. We found that the prices for small commercial projects were comparable to residential projects. Standard window film costs approximately \$3.30 per square foot installed for small commercial and residential jobs. For large commercial jobs, the price drops slightly to \$3.04. In 1996, those numbers were \$3.45 and \$2.94, respectively.

Figure 3-8
Incremental Costs for Residential High-Efficiency Windows, 1994 to 2001

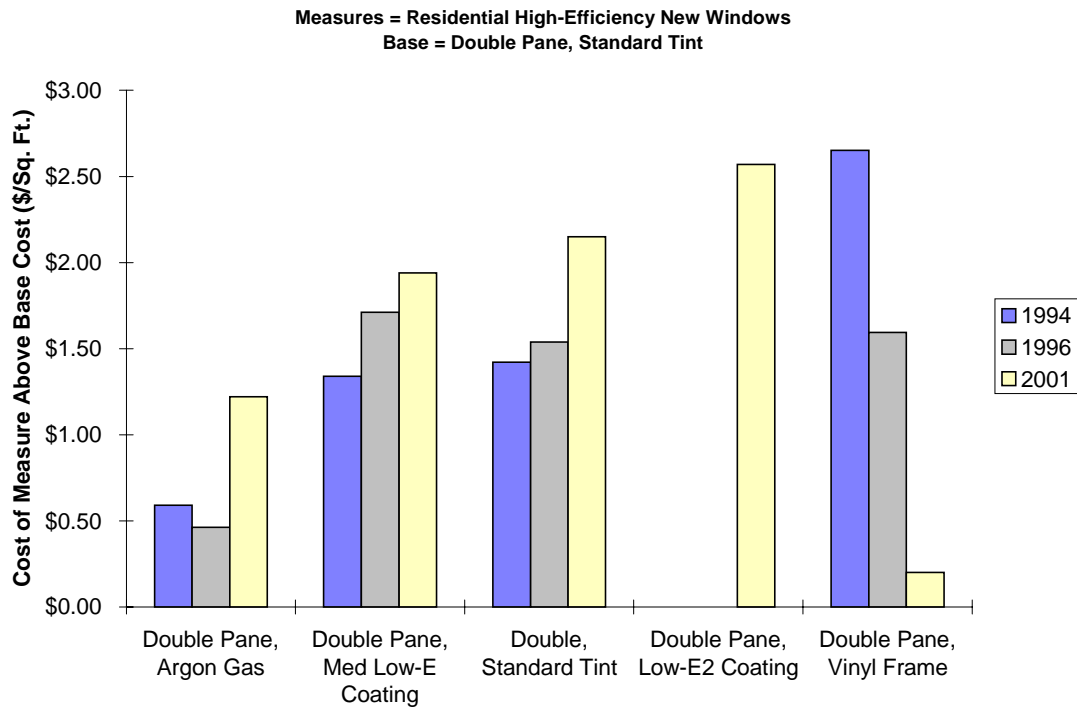
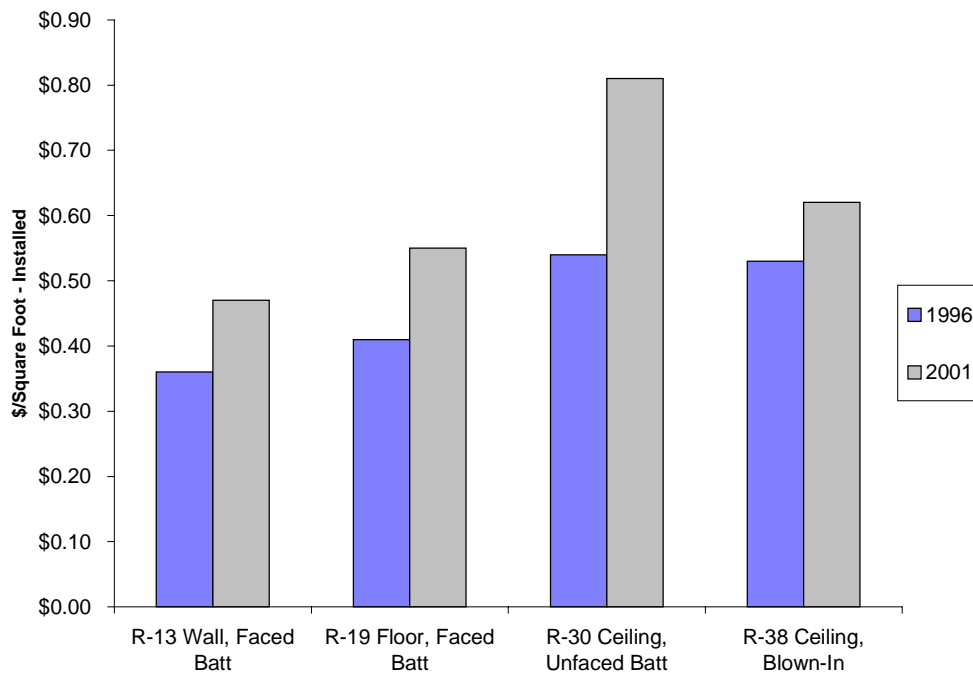


Figure 3-9
Installed Residential Insulation Costs, 1996 and 2001



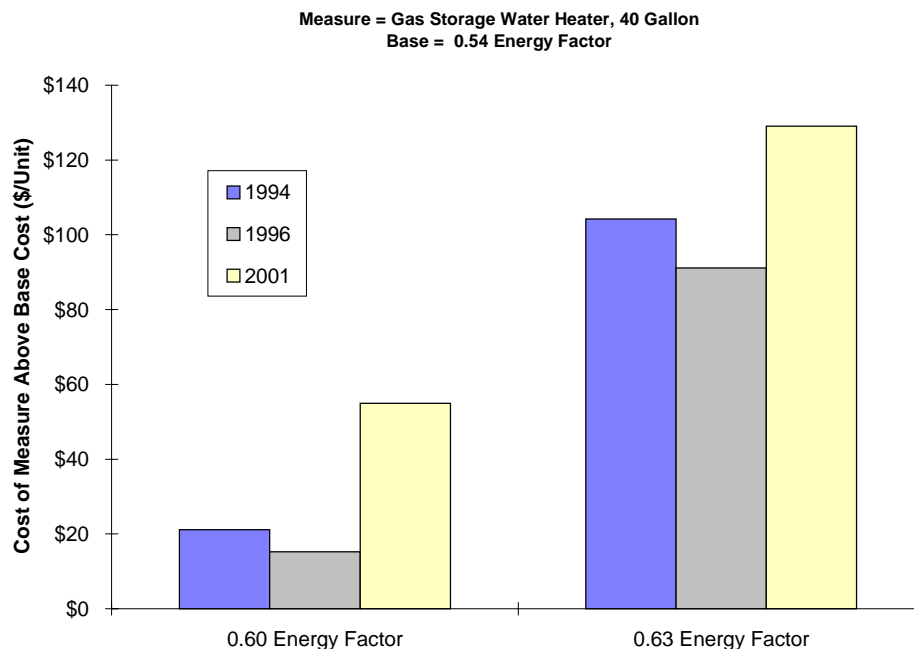
More advanced window films are available but remain expensive. Films that mimic the low- E^2 coatings on glass, referred to as “spectrally-selective,” cost approximately \$11.00 per square foot for residential applications. Films with high-performance tints that have similar thermal performance to low- E^2 coatings but are tinted rather than clear cost about \$6.00 per square foot.

3.3.4 Appliances

Residential Water Heaters

In Figure 3-10, we present incremental cost trends for domestic hot water (DHW) heaters. The 1996 and 2001 estimates were developed using the same regression equation. The data sources included wholesale, contractor, and retail prices. Estimated incremental costs of high-efficiency water heaters increased for both efficiency levels captured in the model, but the differences between 1996 costs and 2001 costs are within the statistical margin of error. In addition, the data we collected from wholesalers and contractors in the current study were somewhat contradictory. *Wholesale-level prices showed virtually no incremental costs for the 0.60 energy factor units,* while prices obtained through contractor quotes showed incremental costs of \$50 to \$100 per unit. As it turns out, the estimated incremental costs from the retail surveys fell between these two extremes. We used the retail estimates as the basis for our 2001 recommended values shown in Figure 3-10 and in the Recommended Cost Tables.

Figure 3-10
Incremental Costs for High-Efficiency Domestic Hot Water Heaters, 1994 to 2001



Washing Machines

Residential-size horizontal-axis clothes washing machines cost \$374 more than the less-efficient standard vertical-axis units. The estimated incremental cost presented in the 1996 Measure Cost Study was \$454. Thus, the cost of horizontal axis units has decreased by almost 20 percent. In addition to the drop in incremental cost, there are many more models of horizontal axis machines on the market today than in 1996.

3.3.5 Residential Refrigerators

Compared to the 1993 federal standards, the incremental costs for high-efficiency residential refrigerators are significantly higher this year than in 1996. We have identified two explanations for the increase; however, it should be noted that we are not convinced the costs presented in the Recommended Values Tables should be used in retrospective program cost-effectiveness analyses. The two reasons are that several retailers left the appliance business in 2000, and we suspect that prices for standard-efficiency units may have been reduced by manufacturers and retailers in late 2000 (during out data collection) to clear inventory of lower-efficiency equipment that will not meet the new federal 2001 refrigerator standards. In fact, the costs of the base case units (i.e., those that just meet the 1993 standards) are lower in the current study than in the 1996 Measure Cost Study, whereas the costs for the high-efficiency units are similar. This results in a higher incremental cost between the base and high-efficiency equipment.

If the dumping hypothesis is correct and the prices in the Recommended Values Tables accurately reflect the market in late 2000, it may still be true that the incremental costs cited are not ideal for use in retrospective program cost-effectiveness analyses for the simple reason that the change in market conditions is unlikely to have been representative of the period from 1996 to 2000. Because of this concern, we encourage the users of these data to view the reported costs as a snapshot in time that may very well be during a short-term change in the market. Note also that the new federal standards will move the consumption of new units to roughly 30 percent below that required under the previous (1993) standards. Neither the current nor previous measure cost studies have adequate data to estimate incremental costs for units that significantly exceed the new 2001 standards.

3.4 DOCUMENTATION OF RECOMMENDED COSTS

In this section, we discuss the sources and types of data used to develop the Recommended Cost Values presented in Section 4.

3.4.1 Clothes Dryers – Moisture Sensor

Retail surveys resulted in cost observations for over 503 clothes dryers. Simple averaging was used to calculate recommended values for horizontal and vertical axis units with and without moisture sensors. The incremental costs are significantly higher for the gas as compared to the electric units. Further investigation of this difference may be warranted (for example, it may reflect bundling of other features).

3.4.2 Clothes Washers – Vertical and Horizontal Axis

Commercial (Coin-Operated) Clothes Washers

Cost data were collected for a sample of 16 clothes washers from 13 sources. Information was collected on the price, the manufacturer or brand name, model number, washer type (horizontal or vertical axis), number of speeds, and capacity (in either cubic feet or pounds). Of the 16 observations, 5 were horizontal axis units. All units had drop or slide coin slots (no electronic card systems). All of the vertical axis units were from American companies, while two of the five horizontal units were European in origin, though available in the United States. Average costs were calculated separately for vertical and horizontal units.

Residential Clothes Washers

Retail surveys netted cost observations for over 1,000 clothes washers. Of these, 49 were vertical axis *EnergyStar* clothes washers, and 140 were horizontal axis *EnergyStar* certified. Information was gathered on the current selling price, regular retail price, manufacturer name, model number, washer type (horizontal or vertical axis), color, volume (cubic feet), and number of speeds. In addition, EnergyGuide label information was gathered wherever it was available. This information included the approximate energy cost per year and the \$/kWh rate used to determine that cost. Also collected in the surveys were details on the types and availability of rebates. Simple averaging was used to calculate recommended values for horizontal and vertical axis units.

3.4.3 Dishwashers

Retail surveys collected prices on over 1,100 dishwashers. Of that sample, roughly 20 percent (230) of the units were EnergyStar qualified. Information was gathered on the current selling price, regular retail price, manufacturer name, model number, features of the unit, and color. In addition, EnergyGuide label information was gathered. This information included the approximate energy cost per year, and the \$/kWh rate used to determine that cost. Also collected in the surveys were details on types and availability of rebates. For those models that were EnergyStar labeled, surveyors included whether the label was from the store or from the manufacturer. A simple average was used to calculate recommended values.

3.4.4 Domestic Hot Water Equipment

Storage Water Heater-Standard

Cost data were collected for a sample of 167 gas and 50 electric water heaters through retail surveys, and a further 275 cost points were collected from wholesale and contractor channels. Data gathered included the current and regular retail price, manufacturer name, model number, capacity (in gallons), energy factor, and input capacity. From the EnergyGuide label, data on annual energy costs were gathered (for both gas and electric). This included annual energy use (therms and kWh) and, whenever available, the assumed costs per therm or kWh. The first-hour

rating (delivery efficiency) was also recorded when available. Because of concerns about the reliability in the wholesale data, we decided to heavily weight the results to the retail data.

3.4.5 Domestic Hot Water – Hot Water Saver

Faucet Aerators

Costs were gathered from retail surveys for prices on faucet aerators. The estimated cost for a basic faucet aerator is based on 178 price points and calculated from a simple average.

Low-Flow Showerhead

There is a wide variety of types of showerheads that meet the water-saving standards of 2.5 gpm, so it was necessary to break up the units into price categories and by features. Three types of low-flow showerheads were priced for this study: basic low-flow under \$15, low-flow above \$15, and massaging low-flow showerheads. We obtained 263 price points for low-flow showerheads. These included basic models under \$15, showerheads over \$15, and prices on the massaging units. Simple averaging was used to develop the estimates provided in the Recommended Values Tables.

Water Heater Pipe Wrap

Prices were collected for water heater pipe wrap from surveys of hardware and home improvement stores. Twenty-nine retail prices were obtained. The recommended price shown in Chapter 4 is for pipe wrap less than or equal to 2 inches thick with an R-value of 6.0. A simple average was used to create the recommended values.

Water Heater Tank Insulation

Two types of water heater insulation blankets were available at the surveyed hardware and home improvement stores that were R-6.7 and R-10. Retail surveys collected 26 and 25 price points for the blankets, respectively. Simple averages were used to calculate recommended values.

3.4.6 Heating, Venting and Air Conditioning Controls

CO₂ Sensors

Thirteen cost quotes were obtained for CO₂ sensors. Most of these were from two retail sources, and one was from an ASHRAE article quoting wholesale costs. The labor cost for this measure was derived by escalating the 1996 labor cost.

Energy Management System (EMS)

Cost quotes for this measure were originally developed for two prototypical applications (100-point and 500-point systems) in the 1996 Study. Our current price data, however, show no \$/point cost distinction between the sizes when generic price quotes are requested (in practice,

EMS costs can vary significantly from site to site). The recommended price is an average from three distributor price quotes.

Thermostats-Programmable

Costs were obtained for 213 thermostats from over 30 hardware and home improvement stores. Products priced included both digital and mechanical thermostats (188 digital, 25 mechanical). Simple averages were used for the values in the Recommended Values Tables.

Timeclocks

Costs were collected for digital and electromechanical timeclocks having periods of 24 hours or 7 days. The recommended costs are based on simple averages of 40 price points from 9 sources.

3.4.7 Heating, Ventilation, and Air Conditioning Equipment

Chillers-Absorption

Cost quotes were obtained for one- and two-stage chillers ranging in size from 150 to 300 tons. These costs were gathered from four of the major chiller manufacturers that dominate this market. All incremental costs are from matched pairs in which costs were provided for both standard- and high-efficiency units.

Chillers-Centrifugal

Cost quotes were obtained for water-cooled centrifugal chillers of 300, 500 and 750 tons. These costs were obtained from distributors representing three of the principal manufacturers that dominate this market. All of the cost quotes used to create the recommended values are matched pairs of standard and high-efficiency units from the same manufacturer. The incremental cost of the high-efficiency chiller is calculated by averaging the incremental costs for each of the manufacturers.

Cooling Tower

Costs were obtained for three types of improvements in cooling tower efficiency: decreasing from a 12 to 6 °F approach temperature, using two-speed motors, and incorporating variable-speed fan control. The approach temperature reduction, two-speed and variable speed fan controller cooling tower costs were obtained from three large vendors in this market. These estimates were all matched pairs that included costs for both the 12 and 6°F scenarios.

DX Air Conditioners-Air Cooled, <65,000 Btuh

The primary data for this technology consist of the costs collected from our surveys of wholesale HVAC distributors. From these surveys we collected costs for 225 central air conditioners – 109 split-system air conditioners and 116 package units. These split and packaged systems are generally used in residential applications, although commercial applications occur as well.

Split Units

A regression model was developed in which price was predicted as a function of capacity and efficiency. We found distinct price differences for incremental SEER levels of 12, 13 and 14 and up. The 11 SEER level was excluded from the Recommended Values Table for lack of robust data. Most distributors reported that SEER levels usually step up from 10 to 12.

Commercial Packaged AC and HP Units + Packaged AC w/ Furnace

A model was developed using matched pairs in which price was predicted as a function of capacity, efficiency and whether or not the unit includes a furnace.

Evaporative Systems-Direct (DEC)

Direct evaporative system costs were developed for commercial applications and ranged from 2,000 CFM to 21,000 CFM. Cost points from five vendors were used to create a model for DEC units that predicts price as a function of CFM.

Evaporative Systems-Indirect (IEC) and Indirect/Direct (IDEC)

Indirect evaporative system prices were gathered from two vendors. Indirect/direct units are an emerging technology and are made by only a few companies. Therefore, obtaining prices on these units was difficult. Equipment prices were limited to one vendor. This vendor supplied us with three sizes, however, and we used matched pairs to extrapolate for other size ranges. Twenty-two quotes for direct evaporative systems were weighted proportionately across the IEC and IDEC technologies to obtain levelized cost estimates across the 2 technologies. Enough cost points were obtained to use simple averages for the direct evaporative units. For the IDEC and IEC units, averages were weighted toward the estimates we judged to be most representative.

Evaporative Pre-Coolers and Refrigerant Sub-cooling

Costs collected for direct evaporative pre-coolers and sub-coolers appeared high and were inconsistent when compared with a key secondary source. Pre-cooler costs collected for this study ranged from \$1,800 for a 2-ton unit to \$5,000 for a 7.5-ton unit. Sub-cooler costs collected were \$6,400 for a 10-ton unit up to \$7,400 for a 30-ton unit. These costs are higher than has been estimated elsewhere. For example, a study for the CEC (CEC, 1999) estimated the cost of an evaporative pre-cooler for a 7.5-ton air conditioner at \$1,200. In addition, cost estimates for these measures were lower in the 1994 Measure Cost Study. As a result of this uncertainty, we have not reported costs for these measures in the recommended values tables. We recommend further study of the costs of these measures.

Furnaces <225,000 Btuh

Costs were collected for 62 furnaces, primarily from wholesale distributors. A regression model was developed in which price was predicted as a function of input capacity, AFUE, channel, and volume. We found the break point between very-high-efficiency condensing furnaces and super-

high-efficiency pulse combustion furnaces occurred at 92 percent AFUE. This model explained 88 percent of the observed price variation. The regression equation was used to predict the prices presented in the Recommended Values Tables. Current estimates are very similar to the values estimated in the 1996 Measure Cost Study, indicating no strong evidence for the hypothesis that prices have changed significantly.

Heat Pumps-Air Cooled, <65,000 Btuh-1 Phase

Costs were collected for 51 central heat pumps less than or equal to 5 tons, primarily from distributors. A regression model was developed in which price was predicted as a function of tons, EER level, type (package versus split), and for vendor. Prices supplied by one of the vendors were consistently lower than other vendors throughout many HVAC technologies, so we isolated them as a variable for our equation. We then estimated their market share (10 percent) and applied performed a weighted average with their average cost weighted to 10 percent and the average cost for the remaining market weighted to 90 percent. The regression equation was used to predict the prices presented in the Recommended Values Tables.

Oversized Water-Cooled Evaporative Condensers

No costs are reported for this measure. Additional research is recommended.

Room and Terminal Units, Room AC and Heat Pumps

Cost data were collected for a sample of 148 room air conditioners, room heat pumps, packaged terminal air conditioners, and packaged terminal heat pumps. Prices were primarily gathered from retail sources, although some distributors carried these units as well. Information was collected on the price, the manufacturer or brand name, model number, type (AC, HP, PTAC or PTHP), cooling capacity, heating capacity, and cooling. A regression model was developed in which EER, cooling capacity and type (HP or AC) were found to be explanatory variables for price. This model explained 77 percent of the observed price variation. The first 0.5 EER level of efficiency above base case was not found to have a significantly different price from the base-case EER level. Therefore, the high-efficiency incremental costs began at 1 full EER above standard.

Whole House Fans

Retail surveys were used to collect price data for whole house fans. Sizes ranged from 3,000 to 6,200 cubic feet per minute and were supported by 72 price quotes. Simple averages were used to produce the values in the Recommended Values Tables.

3.4.8 Heating, Ventilation, and Air Conditioning Maintenance

Basic and Advanced HVAC Diagnostic

Nine contractors provided price quotes for the basic and advanced diagnostic measures. All of these contractors were participants in the Residential Contractor Program. High-volume quotes

were for services performed on more than 100 systems. The Basic Diagnostic measure involves testing and repairing the air conditioning and heating systems. Specifically, the refrigerant charge on the air conditioner is checked and refrigerant is added if needed, the fans are checked for blockage, and the filters are changed if needed. The Advanced Diagnostic Testing and Repair measure is the same as the Basic Diagnostic measure, with the addition of duct repair. The assumed leakage value for the base-case duct system is 20 percent, and 6-percent leakage is assumed for the repaired system.

Duct Repair and Testing

Seven firms provided cost information for these measures. Cost estimates in the Recommended Values Tables are based on an average of these sources. Like the advanced HVAC Diagnostic measure, Duct Repair and Testing uses 20-percent leakage for the base-case system and 6 percent for the repaired system.

Furnace Filters

Retail surveys were used to collect prices on both the electrostatic and basic (pleated) furnace filters. Surveys collected 240 price points for electrostatic and basic (non-electrostatic) furnace filters; of both disposable and permanent types. A simple average of the price points resulted in the estimated costs provided in the Recommended Values Tables.

3.4.9 Heating, Ventilation, and Air Conditioning Shell Measures

Insulation

A total of 288 insulation-related residential cost quotes were collected. No costs were collected for commercial insulation in this study. Costs were organized and analyzed to produce recommended values for the following categories:

- Material only;
- Installed ceiling;
- Installed floor; and
- Installed wall.

Recommended values were developed for both retrofit and new construction and are based on averages, with extreme outliers excluded.

Window-Exterior, Sunscreens

Residential sunscreen costs were collected for one screen size on a typical residential size job: six screens of 20 square feet each. Recommended values represent averages in dollars per square foot of the cost quotes collected.

Window-Retrofit Film

Costs were collected and averaged for five types of retrofit film for both commercial and residential applications:

- Reflective;
- Spectrally selective;
- Standard;
- Low-emissivity (Low-E); and
- High performance tint.

Window-Upgrade

Window upgrades refer to entire window systems, in contrast to window films, which are applied to existing windows. Window costs were collected for a number of window types, including:

- Clear;
- Standard Tint;
- High Performance Tint;
- Medium Reflective Coating;
- High Reflective Coating;
- Low-E Coating;
- Low-E² Coating; and
- Heat Mirror.

The attributes of each cost observation tracked include frame type, gas fill, number of panes, shading coefficient, u-value, and visible light transmittance. Because of the number and variety of combinations possible, cost models were developed for all window measures. The cost models effectively smooth out inconsistencies in the average costs that are attributable to the fact that different sources provided costs for different windows. The cost models were used to populate a matrix of window types with consistent cost increments developed through analysis of the raw data. The cost models also include the fixed costs of windows as part of the initial base to which the cost increments are added. Two cost models were developed, one for the residential sector and one for the commercial sector. Volume assumptions used to collect and develop the window prices were as follows:

- Commercial: High = 24,000 square feet; Low = 2,400 square feet
- Residential: High = 7,200 square feet; Low = 360 square feet.

3.4.10 Low Income

Cost data were averaged from about 900 quotes from 46 firms participating or bidding to participate in two utility programs. As shown in the table below, measures that were bid on included attic insulation (blown-in), water heater blanket installation, replacing showerheads with low-flow units, door weatherstripping, caulking throughout the house, minor home repairs, attic venting, attic access weatherstripping, evaporative cooler cover installation, new furnace

filters, replacing incandescent lamps with compact fluorescents, faucet aerators, foam pipe insulation on the exposed portion of water heater pipes, and the replacement of old refrigerators and air conditioners.

Table 3-2
Low-Income Measure Descriptions

Low-Income Measure	Description
Attic insulation	Insulation blown-in to a depth of 8"
Water Heater Blanket	Installation of an R-10 blanket
Low-Flow Showerhead(s)	Replacement of showerhead(s) with low-flow models
Door Weatherstripping	Installation of door weatherstripping
Caulking	Caulking walls, windows and doors throughout house
Minor Home Repairs	Includes caulking, window repair, weatherstripping, replacement doors.
Attic Access Weatherstripping	Weatherstripping installed around attic access door
Evaporative Cooler Cover	Installation of evaporative cooler cover
Furnace Filter	Replacement of furnace filter
Compact Fluorescent Lamp	Installation of CFL lamps
Faucet Aerators	Installed in bathroom sinks
Foam Pipe Insulation	Installed on exposed portion of water heater pipes
Refrigerator Replacement	Removal, recycling and disposal of old refrigerator and/or freezer and installation of new refrigerator

These low-income prices are for very-high-volume installations and therefore may reflect substantially lower costs than identical non-low income measures (e.g. CFL fixture installation for retrofit cases as compared to low income).

3.4.11 Lighting Controls

Dimming Systems

Dimming system costs were developed for two scenarios based on the number of fixtures per zone controlled. The 2 scenarios were a single office configuration with 2 fixtures per zone and an open floor plan office with 10 fixtures per zone. A set of base-case costs was developed as well, consisting of fixtures with energy-efficient magnetic ballasts and 34-Watt lamps. The dimming system costs include one photosensor and one controller per zone, as well as one dimmable electronic ballast for every standard ballast. Half a day of labor in addition to that required to install the system is also included for testing and tuning each zone.

Occupancy Sensors

Occupancy sensor costs were developed with unweighted averages of 14 wholesale costs collected from 3 major distributors. Costs were collected for two types of sensors: ceiling

sensors, capable of controlling up to 1,000 Watts each, and wallbox sensors, capable of controlling 250 Watts each. Costs were obtained and averaged across both ultrasonic and infrared sensors.

3.4.12 LED Traffic Signals

Cost data for LED Traffic Signals were obtained from five vendors who supply such signals to Cal-Trans. The prices were developed through simple averaging across vendors.

3.4.13 Lighting Equipment

The remainder of the lighting equipment costs were developed using the following approach:

1. Wholesale high- and low-volume costs were collected from an average of five distributors for all of the lighting equipment components.
2. Lighting contractor markup percentages were estimated based on discussions with five major energy service companies.
3. Labor hours were estimated for approximately 40 different types of lighting installations for both retrofit and new construction.
4. Hourly labor rates were estimated for both fixture technicians and electricians. Fixture technicians generally perform high-volume lighting retrofit jobs that do not involve extensive rewiring.
5. XENERGY constructed a cost model that combined the wholesale equipment costs, markup percentages, labor hours, and labor rates to produce estimates of installed costs to end users.

3.4.14 Motor Equipment

Variable-Speed Drives

Costs for variable-speed drives were gathered from one manufacturer and two wholesalers. Costs were derived by averaging the cost per horsepower for various size, voltage, and NEMA protection rating and then constructing values based on a curve fit.

3.4.15 Residential-Type Refrigerators

Costs were collected for over 2,000 residential refrigerators from our retail surveys. Information was collected on the price, whether the unit was on sale, the manufacturer or brand name, model number, door configuration, refrigerator volume, freezer volume, type of defrost control, presence of humidity control drawers, presence of tempered glass shelves, and presence of an energy saver switch. In addition, DOE energy cost rating label data were collected. This information included the annual electric cost and electric rate. We conducted several regression analyses testing the significance of many combinations of the parameters available. As noted in Section 3.35, the incremental costs that we have estimated in the current study for high-efficiency residential refrigerators (as compared to the 1993 federal standards) appear to be significantly higher this year than in 1996. The principal reason we suspect the higher

incremental costs in the current study may be misleading is that prices for standard-efficiency units may have been reduced by manufacturers and retailers in late 2000 (during our data collection) to clear inventory of lower-efficiency equipment that will not meet the new federal 2001 refrigerator standards. In fact, the costs of the base-case units (i.e., those that just meet the 1993 standards) are lower in the current study than in the 1996 Measure Cost Study, whereas the costs for the high-efficiency units are similar. This results in a higher incremental cost between the base and high efficiency equipment.

3.4.16 Commercial Refrigeration Measures

The following information applies to the 13 refrigeration measures. Since these measures relate to commercial refrigeration and specifically supermarket refrigeration, a typical 32,000-square-foot supermarket was used as a basis for design and costing.

Two common supermarket refrigeration system configurations were developed: a conventional (single compressor) air-cooled condenser system and a parallel (multiplex compressors) evaporative condenser system. Different aspects of these two refrigeration configurations are used to complete the various measures and are described in more detail under each measure.

Contractor profit margins were estimated based on industry experience, with considerable variation between certain new and retrofit situations, as well as between different products, reflecting the typical bidding and purchasing practices employed in the commercial refrigeration and supermarket industries.

Most of the measures remain very similar to those completed for the 1994 and 1996 Measure Cost Studies. An effort was made to remain consistent with the approach and assumptions used to develop these measure costs, except for a few measures where the available technology has changed enough to warrant a different approach.

High-Efficiency Display Case Fan Motors

The cost of using high-efficiency fan motors in refrigerated display cases was determined for both new and retrofit situations. High-efficiency motors remain an option on new display cases due to the fact that these motors have a greater failure rate (either real or perceived) than standard motors. The base case is lower efficiency, shaded-pole fan motors. The cost is defined per motor. Individual display cases can have from two to nine fan motors, with the quantity typically identified on the display case nameplate or in manufacturer's engineering literature. The cost of high-efficiency, electronically commutated motors was obtained from several display case manufacturers. Also included are the associated installation and materials costs of wiring in the high efficiency motors in existing display cases, based on doing the work at night and assuming 96 feet of dairy case as a typical length to complete in one shift.

Medium-Temperature Glass Door Display Cases

The use of glass door cases in lieu of open upright medium-temperature display cases can save energy. The base case is a multi-deck upright case used for dairy, beverages, deli items or refrigerated juice products. The incremental additional cost of using medium-temperature glass door display cases was determined for new construction only. Costs from several display case manufacturers were obtained and averaged. The cost is defined per lineal foot of case. A typical 60-foot dairy case lineup was used for cost estimates, plus a 20 percent allowance for additional length since door cases require more length for equivalent product facings. The cost definition is for the glass door lineup length.

Low-Heat Display Cases Glass Doors

This measure describes the use of reduced-wattage glass doors in low-temperature reach-in display cases. The base case is standard-wattage glass doors. Only one manufacturer, Hussmann, provided prices. Hussmann is the leading display case manufacturer and others will likely follow to remain competitive. The cost is defined per door (low temp glass door cases).

Reflective Case Shields for Upright Display Cases

This measure involves installation of reflective shields or “curtains” on upright open display cases to reduce infiltration during non-business hours. A cost estimate was obtained from one manufacturer, based on a typical 60 foot dairy case line-up. The cost is for retrofit only and is defined per lineal foot of case.

High-Efficiency Liquid-Suction Heat Exchangers

This measure includes installation of oversized liquid-suction heat exchangers at the display case or walk-in box to increase refrigeration effect. This measure applies only to low temperature loads. The cost was determined for both retrofit and new construction vintages. Cost was defined per ton of low temperature refrigerated load. The base case is standard in-case heat exchangers. One manufacturer was used for prices. In new construction, the installation cost is minor. For retrofit, the cost includes additional labor for product removal and labor cost for scheduled night work.

Display Anti-Sweat Heater Controls

This measure includes installation of cycling controls for the anti-sweat heaters on low-temperature display cases; primarily glass door cases make up this measure. This measure applies to both new construction and retrofit. The base-case assumption is a constantly operating anti-sweat heater. The cost definition is lineal foot of low temperature glass door case. Control hardware consists of a factory control panel with solid-state relays and microprocessor control necessary to cycle all heaters based on dewpoint or relative humidity. Installation and material costs are included.

Efficient Air-Cooled Condensers

A high-efficiency air-cooled condenser uses larger coil surface and reduced-capacity fan motors (typically from ½ to 1 hp) to achieve a higher specific Btu/Watt efficiency. The base-case assumption is a standard condenser with 1.5-hp or larger motor. Cost is defined per ton of total refrigerated load. Additional controls (e.g., variable-speed drives) are not included.

Efficient Evaporative-Cooled Condensers

For new construction, this measure is in lieu of a standard-efficiency condenser. For retrofit, this is for replacement of the existing condenser. A high-efficiency, evaporative-cooled condenser includes a close approach selection and a reduced-horsepower fan motor to achieve a higher specific Btu/Watt efficiency. Cost is defined per ton of total refrigerated load. Additional controls (e.g., variable-speed drives) are not included. In the retrofit measure, cost is estimated for removal from an equipment room, typical of most markets. A roof-mounted condenser could be more easily changed.

High-Efficiency Multiplex Compressor Systems

This measure addresses the incremental cost for a higher efficiency multiplex (parallel) refrigeration system in new construction. The base-case design for new construction is a parallel system. The incremental improvements consist of additional suction groups and capacity steps or variable-speed control, enabling the system to better match the required fixture suction temperatures.

The cost estimate is based on four systems (suction groups) with improved pressure control, accomplished with either one variable-speed drive (on the largest compressor) or sufficient capacity stages using unloaders and uneven sizes to comprise six steps of capacity per system. Cost is defined per ton of total refrigerated load.

High-Efficiency Replacement Compressors

This replacement compressor applies to a replace-on-burnout situation only. Existing “reed-type” compressors are less efficient than current models but upgrading requires re-piping and other changes, so a less efficient “exact replacement” is commonly used. Cost is defined per compressor horsepower. The cost is the incremental difference between replacing the compressor with the same reed valve model instead with higher efficiency compressor having similar capacity. Compressors were selected for the correct capacity, not simply the same horsepower. The additional labor and materials costs of installing different compressor models (with different piping connections) were included.

High-Efficiency Condenser Fan Controls

This measure includes controls to accomplish floating head pressure at the condenser using variable-speed fan control and variable-setpoint strategy (i.e., ambient reset). Costs include variable-speed drive(s), additional electrical controls for automatic bypass operation as well as

additional sensors and microprocessor components for the required control strategies. Labor is included for electrical installation and system commissioning. Cost is defined per ton of total refrigerated load.

Advanced Refrigeration EMSs

Advanced refrigerator EMS consists of additions to a standard refrigeration control system to accomplish more efficient operation, including defrost termination on all fixtures, floating suction pressure control, and floating head pressure control. In new construction, the base-case control system includes compressor sequencing and condenser control with fixed setpoints. For retrofit, the controls include control for refrigeration racks, and exclude high-efficiency condenser control and anti-sweat heater control. Cost is defined per ton of total refrigerated load.

Commissioning

Performance commissioning includes efforts to achieve a more efficient refrigeration system, both for new construction and existing (retrofit) vintages. In new construction, the base case is a standard system startup that typically involves no performance measurement or validation of energy-efficiency features. Cost is defined per ton of total refrigerated load. For new construction, the cost assumption includes involvement well before startup to verify proper installation, time during startup, and subsequent labor to validate operation during subsequent seasons using remote data gathering from the supermarket's control system. A retrofit commissioning effort assumes fine-tuning efforts to achieve more efficient operation.

4

RECOMMENDED COST TABLES

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4.1 LIST OF CCIG NUMBERS

The list below presents CCIG numbers used in the current study. Most of these numbers were created on previous studies (XENERGY, 1992, 1994 and 1996; and NEOS, 1994). In some cases, new CCIG numbers were needed for measures not included in previous studies. These measures are identified below as well.

BLC-01	Lighting/Controls/Occupancy Sensor/Occupancy Sensor	
BLC-02	Lighting/Controls/Dimming System/System	
BLC-02	Lighting/Controls/Photocell/Switching Photocell	
BLE-04	Lighting/Equipment/Fluorescent U-Lamp/Lamps	
BLE-04	Lighting/Equipment/Fluorescent U-Lamp/System 2-Lamp	
BLE-04	Lighting/Equipment/Fluorescent-Eight Foot/Ballasts	
BLE-04	Lighting/Equipment/Fluorescent-Eight Foot/Lamps	
BLE-04	Lighting/Equipment/Fluorescent-Eight Foot/Reflector	
BLE-04	Lighting/Equipment/Fluorescent-Eight Foot/System 1-Lamp	
BLE-04	Lighting/Equipment/Fluorescent-Eight Foot/System 2-Lamp	
BLE-04	Lighting/Equipment/Fluorescent-Four Foot/Ballasts	
BLE-04	Lighting/Equipment/Fluorescent-Four Foot/Lamps	
BLE-04	Lighting/Equipment/Fluorescent-Four Foot/Reflector	
BLE-04	Lighting/Equipment/Fluorescent-Four Foot/System 1-Lamp	
BLE-04	Lighting/Equipment/Fluorescent-Four Foot/System 2-Lamp	
BLE-04	Lighting/Equipment/Fluorescent-Four Foot/System 3-Lamp	
BLE-04	Lighting/Equipment/Fluorescent-Four Foot/System 4-Lamp	
BLE-04	Lighting/Equipment/Fluorescent-Two Foot/Ballasts	
BLE-04	Lighting/Equipment/Fluorescent-Two Foot/System 2-Lamp	
BLE-04	Lighting/Equipment/Fluorescent-Two Foot/System 4-Lamp	
BLE-05	Lighting/Equipment/Incandescent/Lamps	
BLE-06	Lighting/Equipment/High-Pressure Sodium/Ballasts	
BLE-06	Lighting/Equipment/High-Pressure Sodium/Lamps	
BLE-06	Lighting/Equipment/High-Pressure Sodium/System	
BLE-07	Lighting/Equipment/Metal Halide/Ballast	
BLE-07	Lighting/Equipment/Metal Halide/Lamps	
BLE-07	Lighting/Equipment/Metal Halide/System	
CHC-22	HVAC/Controls/EMS/Energy Management System	
CHC-55	HVAC/Controls/Boiler Control/Boiler Control.....	NEW
CHC-56	HVAC/Controls/CO2 Sensor/CO2 Sensor	NEW
CHE-13	HVAC/Equipment/Cooling Tower/Approach Temperature	
CHE-21	HVAC/Equipment/Heat Pump - Package/Packaged >= 135,000 Btuh <= 760,000 Btuh	
CHE-21	HVAC/Equipment/Heat Pump - Package/Packaged >= 65,000 Btuh	
CHE-23	HVAC/Equipment/Evaporative Systems/Direct	
CHE-23	HVAC/Equipment/Evaporative Systems/Evaporative Systems	
CHE-23	HVAC/Equipment/Evaporative Systems/Indirect	
CHE-23	HVAC/Equipment/Evaporative Systems/Indirect-Direct	
CHE-28	HVAC/Equipment/Chiller-Absorption/1-Stage<300 Tons	

CHE-28	HVAC/Equipment/Chiller-Absorption/1-Stage \geq 300 Tons	
CHE-28	HVAC/Equipment/Chiller-Absorption/2-Stage $<$ 300 Tons	
CHE-28	HVAC/Equipment/Chiller-Absorption/2-Stage \geq 300 Tons	
CHE-34	HVAC/Equipment/Chiller-Centrifugal-Water Cooled/ \geq 300 tons	
CHE-35	HVAC/Equipment/AC - Package/Packaged \geq 135,000 Btuh \leq 760,000 Btuh	
CHE-35	HVAC/Equipment/AC - Package/Packaged \geq 65,000 Btuh	
CHE-55	HVAC/Equipment/Cooling Tower/Two-Speed Motor	
CHE-59	HVAC/Equipment/Cooling Tower/VSD	
CHS-65	HVAC/Shell/Window-Upgrade/Window-Upgrade	NEW
CLC-03	Lighting/Controls/Timeclock/24-Hour Electromechanical.....	NEW
CLC-03	Lighting/Controls/Timeclock/7-Day Digital.....	NEW
CLC-03	Lighting/Controls/Timeclock/7-Day Electromechanical	NEW
CLC-03	Lighting/Controls/Timeclock/7-Day Electromechanical, 3-Phase	NEW
CLE-03	Lighting/Equipment/Compact Fluorescent/Ballasts	
CLE-03	Lighting/Equipment/Compact Fluorescent/System	
CLE-03	Lighting/Equipment/Exit Signs/LED	
CLE-10	Lighting/Equipment/Traffic Lights, LED/LED Traffic Signal	NEW
CME-02	Motor/Equipment/Variable-Speed Drive/Variable-Speed Drive	
CRC-01	Refrigeration/Controls/Display Case/Anti-Condensate Heater Controls	
CRC-01	Refrigeration/Equipment/Compressor/High Efficiency	
CRC-03	Refrigeration/Controls/Refrigeration System/Energy Management System	
CRC-04	Refrigeration/Controls/Refrigeration System/Commissioning	NEW
CRE-02	Refrigeration/Equipment/Display Case/High Efficiency Evaporator Fan Motors	
CRE-02	Refrigeration/Equipment/Display Case/Low-Temperature Glass Doors	
CRE-02	Refrigeration/Equipment/Display Case/Medium-Temperature Glass Doors	
CRE-06	Refrigeration/Equipment/Low-Head Pressure/Multiplex System	
CRE-07	Refrigeration/Equipment/Condenser/High Efficiency Fan Control	
CRE-07	Refrigeration/Equipment/Condenser/Oversized Air-Cooled	
CRE-07	Refrigeration/Equipment/Condenser/Oversized Evaporative	
CRE-09	Refrigeration/Equipment/Heat Exchanger/Low-Temperature External Liquid Suction	
CRI-01	Refrigeration/Insulation/Display Case/Reflective Case Shields	NEW
CWE-06	DHW/Equipment/Storage Water Heater/ $>$ 50 Gallons	
CWE-15	DHW/Equipment/Instantaneous-Electric/14.5 kW, 99.5% Efficient	
CWE-15	DHW/Equipment/Instantaneous-Gas/Maximum 165 kBtu, E.F. = 0.81	
CWE-20	DHW/Equipment/Boiler/ $>$ 500 kBtu	NEW
CWE-20	DHW/Equipment/Boiler/200-500 kBtu	NEW
CWE-20	HVAC/Equipment/Boiler/100-600kBtuh	NEW
CYE-01	Clothes Washer/Equipment/Clothes Washer/Coin-Operated	NEW
RDE-09	Dish Washer/Equipment/Dish Washer/Dish Washer.....	NEW
RHC-53	HVAC/Controls/Thermostat/Thermostat	
RHE-07	HVAC/Equipment/Heat Pump - Split/Split-System $<$ 65,000 Btuh	
RHE-20	HVAC/Equipment/Heat Pump - Package/Packaged $<$ 65,000 Btuh	
RHE-33	HVAC/Equipment/AC - DX Split/Split $<$ 65,000 Btuh	
RHE-33	HVAC/Equipment/AC - Package/Packaged $<$ 65,000 Btuh	
RHE-36	HVAC/Equipment/Furnace-Warm Air/Furnaces-Warm Air $<$ 225,000 Btuh	
RHE-37	HVAC/Equipment/Package Terminal AC/Room Air Conditioner	
RHE-37	HVAC/Equipment/Package Terminal HP/Room Heat Pump	

RHE-38	HVAC/Equipment/AC - Package/Furnace <65,000 Btuh
RHE-63	HVAC/Equipment/Whole-House Fan/Whole House Fan
RHM-17	HVAC/Maintenance/Duct/Duct Test
RHM-17	HVAC/Maintenance/Duct/Seal
RHM-17	HVAC/Maintenance/Duct Test/seal/Duct Test&Seal
RHM-44	HVAC/Maintenance/Diagnostic/Diagnostic
RHM-48	HVAC/Maintenance/Furnace Filter/Furnace Filter NEW
RHS-05	HVAC/Shell/Insulation-Batt Faced/Material
RHS-05	HVAC/Shell/Insulation-Batt Unfaced/Material
RHS-05	HVAC/Shell/Insulation-Ceiling/System Ceiling
RHS-24	HVAC/Shell/Window-Exterior/Sunscreen
RHS-26	HVAC/Shell/Insulation-Floor/System Floor
RHS-30	HVAC/Shell/Window-Retrofit Film/Window-Retrofit Film
RHS-40	HVAC/Shell/Attic Venting/Attic Venting
RHS-40	HVAC/Shell/Infiltration Reduction/Infiltration Reduction
RHS-40	HVAC/Shell/Insulation-Low Income/Attic Insulation
RHS-61	HVAC/Shell/Insulation-Rigid/Material
RHS-61	HVAC/Shell/Insulation-Wall/System Wall
RLE-03	Lighting/Equipment/Compact Fluorescent/Lamps
RLE-09	Lighting/Equipment/Compact Fluorescent/System/Torchiere
RRE-21	Refrigeration/Equipment/Refrigerator Replacement/Refrigerator Replacement
RRE-21	Refrigerator/Equipment/Refrigerator/Side-by-Side
RRE-21	Refrigerator/Equipment/Refrigerator/Top-Mount Freezer
RWE-08	DHW/Equipment/Storage Water Heater/Standard
RWI-14	DHW/Insulation/Pipe Insulation/Foam
RWI-14	DHW/Insulation/Pipe Insulation/Water Heater Pipe Wrap
RWI-20	DHW/Insulation/Blanket/Basic Wrap
RWI-20	DHW/Insulation/Blanket/Water Heater Insulation
RWO-07	DHW/Equipment/Faucet Aerator/Faucet Aerator
RWO-12	DHW/Equipment/Low-Flow Showerhead/Low-Flow Showerhead
RWO-12	DHW/Equipment/Low-Flow Showerhead/Water Stop
RXE-01	Clothes Dryer/Equipment/Clothes Dryer/Clothes Dryer
RYE-01	Clothes Washer/Equipment/Clothes Washer/Clothes Washer

4.2 RECOMMENDED VALUES


Clothes Dryer // Equipment // Clothes Dryer // Clothes Dryer

Sector : Residential
Channel : Retail

Method : Unweighted Average
No. Obs. : 503

Cost Unit : \$/Unit
Vintage : New/ROB

CCIG: RXE-01

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Electric Clothes Dryer, No Moisture Sensor	N/A	L	Full	<input type="checkbox"/>		\$328.00	
Gas Clothes Dryer, No Moisture Sensor	N/A	L	Full	<input type="checkbox"/>		\$351.00	
N/A	Electric Clothes Dryer, Moisture Sensor	L	Full	<input type="checkbox"/>		\$482.00	
N/A	Gas Clothes Dryer, Moisture Sensor	L	Full	<input type="checkbox"/>		\$492.00	
Electric Clothes Dryer, No Moisture Sensor	Electric Clothes Dryer, Moisture Sensor	L	Inc	<input type="checkbox"/>		\$154.00	
Electric Clothes Dryer, No Moisture Sensor	Gas Clothes Dryer, No Moisture Sensor	L	Inc	<input type="checkbox"/>		\$23.00	
Gas Clothes Dryer, No Moisture Sensor	Gas Clothes Dryer, Moisture Sensor	L	Inc	<input type="checkbox"/>		\$141.00	


Clothes Washer // Equipment // Clothes Washer // Clothes Washer

Sector : Residential
Channel : Retail

Method : Unweighted Average
No. Obs. : 870

Cost Unit : \$/Unit
Vintage : New/ROB

CCIG: RYE-01

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Standard Effic Vertical-Axis Clothes Washer	N/A	L	Full	<input type="checkbox"/>		\$449.00	
N/A	Energy Star Vertical-Axis Clothes Washer	L	Full	<input checked="" type="checkbox"/>		\$773.00	
N/A	Horizontal-Axis Clothes Washer	L	Full	<input checked="" type="checkbox"/>		\$823.00	
Standard Effic Vertical-Axis Clothes Washer	Energy Star Vertical-Axis Clothes Washer	L	Inc	<input checked="" type="checkbox"/>		\$324.00	
Standard Effic Vertical-Axis Clothes Washer	Horizontal-Axis Clothes Washer	L	Inc	<input checked="" type="checkbox"/>		\$374.00	


Clothes Washer // Equipment // Clothes Washer // Coin-Operated

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 15

Cost Unit : \$/Unit
Vintage : New/ROB

CCIG: CYE-01

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Standard Effic Vertical-Axis Clothes Washer, Coin-Op	N/A	L	Full	<input type="checkbox"/>		\$776.00	
N/A	Horizontal-Axis Clothes Washer, Coin-Op	L	Full	<input checked="" type="checkbox"/>		\$1,436.00	
Standard Effic Vertical-Axis Clothes Washer, Coin-Op	Horizontal-Axis Clothes Washer, Coin-Op	L	Inc	<input checked="" type="checkbox"/>		\$659.00	


DHW // Equipment // Boiler // >500 kBtu

Sector : Commercial
Channel : Contractor

Method : Regression plus Markup
No. Obs. : 31

Cost Unit : \$/kBtu
Vintage : All

CCIG: CWE-20

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Domestic Hot Water Boiler (Gas), >500 kBtu, 82% Effic	N/A	L	Full	<input type="checkbox"/>		\$7.92	
N/A	Domestic Hot Water Boiler (Gas), >500 kBtu, 95% Effic	L	Full	<input type="checkbox"/>		\$15.00	
Domestic Hot Water Boiler (Gas), >500 kBtu, 82% Effic	Domestic Hot Water Boiler (Gas), >500 kBtu, 95% Effic	L	Inc	<input type="checkbox"/>		\$7.34	


DHW // Equipment // Boiler // 200-500 kBtu

Sector : Commercial
Channel : Contractor


Method : Regression plus Markup
No. Obs. : 31

Cost Unit : \$/kBtu
Vintage : All


CCIG: CWE-20

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Domestic Hot Water Boiler (Gas), 200 -500 kBtu, 82% Effic	N/A	L	Full	<input type="checkbox"/>		\$11.00	
N/A	Domestic Hot Water Boiler (Gas), 200-500 kBtu, 95% Effic	L	Full	<input type="checkbox"/>		\$21.00	
Domestic Hot Water Boiler (Gas), 200 -500 kBtu, 82% Effic	Domestic Hot Water Boiler (Gas), 200-500 kBtu, 95% Effic	L	Inc	<input type="checkbox"/>		\$9.81	


DHW // Equipment // Faucet Aerator // Faucet AeratorSector : Residential
Channel : RetailMethod : Unweighted Average
No. Obs. : 179Cost Unit : \$/Unit
Vintage : New/ROB**CCIG: RWO-07**

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Faucet Aerator	L	Full	<input type="checkbox"/>		\$4.82	

DHW // Equipment // Faucet Aerator // Faucet AeratorSector : Residential
Channel : Utility Files+RetailMethod : Unweighted Average
No. Obs. : 179Cost Unit : \$/Unit
Vintage : Ret**CCIG: RWO-07**


Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Low Income, Faucet Aerators	H	Full	<input type="checkbox"/>			\$4.26

DHW // Equipment // Instantaneous-Electric // 14.5 kW, 99.5% EfficientSector : Commercial
Channel : ContractorMethod : Unweighted Average
No. Obs. : 5Cost Unit : \$/Unit
Vintage : All**CCIG: CWE-15**

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Small instantaneous water heater (Electric), 14.5 kW, 99.5% Effic	L	Full	<input type="checkbox"/>		\$490.00	


DHW // Equipment // Instantaneous-Gas // Maximum 165 kBtu, E.F. = 0.81

Sector : Residential Method : Unweighted Average Cost Unit : \$/Unit CCIG: CWE-15
 Channel : Retail No. Obs. : 6 Vintage : All

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Small instantaneous water heater (Gas), max. 165 kBtu, E.F.=0.81	L	Full	<input type="checkbox"/>		\$700.00	


DHW // Equipment // Low-Flow Showerhead // Low-Flow Showerhead

Sector : Residential Method : Unweighted Average Cost Unit : \$/Unit CCIG: RWO-12
 Channel : Retail No. Obs. : 247 Vintage : New/ROB

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low-Flow Showerhead High Cost (>\$15) Basic Model	L	Full	<input type="checkbox"/>		\$31.00	
N/A	Low-Flow Showerhead Low Cost (<=\$15) Basic Model	L	Full	<input type="checkbox"/>		\$9.23	
N/A	Low-Flow Showerhead Massage Model	L	Full	<input type="checkbox"/>		\$40.00	

DHW // Equipment // Low-Flow Showerhead // Water Stop

Sector : Residential Method : Unweighted Average Cost Unit : \$/Unit CCIG: RWO-12
 Channel : Utility Files+Retail No. Obs. : 46 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low Income, Low-Flow Showerhead	H	Full	<input type="checkbox"/>			\$20.00


DHW // Equipment // Storage Water Heater // >50 Gallons

Sector : Commercial
Channel : Contractor

Method : Regression plus Markup
No. Obs. : 263

Cost Unit : \$/Unit
Vintage : All

CCIG: CWE-06

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Gas Storage Water Heater, 75 gal., 88 kBtu, 76% Effic	N/A	L	Full	<input type="checkbox"/>		\$410.00	
Gas Storage Water Heater, 100 gal., 88 kBtu, 76% Effic	N/A	L	Full	<input type="checkbox"/>		\$721.00	
N/A	Gas Storage Water Heater, 75 gal., 88 kBtu, 80% Effic	L	Full	<input type="checkbox"/>		\$1,714.00	
N/A	Gas Storage Water Heater, 75 gal., 120 kBtu, Condensing, 95% Effic	L	Full	<input type="checkbox"/>		\$2,323.00	
N/A	Gas Storage Water Heater, 75 gal., 199 kBtu, Condensing, 95% Effic	L	Full	<input type="checkbox"/>		\$2,736.00	
N/A	Gas Storage Water Heater, 100 gal., 88 kBtu, 80% Effic	L	Full	<input type="checkbox"/>		\$1,982.00	
N/A	Gas Storage Water Heater, 100 gal., 120 kBtu, Condensing, 95% Effic	L	Full	<input type="checkbox"/>		\$2,686.00	
N/A	Gas Storage Water Heater, 100 gal., 199 kBtu, Condensing, 95% Effic	L	Full	<input type="checkbox"/>		\$3,220.00	
Gas Storage Water Heater, 75 gal., 88 kBtu, 76% Effic	Gas Storage Water Heater, 75 gal., 88 kBtu, 80% Effic	L	Inc	<input type="checkbox"/>		\$1,303.00	
Gas Storage Water Heater, 75 gal., 88 kBtu, 76% Effic	Gas Storage Water Heater, 75 gal., 120 kBtu, Condensing, 95% Effic	L	Inc	<input type="checkbox"/>		\$1,912.00	
Gas Storage Water Heater, 75 gal., 88 kBtu, 76% Effic	Gas Storage Water Heater, 75 gal., 199 kBtu, Condensing, 95% Effic	L	Inc	<input type="checkbox"/>		\$2,326.00	
Gas Storage Water Heater, 100 gal., 88 kBtu, 76% Effic	Gas Storage Water Heater, 100 gal., 88 kBtu, 80% Effic	L	Inc	<input type="checkbox"/>		\$1,261.00	
Gas Storage Water Heater, 100 gal., 88 kBtu, 76% Effic	Gas Storage Water Heater, 100 gal., 120 kBtu, Condensing, 95% Effic	L	Inc	<input type="checkbox"/>		\$1,965.00	
Gas Storage Water Heater, 100 gal., 88 kBtu, 76% Effic	Gas Storage Water Heater, 100 gal., 199 kBtu, Condensing, 95% Effic	L	Inc	<input type="checkbox"/>		\$2,500.00	


DHW // Equipment // Storage Water Heater // Standard

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 263

Cost Unit : \$/Unit
Vintage : New/ROB

CCIG: RWE-08

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
Gas Storage Water Heater, 30 gal., 0.56 Energy Factor	N/A	L	Full	<input type="checkbox"/>		\$151.00	
Gas Storage Water Heater, 40 gal., 0.54 Energy Factor	N/A	L	Full	<input type="checkbox"/>		\$193.00	
Gas Storage Water Heater, 50 gal., 0.53 Energy Factor	N/A	L	Full	<input type="checkbox"/>		\$218.00	
N/A	Gas Storage Water Heater, 30 gal., 0.62 Energy Factor	L	Full	<input type="checkbox"/>		\$200.00	
N/A	Gas Storage Water Heater, 40 gal., 0.60 Energy Factor	L	Full	<input type="checkbox"/>		\$248.00	
N/A	Gas Storage Water Heater, 40 gal., 0.63 Energy Factor	L	Full	<input type="checkbox"/>		\$322.00	
N/A	Gas Storage Water Heater, 50 gal., 0.60 Energy Factor	L	Full	<input type="checkbox"/>		\$279.00	
Gas Storage Water Heater, 30 gal., 0.56 Energy Factor	Gas Storage Water Heater, 30 gal., 0.62 Energy Factor	L	Inc	<input type="checkbox"/>		\$49.00	
Gas Storage Water Heater, 40 gal., 0.54 Energy Factor	Gas Storage Water Heater, 40 gal., 0.60 Energy Factor	L	Inc	<input type="checkbox"/>		\$55.00	
Gas Storage Water Heater, 40 gal., 0.54 Energy Factor	Gas Storage Water Heater, 40 gal., 0.63 Energy Factor	L	Inc	<input type="checkbox"/>		\$129.00	
Gas Storage Water Heater, 50 gal., 0.53 Energy Factor	Gas Storage Water Heater, 50 gal., 0.60 Energy Factor	L	Inc	<input type="checkbox"/>		\$61.00	


DHW // Insulation // Blanket // Basic Wrap

Sector : Residential
Channel : Utility Files

Method : Unweighted Average
No. Obs. : 46


Cost Unit : \$/Unit
Vintage : Ret

CCIG: RWI-20

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Low Income, Water Heater Blanket	H	Full	<input type="checkbox"/>			\$28.00


DHW // Insulation // Blanket // Water Heater Insulation

Sector : Residential Method : Unweighted Average Cost Unit : \$/Unit CCIG: RWI-20
 Channel : Retail No. Obs. : 52 Vintage : New/ROB

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Water Heater Blanket, R-10	L	Full	<input type="checkbox"/>		\$17.00	
N/A	Water Heater Blanket, R- 6.7	L	Full	<input type="checkbox"/>		\$11.00	


DHW // Insulation // Pipe Insulation // Foam

Sector : Residential Method : Unweighted Average Cost Unit : \$/Unit CCIG: RWI-14
 Channel : Utility Files No. Obs. : 46 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low Income, Foam Pipe Insulation	H	Full	<input type="checkbox"/>			\$2.33

DHW // Insulation // Pipe Insulation // Water Heater Pipe Wrap

Sector : Residential Method : Unweighted Average Cost Unit : \$/LF CCIG: RWI-14
 Channel : Retail No. Obs. : 30 Vintage : New/ROB

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Water Heater Pipe Wrap-On <=2" Pipe, R-6	L	Full	<input type="checkbox"/>		\$0.27	


Dish Washer // Equipment // Dish Washer // Dish Washer

Sector : Residential
Channel : Retail

Method : Unweighted Average
No. Obs. : 1144

Cost Unit : \$/Unit
Vintage : New/ROB

CCIG: RDE-09

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Standard Effic Dish Washer	N/A	L	Full	<input type="checkbox"/>		\$421.00	
N/A	Energy Star Dish Washer	L	Full	<input checked="" type="checkbox"/>		\$625.00	
Standard Effic Dish Washer	Energy Star Dish Washer	L	Inc	<input checked="" type="checkbox"/>		\$204.00	

HVAC // Controls // Boiler Control // Boiler Control

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 3

Cost Unit : \$/Unit
Vintage : Ret

CCIG: CHC-55

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Space Heating Boiler Controllers	L	Full	<input type="checkbox"/>			\$1,044.00


HVAC // Controls // CO2 Sensor // CO2 Sensor

Sector : Commercial
Channel : Contractor

Method : Secondary/Report
No. Obs. : 3

Cost Unit : \$/Unit
Vintage : Ret

CCIG: CHC-56

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	CO2 Sensor	L	Full	<input type="checkbox"/>	\$485.00	\$284.00	\$769.00


HVAC // Controls // EMS // Energy Management System

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 6

Cost Unit : \$/Point
Vintage : Ret

CCIG: CHC-22

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Energy Management System, 100 to 500 Point	M	Full	<input type="checkbox"/>			\$1,117.00


HVAC // Controls // Thermostat // Thermostat

Sector : Residential
Channel : Retail

Method : Unweighted Average
No. Obs. : 213

Cost Unit : \$/Unit
Vintage : New/ROB

CCIG: RHC-53

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Programmable Thermostat	L	Full	<input checked="" type="checkbox"/>		\$58.00	


HVAC // Equipment // AC - DX Split // Split <65,000 Btuh

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 188

Cost Unit : \$/Unit
Vintage : New

CCIG: RHE-33

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
DX-Air Cooled, Split, 2.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$709.00	\$613.00	\$1,322.00
DX-Air Cooled, Split, 3.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$1,060.00	\$789.00	\$1,849.00
DX-Air Cooled, Split, 4.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$1,463.00	\$965.00	\$2,428.00
DX-Air Cooled, Split, 5.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$2,080.00	\$1,141.00	\$3,221.00
N/A	DX-Air Cooled, Split, 2.0 Tons, 12 SEER	H	Full	<input checked="" type="checkbox"/>	\$709.00	\$805.00	\$1,514.00
N/A	DX-Air Cooled, Split, 2.0 Tons, 13 SEER	H	Full	<input checked="" type="checkbox"/>	\$709.00	\$1,023.00	\$1,732.00
N/A	DX-Air Cooled, Split, 2.0 Tons, 14+ SEER	H	Full	<input checked="" type="checkbox"/>	\$709.00	\$1,695.00	\$2,404.00
N/A	DX-Air Cooled, Split, 3.0 Tons, 12 SEER	H	Full	<input checked="" type="checkbox"/>	\$1,060.00	\$1,077.00	\$2,137.00
N/A	DX-Air Cooled, Split, 3.0 Tons, 13 SEER	H	Full	<input checked="" type="checkbox"/>	\$1,060.00	\$1,404.00	\$2,464.00
N/A	DX-Air Cooled, Split, 3.0 Tons, 14+ SEER	H	Full	<input checked="" type="checkbox"/>	\$1,060.00	\$2,412.00	\$3,472.00
N/A	DX-Air Cooled, Split, 4.0 Tons, 12 SEER	H	Full	<input checked="" type="checkbox"/>	\$1,463.00	\$1,349.00	\$2,812.00
N/A	DX-Air Cooled, Split, 4.0 Tons, 13 SEER	H	Full	<input checked="" type="checkbox"/>	\$1,463.00	\$1,785.00	\$3,248.00
N/A	DX-Air Cooled, Split, 4.0 Tons, 14+ SEER	H	Full	<input checked="" type="checkbox"/>	\$1,463.00	\$3,129.00	\$4,591.00
N/A	DX-Air Cooled, Split, 5.0 Tons, 12 SEER	H	Full	<input checked="" type="checkbox"/>	\$2,080.00	\$1,621.00	\$3,701.00
N/A	DX-Air Cooled, Split, 5.0 Tons, 13 SEER	H	Full	<input checked="" type="checkbox"/>	\$2,080.00	\$2,166.00	\$4,246.00
N/A	DX-Air Cooled, Split, 5.0 Tons, 14+ SEER	H	Full	<input checked="" type="checkbox"/>	\$2,080.00	\$3,846.00	\$5,926.00
DX-Air Cooled, Split, 2.0 Tons, 10 SEER	DX-Air Cooled, Split, 2.0 Tons, 12 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$192.00	\$192.00
DX-Air Cooled, Split, 2.0 Tons, 10 SEER	DX-Air Cooled, Split, 2.0 Tons, 13 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$410.00	\$410.00
DX-Air Cooled, Split, 2.0 Tons, 10 SEER	DX-Air Cooled, Split, 2.0 Tons, 14+ SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$1,082.00	\$1,082.00
DX-Air Cooled, Split, 3.0 Tons, 10 SEER	DX-Air Cooled, Split, 3.0 Tons, 12 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$288.00	\$288.00
DX-Air Cooled, Split, 3.0 Tons, 10 SEER	DX-Air Cooled, Split, 3.0 Tons, 13 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$615.00	\$615.00
DX-Air Cooled, Split, 3.0 Tons, 10 SEER	DX-Air Cooled, Split, 3.0 Tons, 14+ SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$1,623.00	\$1,623.00
DX-Air Cooled, Split, 4.0 Tons, 10 SEER	DX-Air Cooled, Split, 4.0 Tons, 12 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$384.00	\$384.00
DX-Air Cooled, Split, 4.0 Tons, 10 SEER	DX-Air Cooled, Split, 4.0 Tons, 13 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$820.00	\$820.00
DX-Air Cooled, Split, 4.0 Tons, 10 SEER	DX-Air Cooled, Split, 4.0 Tons, 14+ SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$2,164.00	\$2,164.00
DX-Air Cooled, Split, 5.0 Tons, 10 SEER	DX-Air Cooled, Split, 5.0 Tons, 12 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$480.00	\$480.00
DX-Air Cooled, Split, 5.0 Tons, 10 SEER	DX-Air Cooled, Split, 5.0 Tons, 13 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$1,025.00	\$1,025.00
DX-Air Cooled, Split, 5.0 Tons, 10 SEER	DX-Air Cooled, Split, 5.0 Tons, 14+ SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$2,705.00	\$2,705.00


HVAC // Equipment // AC - Package // Furnace <65,000 Btuh

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 109

Cost Unit : \$/Unit
Vintage : New

CCIG: RHE-38

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Packaged AC/Furnace, 2.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$943.00	\$1,699.00	\$2,642.00
Packaged AC/Furnace, 3.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$1,257.00	\$2,066.00	\$3,323.00
Packaged AC/Furnace, 4.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$1,571.00	\$2,434.00	\$4,005.00
Packaged AC/Furnace, 5.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$1,885.00	\$2,801.00	\$4,686.00
N/A	Packaged AC/Furnace, 2.0 Tons, 12 SEER	H	Full	<input type="checkbox"/>	\$943.00	\$1,939.00	\$2,882.00
N/A	Packaged AC/Furnace, 2.0 Tons, 13 SEER	H	Full	<input type="checkbox"/>	\$943.00	\$2,015.00	\$2,958.00
N/A	Packaged AC/Furnace, 2.0 Tons, 14+ SEER	H	Full	<input type="checkbox"/>	\$943.00	\$2,541.00	\$3,484.00
N/A	Packaged AC/Furnace, 3.0 Tons, 12 SEER	H	Full	<input type="checkbox"/>	\$1,257.00	\$2,427.00	\$3,684.00
N/A	Packaged AC/Furnace, 3.0 Tons, 13 SEER	H	Full	<input type="checkbox"/>	\$1,257.00	\$2,541.00	\$3,798.00
N/A	Packaged AC/Furnace, 3.0 Tons, 14+ SEER	H	Full	<input type="checkbox"/>	\$1,257.00	\$3,330.00	\$4,587.00
N/A	Packaged AC/Furnace, 4.0 Tons, 12 SEER	H	Full	<input type="checkbox"/>	\$1,571.00	\$2,915.00	\$4,486.00
N/A	Packaged AC/Furnace, 4.0 Tons, 13 SEER	H	Full	<input type="checkbox"/>	\$1,571.00	\$3,066.00	\$4,637.00
N/A	Packaged AC/Furnace, 4.0 Tons, 14+ SEER	H	Full	<input type="checkbox"/>	\$1,571.00	\$4,119.00	\$5,690.00
N/A	Packaged AC/Furnace, 5.0 Tons, 12 SEER	H	Full	<input type="checkbox"/>	\$1,885.00	\$3,403.00	\$5,288.00
N/A	Packaged AC/Furnace, 5.0 Tons, 13 SEER	H	Full	<input type="checkbox"/>	\$1,885.00	\$3,592.00	\$5,477.00
N/A	Packaged AC/Furnace, 5.0 Tons, 14+ SEER	H	Full	<input type="checkbox"/>	\$1,885.00	\$4,909.00	\$6,794.00
Packaged AC/Furnace, 2.0 Tons, 10 SEER	Packaged AC/Furnace, 2.0 Tons, 12 SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$241.00	\$241.00
Packaged AC/Furnace, 2.0 Tons, 10 SEER	Packaged AC/Furnace, 2.0 Tons, 13 SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$316.00	\$316.00
Packaged AC/Furnace, 2.0 Tons, 10 SEER	Packaged AC/Furnace, 2.0 Tons, 14+ SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$843.00	\$843.00
Packaged AC/Furnace, 3.0 Tons, 10 SEER	Packaged AC/Furnace, 3.0 Tons, 12 SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$361.00	\$361.00
Packaged AC/Furnace, 3.0 Tons, 10 SEER	Packaged AC/Furnace, 3.0 Tons, 13 SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$474.00	\$474.00
Packaged AC/Furnace, 3.0 Tons, 10 SEER	Packaged AC/Furnace, 3.0 Tons, 14+ SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$1,264.00	\$1,264.00
Packaged AC/Furnace, 4.0 Tons, 10 SEER	Packaged AC/Furnace, 4.0 Tons, 12 SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$481.00	\$481.00
Packaged AC/Furnace, 4.0 Tons, 10 SEER	Packaged AC/Furnace, 4.0 Tons, 13 SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$633.00	\$633.00
Packaged AC/Furnace, 4.0 Tons, 10 SEER	Packaged AC/Furnace, 4.0 Tons, 14+ SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$1,686.00	\$1,686.00
Packaged AC/Furnace, 5.0 Tons, 10 SEER	Packaged AC/Furnace, 5.0 Tons, 12 SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$602.00	\$602.00
Packaged AC/Furnace, 5.0 Tons, 10 SEER	Packaged AC/Furnace, 5.0 Tons, 13 SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$791.00	\$791.00
Packaged AC/Furnace, 5.0 Tons, 10 SEER	Packaged AC/Furnace, 5.0 Tons, 14+ SEER	H	Inc	<input type="checkbox"/>	\$0.00	\$2,107.00	\$2,107.00


HVAC // Equipment // AC - Package // Packaged >= 135,000 Btuh <= 760,000 Btuh

Sector : Commercial
Channel : Contractor

Method : Regression plus Markup
No. Obs. : 188

Cost Unit : \$/Ton
Vintage : New

CCIG: CHE-35

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Packaged AC, 15 Tons, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$185.00	\$544.00	\$729.00
Packaged AC, 20 Tons, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$183.00	\$538.00	\$721.00
Packaged AC, 25 Tons, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$182.00	\$535.00	\$717.00
Packaged AC, 30 Tons, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$180.00	\$534.00	\$714.00
N/A	Packaged AC, 15 Tons, 9.5 EER	L	Full	<input type="checkbox"/>	\$185.00	\$635.00	\$820.00
N/A	Packaged AC, 15 Tons, 10.5 EER	L	Full	<input type="checkbox"/>	\$185.00	\$714.00	\$899.00
N/A	Packaged AC, 20 Tons, 9.5 EER	L	Full	<input type="checkbox"/>	\$183.00	\$630.00	\$813.00
N/A	Packaged AC, 20 Tons, 10.5 EER	L	Full	<input type="checkbox"/>	\$183.00	\$709.00	\$892.00
N/A	Packaged AC, 25 Tons, 9.5 EER	L	Full	<input type="checkbox"/>	\$182.00	\$627.00	\$809.00
N/A	Packaged AC, 25 Tons, 10.5 EER	L	Full	<input type="checkbox"/>	\$182.00	\$706.00	\$888.00
N/A	Packaged AC, 30 Tons, 9.5 EER	L	Full	<input type="checkbox"/>	\$180.00	\$626.00	\$806.00
N/A	Packaged AC, 30 Tons, 10.5 EER	L	Full	<input type="checkbox"/>	\$180.00	\$704.00	\$884.00
Packaged AC, 15 Tons, 8.5 EER	Packaged AC, 15 Tons, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$91.00	\$91.00
Packaged AC, 15 Tons, 8.5 EER	Packaged AC, 15 Tons, 10.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$170.00	\$170.00
Packaged AC, 20 Tons, 8.5 EER	Packaged AC, 20 Tons, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$92.00	\$92.00
Packaged AC, 20 Tons, 8.5 EER	Packaged AC, 20 Tons, 10.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$171.00	\$171.00
Packaged AC, 25 Tons, 8.5 EER	Packaged AC, 25 Tons, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$92.00	\$92.00
Packaged AC, 25 Tons, 8.5 EER	Packaged AC, 25 Tons, 10.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$171.00	\$171.00
Packaged AC, 30 Tons, 8.5 EER	Packaged AC, 30 Tons, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$92.00	\$92.00
Packaged AC, 30 Tons, 8.5 EER	Packaged AC, 30 Tons, 10.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$171.00	\$171.00


HVAC // Equipment // AC - Package // Packaged >= 65,000 Btuh

Sector : Commercial
Channel : Contractor

Method : Regression plus Markup
No. Obs. : 188

Cost Unit : \$/Ton
Vintage : New

CCIG: CHE-35

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
Packaged AC, 10 Tons, 8.9 EER	N/A	L	Full	<input type="checkbox"/>	\$288.00	\$552.00	\$840.00
N/A	Packaged AC, 10 Tons, 9.9 EER	L	Full	<input type="checkbox"/>	\$288.00	\$644.00	\$932.00
N/A	Packaged AC, 10 Tons, 10.9 EER	L	Full	<input type="checkbox"/>	\$288.00	\$723.00	\$1,011.00
Packaged AC, 10 Tons, 8.9 EER	Packaged AC, 10 Tons, 9.9 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$92.00	\$92.00
Packaged AC, 10 Tons, 8.9 EER	Packaged AC, 10 Tons, 10.9 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$171.00	\$171.00


HVAC // Equipment // AC - Package // Packaged<65,000 Btuh

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 188

Cost Unit : \$/Unit
Vintage : New

CCIG: RHE-33

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
DX-Air Cooled, Packaged, 2.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$650.00	\$1,428.00	\$2,078.00
DX-Air Cooled, Packaged, 3.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$741.00	\$1,795.00	\$2,536.00
DX-Air Cooled, Packaged, 4.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$865.00	\$2,163.00	\$3,028.00
DX-Air Cooled, Packaged, 5.0 Tons, 10 SEER	N/A	H	Full	<input type="checkbox"/>	\$1,300.00	\$2,530.00	\$3,830.00
N/A	DX-Air Cooled, Packaged, 2.0 Tons, 12 SEER	H	Full	<input checked="" type="checkbox"/>	\$650.00	\$1,668.00	\$2,318.00
N/A	DX-Air Cooled, Packaged, 2.0 Tons, 13 SEER	H	Full	<input checked="" type="checkbox"/>	\$650.00	\$1,744.00	\$2,394.00
N/A	DX-Air Cooled, Packaged, 2.0 Tons, 14+ SEER	H	Full	<input checked="" type="checkbox"/>	\$650.00	\$2,271.00	\$2,921.00
N/A	DX-Air Cooled, Packaged, 3.0 Tons, 12 SEER	H	Full	<input checked="" type="checkbox"/>	\$741.00	\$2,156.00	\$2,897.00
N/A	DX-Air Cooled, Packaged, 3.0 Tons, 13 SEER	H	Full	<input checked="" type="checkbox"/>	\$741.00	\$2,270.00	\$3,011.00
N/A	DX-Air Cooled, Packaged, 3.0 Tons, 14+ SEER	H	Full	<input checked="" type="checkbox"/>	\$741.00	\$3,060.00	\$3,801.00
N/A	DX-Air Cooled, Packaged, 4.0 Tons, 12 SEER	H	Full	<input checked="" type="checkbox"/>	\$865.00	\$2,644.00	\$3,509.00
N/A	DX-Air Cooled, Packaged, 4.0 Tons, 13 SEER	H	Full	<input checked="" type="checkbox"/>	\$865.00	\$2,795.00	\$3,660.00
N/A	DX-Air Cooled, Packaged, 4.0 Tons, 14+ SEER	H	Full	<input checked="" type="checkbox"/>	\$865.00	\$3,849.00	\$4,714.00
N/A	DX-Air Cooled, Packaged, 5.0 Tons, 12 SEER	H	Full	<input checked="" type="checkbox"/>	\$1,300.00	\$3,132.00	\$4,432.00
N/A	DX-Air Cooled, Packaged, 5.0 Tons, 13 SEER	H	Full	<input checked="" type="checkbox"/>	\$1,300.00	\$3,321.00	\$4,621.00
N/A	DX-Air Cooled, Packaged, 5.0 Tons, 14+ SEER	H	Full	<input checked="" type="checkbox"/>	\$1,300.00	\$4,638.00	\$5,938.00
DX-Air Cooled, Packaged, 2.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 2.0 Tons, 12 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$241.00	\$241.00
DX-Air Cooled, Packaged, 2.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 2.0 Tons, 13 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$316.00	\$316.00
DX-Air Cooled, Packaged, 2.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 2.0 Tons, 14+ SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$843.00	\$843.00
DX-Air Cooled, Packaged, 3.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 3.0 Tons, 12 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$361.00	\$361.00
DX-Air Cooled, Packaged, 3.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 3.0 Tons, 13 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$474.00	\$474.00
DX-Air Cooled, Packaged, 3.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 3.0 Tons, 14+ SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$1,264.00	\$1,264.00
DX-Air Cooled, Packaged, 4.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 4.0 Tons, 12 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$481.00	\$481.00
DX-Air Cooled, Packaged, 4.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 4.0 Tons, 13 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$633.00	\$633.00
DX-Air Cooled, Packaged, 4.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 4.0 Tons, 14+ SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$1,686.00	\$1,686.00
DX-Air Cooled, Packaged, 5.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 5.0 Tons, 12 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$602.00	\$602.00
DX-Air Cooled, Packaged, 5.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 5.0 Tons, 13 SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$791.00	\$791.00
DX-Air Cooled, Packaged, 5.0 Tons, 10 SEER	DX-Air Cooled, Packaged, 5.0 Tons, 14+ SEER	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$2,107.00	\$2,107.00


HVAC // Equipment // Boiler // 100-600kBtuh

Sector : Commercial
Channel : Contractor

Method : Regression plus Markup
No. Obs. : 10

Cost Unit : \$/Unit
Vintage : All

CCIG: CWE-20

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Boiler, 100 kBtuh, 83% AFUE	N/A	L	Full	<input type="checkbox"/>		\$2,292.00	
Boiler, 200 kBtuh, 85% AFUE	N/A	L	Full	<input type="checkbox"/>		\$3,270.00	
Boiler, 600 kBtuh, 84% AFUE	N/A	L	Full	<input type="checkbox"/>		\$11,925.00	
N/A	Boiler, 100 kBtuh, 95% AFUE	L	Full	<input type="checkbox"/>		\$2,700.00	
N/A	Boiler, 200 kBtuh, 88% AFUE	L	Full	<input type="checkbox"/>		\$3,500.00	
N/A	Boiler, 600 kBtuh, 97% AFUE	L	Full	<input type="checkbox"/>		\$16,473.00	
Boiler, 100 kBtuh, 83% AFUE	Boiler, 100 kBtuh, 95% AFUE	L	Inc	<input type="checkbox"/>		\$408.00	
Boiler, 200 kBtuh, 85% AFUE	Boiler, 200 kBtuh, 88% AFUE	L	Inc	<input type="checkbox"/>		\$230.00	
Boiler, 600 kBtuh, 84% AFUE	Boiler, 600 kBtuh, 97% AFUE	L	Inc	<input type="checkbox"/>		\$4,548.00	


HVAC // Equipment // Chiller-Absorption // 1-Stage<300 Tons

Sector : Commercial
Channel : Contractor

Method : Regression plus Markup
No. Obs. : 8


Cost Unit : \$/Ton
Vintage : ROB

CCIG: CHE-28

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Absorption Chiller, 1-Stage, 1.00 COP, 150 tons	L	Full	<input type="checkbox"/>	\$157.00	\$854.00	\$1,012.00


HVAC // Equipment // Chiller-Absorption // 1-Stage>=300 Tons

Sector : Commercial Method : Regression plus Markup Cost Unit : \$/Ton CCIG: CHE-28
Channel : Contractor No. Obs. : 8 Vintage : ROB

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Absorption Chiller, 1-Stage, 1.00 COP, 300 tons	L	Full	<input type="checkbox"/>	\$90.00	\$674.00	\$764.00


HVAC // Equipment // Chiller-Absorption // 2-Stage<300 Tons

Sector : Commercial Method : Regression plus Markup Cost Unit : \$/Ton CCIG: CHE-28
Channel : Contractor No. Obs. : 8 Vintage : ROB

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Absorption Chiller, 2-Stage, 1.05 COP, 150 tons	L	Full	<input type="checkbox"/>	\$197.00	\$1,347.00	\$1,544.00

HVAC // Equipment // Chiller-Absorption // 2-Stage>=300 Tons

Sector : Commercial Method : Regression plus Markup Cost Unit : \$/Ton CCIG: CHE-28
Channel : Contractor No. Obs. : 8 Vintage : ROB

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Absorption Chiller, 2-Stage, 1.05 COP, 300 tons	L	Full	<input type="checkbox"/>	\$113.00	\$829.00	\$942.00


HVAC // Equipment // Chiller-Centrifugal-Water Cooled // >= 300 tons

Sector : Commercial
Channel : Contractor

Method : Regression plus Markup
No. Obs. : 45

Cost Unit : \$/Ton
Vintage : New

CCIG: CHE-34

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Water Cooled Centrifugal Chillers, 300 tons, Base 0.65 kW/ton	N/A	L	Full	<input type="checkbox"/>		\$283.00	
Water Cooled Centrifugal Chillers, 500 tons, Base 0.65 kW/ton	N/A	L	Full	<input type="checkbox"/>		\$220.00	
Water Cooled Centrifugal Chillers, 750 tons, Base 0.65 kW/ton	N/A	L	Full	<input type="checkbox"/>		\$193.00	
N/A	Water Cooled Centrifugal Chillers, 300 tons, Base 0.47 kW/ton	L	Full	<input type="checkbox"/>		\$353.00	
N/A	Water Cooled Centrifugal Chillers, 300 tons, Base 0.51 kW/ton	L	Full	<input type="checkbox"/>		\$343.00	
N/A	Water Cooled Centrifugal Chillers, 300 tons, Base 0.54 kW/ton	L	Full	<input type="checkbox"/>		\$337.00	
N/A	Water Cooled Centrifugal Chillers, 300 tons, Base 0.61 kW/ton	L	Full	<input type="checkbox"/>		\$297.00	
N/A	Water Cooled Centrifugal Chillers, 500 tons, Base 0.47 kW/ton	L	Full	<input type="checkbox"/>		\$259.00	
N/A	Water Cooled Centrifugal Chillers, 500 tons, Base 0.51 kW/ton	L	Full	<input type="checkbox"/>		\$255.00	
N/A	Water Cooled Centrifugal Chillers, 500 tons, Base 0.54 kW/ton	L	Full	<input type="checkbox"/>		\$249.00	
N/A	Water Cooled Centrifugal Chillers, 500 tons, Base 0.61 kW/ton	L	Full	<input type="checkbox"/>		\$232.00	
N/A	Water Cooled Centrifugal Chillers, 750 tons, Base 0.47 kW/ton	L	Full	<input type="checkbox"/>		\$248.00	
N/A	Water Cooled Centrifugal Chillers, 750 tons, Base 0.51 kW/ton	L	Full	<input type="checkbox"/>		\$237.00	
N/A	Water Cooled Centrifugal Chillers, 750 tons, Base 0.54 kW/ton	L	Full	<input type="checkbox"/>		\$213.00	
N/A	Water Cooled Centrifugal Chillers, 750 tons, Base 0.61 kW/ton	L	Full	<input type="checkbox"/>		\$198.00	
Water Cooled Centrifugal Chillers, 300 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 300 tons, Base 0.47 kW/ton	L	Inc	<input type="checkbox"/>		\$70.00	
Water Cooled Centrifugal Chillers, 300 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 300 tons, Base 0.51 kW/ton	L	Inc	<input type="checkbox"/>		\$60.00	
Water Cooled Centrifugal Chillers, 300 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 300 tons, Base 0.54 kW/ton	L	Inc	<input type="checkbox"/>		\$54.00	
Water Cooled Centrifugal Chillers, 300 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 300 tons, Base 0.61 kW/ton	L	Inc	<input type="checkbox"/>		\$14.00	
Water Cooled Centrifugal Chillers, 500 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 500 tons, Base 0.47 kW/ton	L	Inc	<input type="checkbox"/>		\$38.00	
Water Cooled Centrifugal Chillers, 500 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 500 tons, Base 0.51 kW/ton	L	Inc	<input type="checkbox"/>		\$35.00	
Water Cooled Centrifugal Chillers, 500 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 500 tons, Base 0.54 kW/ton	L	Inc	<input type="checkbox"/>		\$28.00	
Water Cooled Centrifugal Chillers, 500 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 500 tons, Base 0.61 kW/ton	L	Inc	<input type="checkbox"/>		\$12.00	
Water Cooled Centrifugal Chillers, 750 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 750 tons, Base 0.47 kW/ton	L	Inc	<input type="checkbox"/>		\$55.00	
Water Cooled Centrifugal Chillers, 750 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 750 tons, Base 0.51 kW/ton	L	Inc	<input type="checkbox"/>		\$44.00	
Water Cooled Centrifugal Chillers, 750 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 750 tons, Base 0.54 kW/ton	L	Inc	<input type="checkbox"/>		\$20.00	
Water Cooled Centrifugal Chillers, 750 tons, Base 0.65 kW/ton	Water Cooled Centrifugal Chillers, 750 tons, Base 0.61 kW/ton	L	Inc	<input type="checkbox"/>		\$5.00	


HVAC // Equipment // Cooling Tower // Approach Temperature

Sector : Commercial
Channel : Contractor

Method : Weighted Average plus Markup
No. Obs. : 54

Cost Unit : \$/Ton
Vintage : ROB

CCIG: CHE-13

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Cooling Tower, 150 tons, 12 Deg. F. Approach Temp.	N/A	L	Full	<input type="checkbox"/>	\$74.00	\$208.00	\$282.00
Cooling Tower, 200 tons, 12 Deg. F. Approach Temp.	N/A	L	Full	<input type="checkbox"/>	\$70.00	\$167.00	\$237.00
Cooling Tower, 300 tons, 12 Deg. F. Approach Temp.	N/A	L	Full	<input type="checkbox"/>	\$66.00	\$148.00	\$215.00
N/A	Cooling Tower, 150 tons, 6 Deg. F. Approach Temp.	L	Full	<input type="checkbox"/>	\$74.00	\$220.00	\$293.00
N/A	Cooling Tower, 200 tons, 6 Deg. F. Approach Temp.	L	Full	<input type="checkbox"/>	\$70.00	\$192.00	\$262.00
N/A	Cooling Tower, 300 tons, 6 Deg. F. Approach Temp.	L	Full	<input type="checkbox"/>	\$66.00	\$173.00	\$239.00
Cooling Tower, 150 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 150 tons, 6 Deg. F. Approach Temp.	L	Inc	<input type="checkbox"/>	\$0.00	\$11.00	\$11.00
Cooling Tower, 200 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 200 tons, 6 Deg. F. Approach Temp.	L	Inc	<input type="checkbox"/>	\$0.00	\$25.00	\$25.00
Cooling Tower, 300 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 300 tons, 6 Deg. F. Approach Temp.	L	Inc	<input type="checkbox"/>	\$0.00	\$25.00	\$25.00


HVAC // Equipment // Cooling Tower // Two-Speed Motor

Sector : Commercial
Channel : Contractor

Method : Weighted Average plus Markup
No. Obs. : 54

Cost Unit : \$/Ton
Vintage : ROB

CCIG: CHE-55

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Cooling Tower, 150 tons, 6 Deg. F. Approach Temp., 2-Speed Motor	L	Full	<input type="checkbox"/>	\$74.00	\$232.00	\$305.00
N/A	Cooling Tower, 150 tons, 12 Deg. F. Approach Temp., 2-Speed Motor	L	Full	<input type="checkbox"/>	\$74.00	\$220.00	\$293.00
N/A	Cooling Tower, 200 tons, 6 Deg. F. Approach Temp., 2-Speed Motor	L	Full	<input type="checkbox"/>	\$70.00	\$201.00	\$271.00
N/A	Cooling Tower, 200 tons, 12 Deg. F. Approach Temp., 2-Speed Motor	L	Full	<input type="checkbox"/>	\$70.00	\$176.00	\$246.00
N/A	Cooling Tower, 300 tons, 6 Deg. F. Approach Temp., 2-Speed Motor	L	Full	<input type="checkbox"/>	\$66.00	\$179.00	\$246.00
N/A	Cooling Tower, 300 tons, 12 Deg. F. Approach Temp., 2-Speed Motor	L	Full	<input type="checkbox"/>	\$66.00	\$154.00	\$220.00
Cooling Tower, 150 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 150 tons, 6 Deg. F. Approach Temp., 2-Speed Motor	L	Inc	<input type="checkbox"/>	\$0.00	\$24.00	\$24.00
Cooling Tower, 150 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 150 tons, 12 Deg. F. Approach Temp., 2-Speed Motor	L	Inc	<input type="checkbox"/>	\$0.00	\$12.00	\$12.00
Cooling Tower, 200 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 200 tons, 6 Deg. F. Approach Temp., 2-Speed Motor	L	Inc	<input type="checkbox"/>	\$0.00	\$34.00	\$34.00
Cooling Tower, 200 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 200 tons, 12 Deg. F. Approach Temp., 2-Speed Motor	L	Inc	<input type="checkbox"/>	\$0.00	\$9.00	\$9.00
Cooling Tower, 300 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 300 tons, 6 Deg. F. Approach Temp., 2-Speed Motor	L	Inc	<input type="checkbox"/>	\$0.00	\$31.00	\$31.00
Cooling Tower, 300 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 300 tons, 12 Deg. F. Approach Temp., 2-Speed Motor	L	Inc	<input type="checkbox"/>	\$0.00	\$6.00	\$6.00


HVAC // Equipment // Cooling Tower // VSD

Sector : Commercial
Channel : Contractor

Method : Weighted Average plus Markup
No. Obs. : 54

Cost Unit : \$/Ton
Vintage : ROB

CCIG: CHE-59

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Cooling Tower, 150 tons, 6 Deg. F. Approach Temp., Variable-Speed Mot	L	Full	<input type="checkbox"/>	\$74.00	\$262.00	\$336.00
N/A	Cooling Tower, 150 tons, 12 Deg. F. Approach Temp., Variable-Speed Mot	L	Full	<input type="checkbox"/>	\$74.00	\$248.00	\$322.00
N/A	Cooling Tower, 200 tons, 6 Deg. F. Approach Temp., Variable-Speed Mot	L	Full	<input type="checkbox"/>	\$70.00	\$228.00	\$298.00
N/A	Cooling Tower, 200 tons, 12 Deg. F. Approach Temp., Variable-Speed Mot	L	Full	<input type="checkbox"/>	\$70.00	\$197.00	\$267.00
N/A	Cooling Tower, 300 tons, 6 Deg. F. Approach Temp., Variable-Speed Mot	L	Full	<input type="checkbox"/>	\$66.00	\$201.00	\$267.00
N/A	Cooling Tower, 300 tons, 12 Deg. F. Approach Temp., Variable-Speed Mot	L	Full	<input type="checkbox"/>	\$66.00	\$170.00	\$236.00
Cooling Tower, 150 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 150 tons, 6 Deg. F. Approach Temp., Variable-Speed Mot	L	Inc	<input type="checkbox"/>	\$0.00	\$54.00	\$54.00
Cooling Tower, 150 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 150 tons, 12 Deg. F. Approach Temp., Variable-Speed Mot	L	Inc	<input type="checkbox"/>	\$0.00	\$40.00	\$40.00
Cooling Tower, 200 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 200 tons, 6 Deg. F. Approach Temp., Variable-Speed Mot	L	Inc	<input type="checkbox"/>	\$0.00	\$62.00	\$62.00
Cooling Tower, 200 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 200 tons, 12 Deg. F. Approach Temp., Variable-Speed Mot	L	Inc	<input type="checkbox"/>	\$0.00	\$31.00	\$31.00
Cooling Tower, 300 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 300 tons, 6 Deg. F. Approach Temp., Variable-Speed Mot	L	Inc	<input type="checkbox"/>	\$0.00	\$53.00	\$53.00
Cooling Tower, 300 tons, 12 Deg. F. Approach Temp.	Cooling Tower, 300 tons, 12 Deg. F. Approach Temp., Variable-Speed Mot	L	Inc	<input type="checkbox"/>	\$0.00	\$21.00	\$21.00


HVAC // Equipment // Evaporative Systems // Direct

Sector : Commercial
Channel : Contractor

Method : Regression plus Markup
No. Obs. : 44


Cost Unit : \$/Unit
Vintage : All

CCIG: CHE-23

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Direct Evaporative Air Conditioner, 4000 CFM	L	Full	<input type="checkbox"/>		\$840.00	
N/A	Direct Evaporative Air Conditioner, 6000 CFM	L	Full	<input type="checkbox"/>		\$1,080.00	
N/A	Direct Evaporative Air Conditioner, 8000 CFM	L	Full	<input type="checkbox"/>		\$1,320.00	
N/A	Direct Evaporative Air Conditioner, 12000 CFM	L	Full	<input type="checkbox"/>		\$1,920.00	


HVAC // Equipment // Evaporative Systems // Evaporative Systems

Sector : Residential Method : Unweighted Average Cost Unit : \$/Unit CCIG: CHE-23
 Channel : Utility Files No. Obs. : 1 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low Income, Direct Evaporative Cooler	H	Full	<input type="checkbox"/>			\$560.00


HVAC // Equipment // Evaporative Systems // Indirect

Sector : Commercial Method : Regression plus Markup Cost Unit : \$/Unit CCIG: CHE-23
 Channel : Contractor No. Obs. : 44 Vintage : All

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Indirect Evaporative Air Conditioner, 4000 CFM	L	Full	<input type="checkbox"/>		\$1,522.00	
N/A	Indirect Evaporative Air Conditioner, 6000 CFM	L	Full	<input type="checkbox"/>		\$2,158.00	
N/A	Indirect Evaporative Air Conditioner, 8000 CFM	L	Full	<input type="checkbox"/>		\$2,794.00	
N/A	Indirect Evaporative Air Conditioner, 12000 CFM	L	Full	<input type="checkbox"/>		\$4,066.00	

HVAC // Equipment // Evaporative Systems // Indirect-Direct

Sector : Commercial Method : Regression plus Markup Cost Unit : \$/Unit CCIG: CHE-23
 Channel : Contractor No. Obs. : 44 Vintage : All

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Indirect/Direct Evaporative Air Conditioner, 4000 CFM	L	Full	<input type="checkbox"/>		\$2,346.00	
N/A	Indirect/Direct Evaporative Air Conditioner, 6000 CFM	L	Full	<input type="checkbox"/>		\$3,412.00	
N/A	Indirect/Direct Evaporative Air Conditioner, 8000 CFM	L	Full	<input type="checkbox"/>		\$4,466.00	
N/A	Indirect/Direct Evaporative Air Conditioner, 12000 CFM	L	Full	<input type="checkbox"/>		\$6,574.00	


HVAC // Equipment // Furnace-Warm Air // Furnaces-Warm Air <225,000 Btuh

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 62

Cost Unit : \$/Unit
Vintage : New

CCIG: RHE-36

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Furnace-Warm Air, Standard, 60 kBtu, 80 AFUE	N/A	L	Full	<input type="checkbox"/>	\$267.00	\$433.00	\$700.00
Furnace-Warm Air, Standard, 80 kBtu, 80 AFUE	N/A	L	Full	<input type="checkbox"/>	\$293.00	\$495.00	\$788.00
Furnace-Warm Air, Standard, 100 kBtu, 80 AFUE	N/A	L	Full	<input type="checkbox"/>	\$325.00	\$557.00	\$882.00
Furnace-Warm Air, Standard, 120 kBtu, 80 AFUE	N/A	L	Full	<input type="checkbox"/>	\$345.00	\$619.00	\$964.00
Furnace-Warm Air, Standard, 140 kBtu, 80 AFUE	N/A	L	Full	<input type="checkbox"/>	\$351.00	\$681.00	\$1,032.00
Furnace-Warm Air, Standard, 160 kBtu, 80 AFUE	N/A	L	Full	<input type="checkbox"/>	\$358.00	\$743.00	\$1,101.00
N/A	Furnace-Warm Air, Condensing, 60 kBtu, 90 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$267.00	\$1,048.00	\$1,315.00
N/A	Furnace-Warm Air, Condensing, 60 kBtu, 92 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$267.00	\$1,067.00	\$1,334.00
N/A	Furnace-Warm Air, Condensing, 60 kBtu, 93+ AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$267.00	\$1,219.00	\$1,486.00
N/A	Furnace-Warm Air, Condensing, 80 kBtu, 90 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$293.00	\$1,149.00	\$1,442.00
N/A	Furnace-Warm Air, Condensing, 80 kBtu, 92 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$293.00	\$1,174.00	\$1,467.00
N/A	Furnace-Warm Air, Condensing, 80 kBtu, 93+ AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$293.00	\$1,377.00	\$1,670.00
N/A	Furnace-Warm Air, Condensing, 100 kBtu, 90 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$325.00	\$1,250.00	\$1,575.00
N/A	Furnace-Warm Air, Condensing, 100 kBtu, 92 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$325.00	\$1,281.00	\$1,606.00
N/A	Furnace-Warm Air, Condensing, 100 kBtu, 93+ AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$325.00	\$1,534.00	\$1,859.00
N/A	Furnace-Warm Air, Condensing, 120 kBtu, 90 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$345.00	\$1,350.00	\$1,695.00
N/A	Furnace-Warm Air, Condensing, 120 kBtu, 92 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$345.00	\$1,388.00	\$1,733.00
N/A	Furnace-Warm Air, Condensing, 120 kBtu, 93+ AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$345.00	\$1,692.00	\$2,037.00
N/A	Furnace-Warm Air, Condensing, 140 kBtu, 90 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$351.00	\$1,451.00	\$1,802.00
N/A	Furnace-Warm Air, Condensing, 140 kBtu, 92 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$351.00	\$1,495.00	\$1,846.00
N/A	Furnace-Warm Air, Condensing, 140 kBtu, 93+ AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$351.00	\$1,849.00	\$2,200.00
N/A	Furnace-Warm Air, Condensing, 160 kBtu, 90 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$358.00	\$1,551.00	\$1,909.00
N/A	Furnace-Warm Air, Condensing, 160 kBtu, 92 AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$358.00	\$1,602.00	\$1,960.00
N/A	Furnace-Warm Air, Condensing, 160 kBtu, 93+ AFUE, VSD	L	Full	<input checked="" type="checkbox"/>	\$358.00	\$2,007.00	\$2,365.00
Furnace-Warm Air, Standard, 60 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 60 kBtu, 90 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$616.00	\$616.00
Furnace-Warm Air, Standard, 60 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 60 kBtu, 92 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$635.00	\$635.00
Furnace-Warm Air, Standard, 60 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 60 kBtu, 93+ AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$787.00	\$787.00
Furnace-Warm Air, Standard, 80 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 80 kBtu, 90 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$654.00	\$654.00
Furnace-Warm Air, Standard, 80 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 80 kBtu, 92 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$680.00	\$680.00
Furnace-Warm Air, Standard, 80 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 80 kBtu, 93+ AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$882.00	\$882.00
Furnace-Warm Air, Standard, 100 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 100 kBtu, 90 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$693.00	\$693.00
Furnace-Warm Air, Standard, 100 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 100 kBtu, 92 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$724.00	\$724.00
Furnace-Warm Air, Standard, 100 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 100 kBtu, 93+ AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$978.00	\$978.00
Furnace-Warm Air, Standard, 120 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 120 kBtu, 90 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$731.00	\$731.00
Furnace-Warm Air, Standard, 120 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 120 kBtu, 92 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$769.00	\$769.00
Furnace-Warm Air, Standard, 120 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 120 kBtu, 93+ AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$1,073.00	\$1,073.00
Furnace-Warm Air, Standard, 140 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 140 kBtu, 90 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$770.00	\$770.00
Furnace-Warm Air, Standard, 140 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 140 kBtu, 92 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$814.00	\$814.00


HVAC // Equipment // Furnace-Warm Air // Furnaces-Warm Air <225,000 Btuh

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 62

Cost Unit : \$/Unit
Vintage : New

CCIG: RHE-36

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Furnace-Warm Air, Standard, 140 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 140 kBtu, 93+ AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$1,168.00	\$1,168.00
Furnace-Warm Air, Standard, 160 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 160 kBtu, 90 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$808.00	\$808.00
Furnace-Warm Air, Standard, 160 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 160 kBtu, 92 AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$859.00	\$859.00
Furnace-Warm Air, Standard, 160 kBtu, 80 AFUE	Furnace-Warm Air, Condensing, 160 kBtu, 93+ AFUE, VSD	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$1,264.00	\$1,264.00


HVAC // Equipment // Heat Pump - Package // Packaged >= 135,000 Btuh <= 760,000 Btuh

Sector : Commercial
Channel : Contractor

Method : Regression plus Markup
No. Obs. : 61

Cost Unit : \$/Ton
Vintage : New

CCIG: CHE-21

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Packaged HP, 15 Tons, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$365.00	\$568.00	\$933.00
Packaged HP, 20 Tons, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$361.00	\$563.00	\$924.00
Packaged HP, 25 Tons, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$356.00	\$560.00	\$916.00
Packaged HP, 30 Tons, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$351.00	\$558.00	\$909.00
N/A	Packaged HP, 15 Tons, 9.5 EER	L	Full	<input type="checkbox"/>	\$365.00	\$660.00	\$1,025.00
N/A	Packaged HP, 15 Tons, 10.5 EER	L	Full	<input type="checkbox"/>	\$365.00	\$739.00	\$1,104.00
N/A	Packaged HP, 20 Tons, 9.5 EER	L	Full	<input type="checkbox"/>	\$361.00	\$655.00	\$1,016.00
N/A	Packaged HP, 20 Tons, 10.5 EER	L	Full	<input type="checkbox"/>	\$361.00	\$734.00	\$1,095.00
N/A	Packaged HP, 25 Tons, 9.5 EER	L	Full	<input type="checkbox"/>	\$356.00	\$652.00	\$1,008.00
N/A	Packaged HP, 25 Tons, 10.5 EER	L	Full	<input type="checkbox"/>	\$356.00	\$731.00	\$1,087.00
N/A	Packaged HP, 30 Tons, 9.5 EER	L	Full	<input type="checkbox"/>	\$351.00	\$650.00	\$1,001.00
N/A	Packaged HP, 30 Tons, 10.5 EER	L	Full	<input type="checkbox"/>	\$351.00	\$729.00	\$1,080.00
Packaged HP, 15 Tons, 8.5 EER	Packaged HP, 15 Tons, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$92.00	\$92.00
Packaged HP, 15 Tons, 8.5 EER	Packaged HP, 15 Tons, 10.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$171.00	\$171.00
Packaged HP, 20 Tons, 8.5 EER	Packaged HP, 20 Tons, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$92.00	\$92.00
Packaged HP, 20 Tons, 8.5 EER	Packaged HP, 20 Tons, 10.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$171.00	\$171.00
Packaged HP, 25 Tons, 8.5 EER	Packaged HP, 25 Tons, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$92.00	\$92.00
Packaged HP, 25 Tons, 8.5 EER	Packaged HP, 25 Tons, 10.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$171.00	\$171.00
Packaged HP, 30 Tons, 8.5 EER	Packaged HP, 30 Tons, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$92.00	\$92.00
Packaged HP, 30 Tons, 8.5 EER	Packaged HP, 30 Tons, 10.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$171.00	\$171.00


HVAC // Equipment // Heat Pump - Package // Packaged >= 65,000 Btuh

Sector : Commercial
Channel : Contractor

Method : Regression plus Markup
No. Obs. : 61

Cost Unit : \$/Ton
Vintage : New

CCIG: CHE-21

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Packaged HP, 10 Tons, 8.9 EER	N/A	L	Full	<input type="checkbox"/>	\$558.00	\$577.00	\$1,135.00
N/A	Packaged HP, 10 Tons, 9.9 EER	L	Full	<input type="checkbox"/>	\$558.00	\$669.00	\$1,227.00
N/A	Packaged HP, 10 Tons, 10.9 EER	L	Full	<input type="checkbox"/>	\$558.00	\$748.00	\$1,306.00
Packaged HP, 10 Tons, 8.9 EER	Packaged HP, 10 Tons, 9.9 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$92.00	\$92.00
Packaged HP, 10 Tons, 8.9 EER	Packaged HP, 10 Tons, 10.9 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$171.00	\$171.00


HVAC // Equipment // Heat Pump - Package // Packaged < 65,000 Btuh

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 61

Cost Unit : \$/Unit
Vintage : All

CCIG: RHE-20

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Air-Cooled Packaged HP, 5.0 Tons, 9.7 SEER	N/A	L	Full	<input type="checkbox"/>		\$2,469.00	
N/A	Air-Cooled Packaged HP, 5.0 Tons, 11.7 SEER	L	Full	<input type="checkbox"/>		\$3,037.00	
N/A	Air-Cooled Packaged HP, 5.0 Tons, 12.7 SEER	L	Full	<input checked="" type="checkbox"/>		\$3,168.00	
Air-Cooled Packaged HP, 5.0 Tons, 9.7 SEER	Air-Cooled Packaged HP, 5.0 Tons, 11.7 SEER	L	Inc	<input type="checkbox"/>		\$569.00	
Air-Cooled Packaged HP, 5.0 Tons, 9.7 SEER	Air-Cooled Packaged HP, 5.0 Tons, 12.7 SEER	L	Inc	<input checked="" type="checkbox"/>		\$700.00	


HVAC // Equipment // Heat Pump - Split // Split-System<65,000 Btuh

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 61

Cost Unit : \$/Unit
Vintage : All

CCIG: RHE-07

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Air-Cooled Split System HP, 2.0 Tons, 10.0 SEER	N/A	L	Full	<input type="checkbox"/>		\$1,082.00	
Air-Cooled Split System HP, 3.0 Tons, 10.0 SEER	N/A	L	Full	<input type="checkbox"/>		\$1,392.00	
Air-Cooled Split System HP, 4.0 Tons, 10.0 SEER	N/A	L	Full	<input type="checkbox"/>		\$1,703.00	
Air-Cooled Split System HP, 5.0 Tons, 10.0 SEER	N/A	L	Full	<input type="checkbox"/>		\$2,013.00	
N/A	Air-Cooled Split System HP, 2.0 Tons, 12.0 SEER	L	Full	<input checked="" type="checkbox"/>		\$1,309.00	
N/A	Air-Cooled Split System HP, 2.0 Tons, 13.0 SEER	L	Full	<input checked="" type="checkbox"/>		\$1,362.00	
N/A	Air-Cooled Split System HP, 3.0 Tons, 12.0 SEER	L	Full	<input checked="" type="checkbox"/>		\$1,734.00	
N/A	Air-Cooled Split System HP, 3.0 Tons, 13.0 SEER	L	Full	<input checked="" type="checkbox"/>		\$1,812.00	
N/A	Air-Cooled Split System HP, 4.0 Tons, 12.0 SEER	L	Full	<input checked="" type="checkbox"/>		\$2,158.00	
N/A	Air-Cooled Split System HP, 4.0 Tons, 13.0 SEER	L	Full	<input checked="" type="checkbox"/>		\$2,263.00	
N/A	Air-Cooled Split System HP, 5.0 Tons, 12.0 SEER	L	Full	<input checked="" type="checkbox"/>		\$2,582.00	
N/A	Air-Cooled Split System HP, 5.0 Tons, 13.0 SEER	L	Full	<input checked="" type="checkbox"/>		\$2,713.00	
Air-Cooled Split System HP, 2.0 Tons, 10.0 SEER	Air-Cooled Split System HP, 2.0 Tons, 12.0 SEER	L	Inc	<input checked="" type="checkbox"/>		\$228.00	
Air-Cooled Split System HP, 2.0 Tons, 10.0 SEER	Air-Cooled Split System HP, 2.0 Tons, 13.0 SEER	L	Inc	<input checked="" type="checkbox"/>		\$280.00	
Air-Cooled Split System HP, 3.0 Tons, 10.0 SEER	Air-Cooled Split System HP, 3.0 Tons, 12.0 SEER	L	Inc	<input checked="" type="checkbox"/>		\$341.00	
Air-Cooled Split System HP, 3.0 Tons, 10.0 SEER	Air-Cooled Split System HP, 3.0 Tons, 13.0 SEER	L	Inc	<input checked="" type="checkbox"/>		\$420.00	
Air-Cooled Split System HP, 4.0 Tons, 10.0 SEER	Air-Cooled Split System HP, 4.0 Tons, 12.0 SEER	L	Inc	<input checked="" type="checkbox"/>		\$455.00	
Air-Cooled Split System HP, 4.0 Tons, 10.0 SEER	Air-Cooled Split System HP, 4.0 Tons, 13.0 SEER	L	Inc	<input checked="" type="checkbox"/>		\$560.00	
Air-Cooled Split System HP, 5.0 Tons, 10.0 SEER	Air-Cooled Split System HP, 5.0 Tons, 12.0 SEER	L	Inc	<input checked="" type="checkbox"/>		\$569.00	
Air-Cooled Split System HP, 5.0 Tons, 10.0 SEER	Air-Cooled Split System HP, 5.0 Tons, 13.0 SEER	L	Inc	<input checked="" type="checkbox"/>		\$700.00	


HVAC // Equipment // Package Terminal AC // Room Air Conditioner

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 105

Cost Unit : \$/Unit
Vintage : All

CCIG: RHE-37

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Room Air Conditioner, 6 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$395.00	\$395.00
Room Air Conditioner, 7 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$427.00	\$427.00
Room Air Conditioner, 8 kBtuh, 9.0 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$458.00	\$458.00
Room Air Conditioner, 9 kBtuh, 9.0 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$489.00	\$489.00
Room Air Conditioner, 10 kBtuh, 9.0 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$520.00	\$520.00
Room Air Conditioner, 12 kBtuh, 9.0 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$582.00	\$582.00
Room Air Conditioner, 14 kBtuh, 8.8 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$644.00	\$644.00
Room Air Conditioner, 18 kBtuh, 8.8 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$768.00	\$768.00
Room Air Conditioner, 22 kBtuh, 8.2 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$893.00	\$893.00
N/A	Room Air Conditioner, 6 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$411.00	\$411.00
N/A	Room Air Conditioner, 6 kBtuh, 10.0 EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$461.00	\$461.00
N/A	Room Air Conditioner, 6 kBtuh, 10.5+ EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$598.00	\$598.00
N/A	Room Air Conditioner, 7 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$445.00	\$445.00
N/A	Room Air Conditioner, 7 kBtuh, 10.0 EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$502.00	\$502.00
N/A	Room Air Conditioner, 7 kBtuh, 10.5+ EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$663.00	\$663.00
N/A	Room Air Conditioner, 8 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$479.00	\$479.00
N/A	Room Air Conditioner, 8 kBtuh, 10.5 EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$544.00	\$544.00
N/A	Room Air Conditioner, 8 kBtuh, 11.0+ EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$728.00	\$728.00
N/A	Room Air Conditioner, 9 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$513.00	\$513.00
N/A	Room Air Conditioner, 9 kBtuh, 10.5 EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$586.00	\$586.00
N/A	Room Air Conditioner, 9 kBtuh, 11.0+ EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$793.00	\$793.00
N/A	Room Air Conditioner, 10 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$546.00	\$546.00
N/A	Room Air Conditioner, 10 kBtuh, 10.5 EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$628.00	\$628.00
N/A	Room Air Conditioner, 10 kBtuh, 11.0+ EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$858.00	\$858.00
N/A	Room Air Conditioner, 12 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$614.00	\$614.00
N/A	Room Air Conditioner, 12 kBtuh, 10.5 EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$712.00	\$712.00
N/A	Room Air Conditioner, 12 kBtuh, 11.0+ EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$987.00	\$987.00
N/A	Room Air Conditioner, 14 kBtuh, 9.8 EER	L	Full	<input type="checkbox"/>	\$0.00	\$681.00	\$681.00
N/A	Room Air Conditioner, 14 kBtuh, 10.3 EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$796.00	\$796.00
N/A	Room Air Conditioner, 14 kBtuh, 10.8+ EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$1,117.00	\$1,117.00
N/A	Room Air Conditioner, 18 kBtuh, 9.8 EER	L	Full	<input type="checkbox"/>	\$0.00	\$816.00	\$816.00
N/A	Room Air Conditioner, 18 kBtuh, 10.3 EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$964.00	\$964.00
N/A	Room Air Conditioner, 18 kBtuh, 10.8+ EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$1,377.00	\$1,377.00
N/A	Room Air Conditioner, 22 kBtuh, 9.2 EER	L	Full	<input type="checkbox"/>	\$0.00	\$951.00	\$951.00
N/A	Room Air Conditioner, 22 kBtuh, 9.7 EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$1,131.00	\$1,131.00
N/A	Room Air Conditioner, 22 kBtuh, 10.2+ EER	L	Full	<input checked="" type="checkbox"/>	\$0.00	\$1,636.00	\$1,636.00
Room Air Conditioner, 6 kBtuh, 8.5 EER	Room Air Conditioner, 6 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$16.00	\$16.00
Room Air Conditioner, 6 kBtuh, 8.5 EER	Room Air Conditioner, 6 kBtuh, 10.0 EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$65.00	\$65.00


HVAC // Equipment // Package Terminal AC // Room Air Conditioner

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 105

Cost Unit : \$/Unit
Vintage : All

CCIG: RHE-37

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Room Air Conditioner, 6 kBtuh, 8.5 EER	Room Air Conditioner, 6 kBtuh, 10.5+ EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$203.00	\$203.00
Room Air Conditioner, 7 kBtuh, 8.5 EER	Room Air Conditioner, 7 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$19.00	\$19.00
Room Air Conditioner, 7 kBtuh, 8.5 EER	Room Air Conditioner, 7 kBtuh, 10.0 EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$76.00	\$76.00
Room Air Conditioner, 7 kBtuh, 8.5 EER	Room Air Conditioner, 7 kBtuh, 10.5+ EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$237.00	\$237.00
Room Air Conditioner, 8 kBtuh, 9.0 EER	Room Air Conditioner, 8 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$21.00	\$21.00
Room Air Conditioner, 8 kBtuh, 9.0 EER	Room Air Conditioner, 8 kBtuh, 10.5 EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$87.00	\$87.00
Room Air Conditioner, 8 kBtuh, 9.0 EER	Room Air Conditioner, 8 kBtuh, 11.0+ EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$270.00	\$270.00
Room Air Conditioner, 9 kBtuh, 9.0 EER	Room Air Conditioner, 9 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$24.00	\$24.00
Room Air Conditioner, 9 kBtuh, 9.0 EER	Room Air Conditioner, 9 kBtuh, 10.5 EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$98.00	\$98.00
Room Air Conditioner, 9 kBtuh, 9.0 EER	Room Air Conditioner, 9 kBtuh, 11.0+ EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$304.00	\$304.00
Room Air Conditioner, 10 kBtuh, 9.0 EER	Room Air Conditioner, 10 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$27.00	\$27.00
Room Air Conditioner, 10 kBtuh, 9.0 EER	Room Air Conditioner, 10 kBtuh, 10.5 EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$108.00	\$108.00
Room Air Conditioner, 10 kBtuh, 9.0 EER	Room Air Conditioner, 10 kBtuh, 11.0+ EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$338.00	\$338.00
Room Air Conditioner, 12 kBtuh, 9.0 EER	Room Air Conditioner, 12 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$32.00	\$32.00
Room Air Conditioner, 12 kBtuh, 9.0 EER	Room Air Conditioner, 12 kBtuh, 10.5 EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$130.00	\$130.00
Room Air Conditioner, 12 kBtuh, 9.0 EER	Room Air Conditioner, 12 kBtuh, 11.0+ EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$406.00	\$406.00
Room Air Conditioner, 14 kBtuh, 8.8 EER	Room Air Conditioner, 14 kBtuh, 9.8 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$37.00	\$37.00
Room Air Conditioner, 14 kBtuh, 8.8 EER	Room Air Conditioner, 14 kBtuh, 10.3 EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$152.00	\$152.00
Room Air Conditioner, 14 kBtuh, 8.8 EER	Room Air Conditioner, 14 kBtuh, 10.8+ EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$473.00	\$473.00
Room Air Conditioner, 18 kBtuh, 8.8 EER	Room Air Conditioner, 18 kBtuh, 9.8 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$48.00	\$48.00
Room Air Conditioner, 18 kBtuh, 8.8 EER	Room Air Conditioner, 18 kBtuh, 10.3 EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$195.00	\$195.00
Room Air Conditioner, 18 kBtuh, 8.8 EER	Room Air Conditioner, 18 kBtuh, 10.8+ EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$608.00	\$608.00
Room Air Conditioner, 22 kBtuh, 8.2 EER	Room Air Conditioner, 22 kBtuh, 9.2 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$58.00	\$58.00
Room Air Conditioner, 22 kBtuh, 8.2 EER	Room Air Conditioner, 22 kBtuh, 9.7 EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$239.00	\$239.00
Room Air Conditioner, 22 kBtuh, 8.2 EER	Room Air Conditioner, 22 kBtuh, 10.2+ EER	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$744.00	\$744.00


HVAC // Equipment // Package Terminal HP // Room Heat Pump

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 105

Cost Unit : \$/Unit
Vintage : New

CCIG: RHE-37

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Room Heat Pump, 6 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$523.00	\$523.00
Room Heat Pump, 7 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$575.00	\$575.00
Room Heat Pump, 8 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$627.00	\$627.00
Room Heat Pump, 9 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$680.00	\$680.00
Room Heat Pump, 10 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$732.00	\$732.00
Room Heat Pump, 12 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$836.00	\$836.00
Room Heat Pump, 14 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$941.00	\$941.00
Room Heat Pump, 18 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$1,150.00	\$1,150.00
Room Heat Pump, 22 kBtuh, 8.5 EER	N/A	L	Full	<input type="checkbox"/>	\$0.00	\$1,359.00	\$1,359.00
N/A	Room Heat Pump, 6 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$539.00	\$539.00
N/A	Room Heat Pump, 6 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$588.00	\$588.00
N/A	Room Heat Pump, 6 kBtuh, 10.5+ EER	L	Full	<input type="checkbox"/>	\$0.00	\$725.00	\$725.00
N/A	Room Heat Pump, 7 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$594.00	\$594.00
N/A	Room Heat Pump, 7 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$651.00	\$651.00
N/A	Room Heat Pump, 7 kBtuh, 10.5+ EER	L	Full	<input type="checkbox"/>	\$0.00	\$812.00	\$812.00
N/A	Room Heat Pump, 8 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$648.00	\$648.00
N/A	Room Heat Pump, 8 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$714.00	\$714.00
N/A	Room Heat Pump, 8 kBtuh, 10.5+ EER	L	Full	<input type="checkbox"/>	\$0.00	\$898.00	\$898.00
N/A	Room Heat Pump, 9 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$703.00	\$703.00
N/A	Room Heat Pump, 9 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$777.00	\$777.00
N/A	Room Heat Pump, 9 kBtuh, 10.5+ EER	L	Full	<input type="checkbox"/>	\$0.00	\$984.00	\$984.00
N/A	Room Heat Pump, 10 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$758.00	\$758.00
N/A	Room Heat Pump, 10 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$840.00	\$840.00
N/A	Room Heat Pump, 10 kBtuh, 10.5+ EER	L	Full	<input type="checkbox"/>	\$0.00	\$1,070.00	\$1,070.00
N/A	Room Heat Pump, 12 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$868.00	\$868.00
N/A	Room Heat Pump, 12 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$967.00	\$967.00
N/A	Room Heat Pump, 12 kBtuh, 10.5+ EER	L	Full	<input type="checkbox"/>	\$0.00	\$1,242.00	\$1,242.00
N/A	Room Heat Pump, 14 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$978.00	\$978.00
N/A	Room Heat Pump, 14 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$1,093.00	\$1,093.00
N/A	Room Heat Pump, 14 kBtuh, 10.5+ EER	L	Full	<input type="checkbox"/>	\$0.00	\$1,414.00	\$1,414.00
N/A	Room Heat Pump, 18 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$1,198.00	\$1,198.00
N/A	Room Heat Pump, 18 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$1,345.00	\$1,345.00
N/A	Room Heat Pump, 18 kBtuh, 10.5+ EER	L	Full	<input type="checkbox"/>	\$0.00	\$1,758.00	\$1,758.00
N/A	Room Heat Pump, 22 kBtuh, 9.5 EER	L	Full	<input type="checkbox"/>	\$0.00	\$1,418.00	\$1,418.00
N/A	Room Heat Pump, 22 kBtuh, 10.0 EER	L	Full	<input type="checkbox"/>	\$0.00	\$1,598.00	\$1,598.00
N/A	Room Heat Pump, 22 kBtuh, 10.5+ EER	L	Full	<input type="checkbox"/>	\$0.00	\$2,103.00	\$2,103.00
Room Heat Pump, 6 kBtuh, 8.5 EER	Room Heat Pump, 6 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$16.00	\$16.00
Room Heat Pump, 6 kBtuh, 8.5 EER	Room Heat Pump, 6 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$65.00	\$65.00


HVAC // Equipment // Package Terminal HP // Room Heat Pump

Sector : Residential
Channel : Retail

Method : Regression plus Markup
No. Obs. : 105

Cost Unit : \$/Unit
Vintage : New

CCIG: RHE-37

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Room Heat Pump, 6 kBtuh, 8.5 EER	Room Heat Pump, 6 kBtuh, 10.5+ EER	L	Inc	<input type="checkbox"/>	\$0.00	\$203.00	\$203.00
Room Heat Pump, 7 kBtuh, 8.5 EER	Room Heat Pump, 7 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$19.00	\$19.00
Room Heat Pump, 7 kBtuh, 8.5 EER	Room Heat Pump, 7 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$76.00	\$76.00
Room Heat Pump, 7 kBtuh, 8.5 EER	Room Heat Pump, 7 kBtuh, 10.5+ EER	L	Inc	<input type="checkbox"/>	\$0.00	\$237.00	\$237.00
Room Heat Pump, 8 kBtuh, 8.5 EER	Room Heat Pump, 8 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$21.00	\$21.00
Room Heat Pump, 8 kBtuh, 8.5 EER	Room Heat Pump, 8 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$87.00	\$87.00
Room Heat Pump, 8 kBtuh, 8.5 EER	Room Heat Pump, 8 kBtuh, 10.5+ EER	L	Inc	<input type="checkbox"/>	\$0.00	\$270.00	\$270.00
Room Heat Pump, 9 kBtuh, 8.5 EER	Room Heat Pump, 9 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$24.00	\$24.00
Room Heat Pump, 9 kBtuh, 8.5 EER	Room Heat Pump, 9 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$98.00	\$98.00
Room Heat Pump, 9 kBtuh, 8.5 EER	Room Heat Pump, 9 kBtuh, 10.5+ EER	L	Inc	<input type="checkbox"/>	\$0.00	\$304.00	\$304.00
Room Heat Pump, 10 kBtuh, 8.5 EER	Room Heat Pump, 10 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$27.00	\$27.00
Room Heat Pump, 10 kBtuh, 8.5 EER	Room Heat Pump, 10 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$108.00	\$108.00
Room Heat Pump, 10 kBtuh, 8.5 EER	Room Heat Pump, 10 kBtuh, 10.5+ EER	L	Inc	<input type="checkbox"/>	\$0.00	\$338.00	\$338.00
Room Heat Pump, 12 kBtuh, 8.5 EER	Room Heat Pump, 12 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$32.00	\$32.00
Room Heat Pump, 12 kBtuh, 8.5 EER	Room Heat Pump, 12 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$130.00	\$130.00
Room Heat Pump, 12 kBtuh, 8.5 EER	Room Heat Pump, 12 kBtuh, 10.5+ EER	L	Inc	<input type="checkbox"/>	\$0.00	\$406.00	\$406.00
Room Heat Pump, 14 kBtuh, 8.5 EER	Room Heat Pump, 14 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$37.00	\$37.00
Room Heat Pump, 14 kBtuh, 8.5 EER	Room Heat Pump, 14 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$152.00	\$152.00
Room Heat Pump, 14 kBtuh, 8.5 EER	Room Heat Pump, 14 kBtuh, 10.5+ EER	L	Inc	<input type="checkbox"/>	\$0.00	\$473.00	\$473.00
Room Heat Pump, 18 kBtuh, 8.5 EER	Room Heat Pump, 18 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$48.00	\$48.00
Room Heat Pump, 18 kBtuh, 8.5 EER	Room Heat Pump, 18 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$195.00	\$195.00
Room Heat Pump, 18 kBtuh, 8.5 EER	Room Heat Pump, 18 kBtuh, 10.5+ EER	L	Inc	<input type="checkbox"/>	\$0.00	\$608.00	\$608.00
Room Heat Pump, 22 kBtuh, 8.5 EER	Room Heat Pump, 22 kBtuh, 9.5 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$58.00	\$58.00
Room Heat Pump, 22 kBtuh, 8.5 EER	Room Heat Pump, 22 kBtuh, 10.0 EER	L	Inc	<input type="checkbox"/>	\$0.00	\$239.00	\$239.00
Room Heat Pump, 22 kBtuh, 8.5 EER	Room Heat Pump, 22 kBtuh, 10.5+ EER	L	Inc	<input type="checkbox"/>	\$0.00	\$744.00	\$744.00


HVAC // Equipment // Whole-House Fan // Whole House Fan

Sector : Residential
Channel : Retail

Method : Unweighted Average
No. Obs. : 72

Cost Unit : \$/Unit
Vintage : New/ROB

CCIG: RHE-63

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Whole House Fan <4000 CFM	L	Full	<input type="checkbox"/>		\$134.00	
N/A	Whole House Fan 4000-5000 CFM	L	Full	<input type="checkbox"/>		\$122.00	
N/A	Whole House Fan 5000-6000 CFM	L	Full	<input type="checkbox"/>		\$133.00	
N/A	Whole House Fan >6000 CFM	L	Full	<input type="checkbox"/>		\$177.00	


HVAC // Maintenance // Diagnostic // Diagnostic

Sector : Residential
Channel : Contractor

Method : Secondary/Report
No. Obs. : 20

Cost Unit : \$/Unit
Vintage : Ret

CCIG: RHM-44

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Advanced HVAC Diagonostic	L	Full	<input type="checkbox"/>			\$780.00
N/A	Basic HVAC Diagonostic	L	Full	<input type="checkbox"/>			\$123.00


HVAC // Maintenance // Duct // Duct Test

Sector : Residential
Channel : Contractor

Method : Secondary/Report
No. Obs. : 5

Cost Unit : \$/Unit
Vintage : New

CCIG: RHM-17

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Duct Testing	H	Full	<input type="checkbox"/>	\$127.00		


HVAC // Maintenance // Duct // Seal

Sector : Residential
Channel : Contractor

Method : Secondary/Report
No. Obs. : 5

Cost Unit : \$/Unit
Vintage : Ret

CCIG: RHM-17

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Duct Sealing	L	Full	<input type="checkbox"/>			\$540.00
N/A	Duct Testing	L	Full	<input type="checkbox"/>	\$150.00		


HVAC // Maintenance // Duct Test/seal // Duct Test&Seal

Sector : Residential
Channel : Contractor

Method : Secondary/Report
No. Obs. : 10

Cost Unit : \$/Unit
Vintage : New

CCIG: RHM-17

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Duct Testing and Sealing	H	Full	<input type="checkbox"/>			\$568.00
N/A	Duct Testing and Sealing	L	Full	<input type="checkbox"/>			\$614.00


HVAC // Maintenance // Duct Test/seal // Duct Test&Seal

Sector : Residential
Channel : Contractor

Method : Secondary/Report
No. Obs. : 10


Cost Unit : \$/Unit
Vintage : Ret

CCIG: RHM-17

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Duct Sealing & Testing-MF Dwellings	L	Full	<input type="checkbox"/>			\$630.00
N/A	Duct Sealing & Testing-SF Dwellings	L	Full	<input type="checkbox"/>			\$630.00


HVAC // Maintenance // Furnace Filter // Furnace Filter

Sector : Residential Method : Unweighted Average Cost Unit : \$/Unit CCIG: RHM-48
 Channel : Retail No. Obs. : 239 Vintage : New/ROB

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Basic Furnace Filter (Non-Electrostatic)	L	Full	<input type="checkbox"/>		\$3.19	
N/A	Electrostatic Furnace Filter	L	Full	<input type="checkbox"/>		\$16.00	


HVAC // Maintenance // Furnace Filter // Furnace Filter

Sector : Residential Method : Unweighted Average Cost Unit : \$/Unit CCIG: RHM-48
 Channel : Utility Files+Retail No. Obs. : 239 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low Income, Furnace Filters	H	Full	<input type="checkbox"/>			\$13.00

HVAC // Shell // Attic Venting // Attic Venting

Sector : Residential Method : Unweighted Average Cost Unit : \$/Unit CCIG: RHS-40
 Channel : Utility Files No. Obs. : 46 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low Income, Attic Venting	H	Full	<input type="checkbox"/>			\$41.00


HVAC // Shell // Infiltration Reduction // Infiltration Reduction

Sector : Residential
Channel : Utility Files

Method : Unweighted Average
No. Obs. : 46

Cost Unit : \$/Unit
Vintage : Ret

CCIG: RHS-40

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low Income, Attic Access Weatherstripping	H	Full	<input type="checkbox"/>			\$10.00
N/A	Low Income, Caulking, <600 sf	H	Full	<input type="checkbox"/>			\$142.00
N/A	Low Income, Caulking, 600-799 sf	H	Full	<input type="checkbox"/>			\$182.00
N/A	Low Income, Caulking, 800-999 sf	H	Full	<input type="checkbox"/>			\$236.00
N/A	Low Income, Caulking, Mobile Home	H	Full	<input type="checkbox"/>			\$44.00
N/A	Low Income, Caulking, Multi unit dwelling	H	Full	<input type="checkbox"/>			\$27.00
N/A	Low Income, Caulking, SF <200 sf	H	Full	<input type="checkbox"/>			\$47.00
N/A	Low Income, Door Weatherstripping	H	Full	<input type="checkbox"/>			\$38.00
N/A	Low Income, Evaporative Cooler Cover	H	Full	<input type="checkbox"/>			\$37.00
N/A	Low Income, Minor Home Repairs, <200 sf	H	Full	<input type="checkbox"/>			\$52.00
N/A	Low Income, Minor Home Repairs, >200<400 sf	H	Full	<input type="checkbox"/>			\$92.00
N/A	Low Income, Minor Home Repairs, >400<750 sf	H	Full	<input type="checkbox"/>			\$140.00
N/A	Low Income, Utility Gaskets	H	Full	<input type="checkbox"/>			\$1.04
N/A	Low Income, Weatherization	H	Full	<input type="checkbox"/>			\$500.00


HVAC // Shell // Insulation-Batt Faced // Material

Sector : Residential
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 158

Cost Unit : \$/sf
Vintage : All

CCIG: RHS-05

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Insulation Material, Faced Fiberglass Batt, R-11	L	Full	<input type="checkbox"/>		\$0.24	
N/A	Insulation Material, Faced Fiberglass Batt, R-13	L	Full	<input type="checkbox"/>		\$0.29	
N/A	Insulation Material, Faced Fiberglass Batt, R-15	L	Full	<input type="checkbox"/>		\$0.55	
N/A	Insulation Material, Faced Fiberglass Batt, R-19	L	Full	<input type="checkbox"/>		\$0.32	
N/A	Insulation Material, Faced Fiberglass Batt, R-21	L	Full	<input type="checkbox"/>		\$0.52	
N/A	Insulation Material, Faced Fiberglass Batt, R-30	L	Full	<input type="checkbox"/>		\$0.52	
N/A	Insulation Material, Faced Fiberglass Batt, R-30C	L	Full	<input type="checkbox"/>		\$0.77	
N/A	Insulation Material, Faced Fiberglass Batt, R-38	L	Full	<input type="checkbox"/>		\$0.63	


HVAC // Shell // Insulation-Batt Unfaced // Material

Sector : Residential
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 158

Cost Unit : \$/sf
Vintage : All

CCIG: RHS-05

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Insulation Material, Unfaced Fiberglass Batt, R-11	L	Full	<input type="checkbox"/>		\$0.22	
N/A	Insulation Material, Unfaced Fiberglass Batt, R-13	L	Full	<input type="checkbox"/>		\$0.25	
N/A	Insulation Material, Unfaced Fiberglass Batt, R-15	L	Full	<input type="checkbox"/>		\$0.46	
N/A	Insulation Material, Unfaced Fiberglass Batt, R-19	L	Full	<input type="checkbox"/>		\$0.31	
N/A	Insulation Material, Unfaced Fiberglass Batt, R-21	L	Full	<input type="checkbox"/>		\$0.47	
N/A	Insulation Material, Unfaced Fiberglass Batt, R-30	L	Full	<input type="checkbox"/>		\$0.50	
N/A	Insulation Material, Unfaced Fiberglass Batt, R-30C	L	Full	<input type="checkbox"/>		\$0.71	
N/A	Insulation Material, Unfaced Fiberglass Batt, R-38	L	Full	<input type="checkbox"/>		\$0.55	


HVAC // Shell // Insulation-Ceiling // System Ceiling

Sector : Residential
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 158

Cost Unit : \$/sf
Vintage : New

CCIG: RHS-05

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Ceiling Insulation, Blow-In, R-30	N/A	L	Full	<input type="checkbox"/>			\$0.52
Ceiling Insulation, Faced Fiberglass Batt, R-30	N/A	L	Full	<input type="checkbox"/>			\$0.84
Ceiling Insulation, Unfaced Fiberglass Batt, R-30	N/A	L	Full	<input type="checkbox"/>			\$0.81
N/A	Ceiling Insulation, Blow-In, R-38	L	Full	<input type="checkbox"/>			\$0.62
N/A	Ceiling Insulation, Faced Fiberglass Batt, R-38	L	Full	<input type="checkbox"/>			\$1.02
N/A	Ceiling Insulation, Unfaced Fiberglass Batt, R-38	L	Full	<input type="checkbox"/>			\$0.89
Ceiling Insulation, Blow-In, R-30	Ceiling Insulation, Blow-In, R-38	L	Inc	<input type="checkbox"/>			\$0.10
Ceiling Insulation, Faced Fiberglass Batt, R-30	Ceiling Insulation, Faced Fiberglass Batt, R-38	L	Inc	<input type="checkbox"/>			\$0.18
Ceiling Insulation, Unfaced Fiberglass Batt, R-30	Ceiling Insulation, Unfaced Fiberglass Batt, R-38	L	Inc	<input type="checkbox"/>			\$0.08


HVAC // Shell // Insulation-Ceiling // System Ceiling

Sector : Residential
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 158

Cost Unit : \$/sf
Vintage : Ret

CCIG: RHS-05

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Ceiling Insulation, Blow-In, R-30	L	Full	<input type="checkbox"/>			\$0.52
N/A	Ceiling Insulation, Blow-In, R-38	L	Full	<input type="checkbox"/>			\$0.62
N/A	Ceiling Insulation, Faced Fiberglass Batt, R-30	L	Full	<input type="checkbox"/>			\$1.15
N/A	Ceiling Insulation, Faced Fiberglass Batt, R-38	L	Full	<input type="checkbox"/>			\$1.40
N/A	Ceiling Insulation, Unfaced Fiberglass Batt, R-30	L	Full	<input type="checkbox"/>			\$1.11
N/A	Ceiling Insulation, Unfaced Fiberglass Batt, R-38	L	Full	<input type="checkbox"/>			\$1.22


HVAC // Shell // Insulation-Floor // System Floor

Sector : Residential
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 158

Cost Unit : \$/sf
Vintage : New

CCIG: RHS-26

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Floor Insulation, Faced Fiberglass Batt, R-13	N/A	L	Full	<input type="checkbox"/>			\$0.50
N/A	Floor Insulation, Faced Fiberglass Batt, R-19	L	Full	<input type="checkbox"/>			\$0.55
N/A	Floor Insulation, Faced Fiberglass Batt, R-30	L	Full	<input type="checkbox"/>			\$0.89
Floor Insulation, Faced Fiberglass Batt, R-13	Floor Insulation, Faced Fiberglass Batt, R-19	L	Inc	<input type="checkbox"/>			\$0.05
Floor Insulation, Faced Fiberglass Batt, R-19	Floor Insulation, Faced Fiberglass Batt, R-30	L	Inc	<input type="checkbox"/>			\$0.34


HVAC // Shell // Insulation-Floor // System Floor

Sector : Residential
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 158

Cost Unit : \$/sf
Vintage : Ret

CCIG: RHS-26

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Floor Insulation, Faced Fiberglass Batt, R-13	L	Full	<input type="checkbox"/>			\$0.94
N/A	Floor Insulation, Faced Fiberglass Batt, R-19	L	Full	<input type="checkbox"/>			\$1.01
N/A	Floor Insulation, Faced Fiberglass Batt, R-30	L	Full	<input type="checkbox"/>			\$1.48


HVAC // Shell // Insulation-Low Income // Attic Insulation

Sector : Residential
Channel : Utility Files

Method : Unweighted Average
No. Obs. : 46

Cost Unit : \$/sf
Vintage : Ret

CCIG: RHS-40

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low Income, Attic Insulation	H	Full	<input type="checkbox"/>			\$0.52


HVAC // Shell // Insulation-Rigid // Material

Sector : Residential
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 158

Cost Unit : \$/sf
Vintage : All

CCIG: RHS-61

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Insulation Material, Rigid Polyisocyanurate, R-7, 1.0"	L	Full	<input type="checkbox"/>		\$0.46	
N/A	Insulation Material, Rigid Polyisocyanurate, R-10, 1.5"	L	Full	<input type="checkbox"/>		\$0.56	
N/A	Insulation Material, Rigid Polyisocyanurate, R-14, 2.0"	L	Full	<input type="checkbox"/>		\$0.73	
N/A	Insulation Material, Rigid Polyisocyanurate, R-21, 3.0"	L	Full	<input type="checkbox"/>		\$1.07	
N/A	Insulation Material, Rigid Polystyrene, R-5, 1.0"	L	Full	<input type="checkbox"/>		\$0.35	
N/A	Insulation Material, Rigid Polystyrene, R-7.5, 1.5"	L	Full	<input type="checkbox"/>		\$0.51	
N/A	Insulation Material, Rigid Polystyrene, R-10, 2.0"	L	Full	<input type="checkbox"/>		\$0.67	
N/A	Insulation Material, Rigid Polystyrene, R-15, 3.0"	L	Full	<input type="checkbox"/>		\$1.05	


HVAC // Shell // Insulation-Wall // System Wall

Sector : Residential
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 158

Cost Unit : \$/sf
Vintage : New

CCIG: RHS-61

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Wall Insulation, 2X4 Ext. Rigid Foam, R-14	N/A	L	Full	<input type="checkbox"/>			\$1.18
Wall Insulation, Faced Fiberglass Batt, 2X4, R-13	N/A	L	Full	<input type="checkbox"/>			\$0.47
Wall Insulation, Unfaced Fibergalss Batt, 2X4, R-13	N/A	L	Full	<input type="checkbox"/>			\$0.40
N/A	Wall Insulation, 2X4 Ext. Rigid Foam, R-21	L	Full	<input type="checkbox"/>			\$1.73
N/A	Wall Insulation, Faced Fiberglass Batt, 2X4, R-15	L	Full	<input type="checkbox"/>			\$0.89
N/A	Wall Insulation, Faced Fiberglass Batt, 2X6, R-19	L	Full	<input type="checkbox"/>			\$0.71
N/A	Wall Insulation, Faced Fiberglass Batt, 2X6, R-21	L	Full	<input type="checkbox"/>			\$1.15
N/A	Wall Insulation, Unfaced Fibergalss Batt, 2X4, R-15	L	Full	<input type="checkbox"/>			\$0.74
N/A	Wall Insulation, Unfaced Fibergalss Batt, 2X6, R-19	L	Full	<input type="checkbox"/>			\$0.68
N/A	Wall Insulation, Unfaced Fibergalss Batt, 2X6, R-21	L	Full	<input type="checkbox"/>			\$1.04
Wall Insulation, 2X4 Ext. Rigid Foam, R-14	Wall Insulation, 2X4 Ext. Rigid Foam, R-21	L	Inc	<input type="checkbox"/>			\$0.55
Wall Insulation, Faced Fiberglass Batt, 2X4, R-13	Wall Insulation, Faced Fiberglass Batt, 2X4, R-15	L	Inc	<input type="checkbox"/>			\$0.42
Wall Insulation, Faced Fiberglass Batt, 2X4, R-13	Wall Insulation, Faced Fiberglass Batt, 2X6, R-19	L	Inc	<input type="checkbox"/>			\$0.24
Wall Insulation, Faced Fiberglass Batt, 2X4, R-13	Wall Insulation, Faced Fiberglass Batt, 2X6, R-21	L	Inc	<input type="checkbox"/>			\$0.68
Wall Insulation, Faced Fiberglass Batt, 2X6, R-19	Wall Insulation, Faced Fiberglass Batt, 2X6, R-21	L	Inc	<input type="checkbox"/>			\$0.44
Wall Insulation, Unfaced Fibergalss Batt, 2X4, R-13	Wall Insulation, Unfaced Fibergalss Batt, 2X4, R-15	L	Inc	<input type="checkbox"/>			\$0.34
Wall Insulation, Unfaced Fibergalss Batt, 2X4, R-13	Wall Insulation, Unfaced Fibergalss Batt, 2X6, R-19	L	Inc	<input type="checkbox"/>			\$0.28
Wall Insulation, Unfaced Fibergalss Batt, 2X4, R-13	Wall Insulation, Unfaced Fibergalss Batt, 2X6, R-21	L	Inc	<input type="checkbox"/>			\$0.63
Wall Insulation, Unfaced Fibergalss Batt, 2X6, R-19	Wall Insulation, Unfaced Fibergalss Batt, 2X6, R-21	L	Inc	<input type="checkbox"/>			\$0.35


HVAC // Shell // Window-Exterior // Sunscreen

Sector : Residential
Channel : Retail

Method : Unweighted Average
No. Obs. : 10

Cost Unit : \$/sf
Vintage : New

CCIG: RHS-24

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Sunscreen, 0.32 Shading Coefficient	L	Full	<input type="checkbox"/>	\$0.98	\$2.56	\$3.55


HVAC // Shell // Window-Retrofit Film // Window-Retrofit Film

Sector : Commercial
Channel : Retail

Method : Weighted Average
No. Obs. : 52

Cost Unit : \$/sf
Vintage : Ret

CCIG: CHS-30

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Window-Retrofit Film, High Performance Tint	H	Full	<input type="checkbox"/>			\$5.87
N/A	Window-Retrofit Film, Low-E	H	Full	<input type="checkbox"/>			\$3.50
N/A	Window-Retrofit Film, Reflective	H	Full	<input type="checkbox"/>			\$3.04
N/A	Window-Retrofit Film, Spectrally Selective	H	Full	<input type="checkbox"/>			\$10.00
N/A	Window-Retrofit Film, Standard	H	Full	<input type="checkbox"/>			\$3.04
N/A	Window-Retrofit Film, High Performance Tint	L	Full	<input type="checkbox"/>			\$6.05
N/A	Window-Retrofit Film, Low-E	L	Full	<input type="checkbox"/>			\$3.50
N/A	Window-Retrofit Film, Reflective	L	Full	<input type="checkbox"/>			\$3.12
N/A	Window-Retrofit Film, Spectrally Selective	L	Full	<input type="checkbox"/>			\$11.00
N/A	Window-Retrofit Film, Standard	L	Full	<input type="checkbox"/>			\$3.30


HVAC // Shell // Window-Retrofit Film // Window-Retrofit Film

Sector : Residential
Channel : Retail

Method : Weighted Average
No. Obs. : 26

Cost Unit : \$/sf
Vintage : Ret

CCIG: RHS-30

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Window-Retrofit Film, High Performance Tint	L	Full	<input type="checkbox"/>			\$6.05
N/A	Window-Retrofit Film, Low-E	L	Full	<input type="checkbox"/>			\$3.50
N/A	Window-Retrofit Film, Reflective	L	Full	<input type="checkbox"/>			\$3.12
N/A	Window-Retrofit Film, Spectrally Selective	L	Full	<input type="checkbox"/>			\$11.00
N/A	Window-Retrofit Film, Standard	L	Full	<input type="checkbox"/>			\$3.30


HVAC // Shell // Window-Upgrade // Window-Upgrade

Sector : Commercial
Channel : Contractor

Method : Weighted Average
No. Obs. : 87

Cost Unit : \$/sf
Vintage : New

CCIG: CHS-65

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
New Window, Single, Aluminum Frame, Clear	N/A	H	Full	<input type="checkbox"/>			\$22.00
New Window, Single, Aluminum Frame, Standard Tint	N/A	H	Full	<input type="checkbox"/>			\$23.00
New Window, Double, Aluminum Frame, Clear	N/A	H	Full	<input type="checkbox"/>			\$24.00
New Window, Double, Aluminum Frame, Standard Tint	N/A	H	Full	<input type="checkbox"/>			\$26.00
N/A	New Window, Double, Aluminum Frame, Argon Gas	H	Full	<input type="checkbox"/>			\$25.00
N/A	New Window, Double, Aluminum Frame, Clear	H	Full	<input type="checkbox"/>			\$24.00
N/A	New Window, Double, Aluminum Frame, Low-E	H	Full	<input type="checkbox"/>			\$27.00
N/A	New Window, Double, Aluminum Frame, Low-E2	H	Full	<input type="checkbox"/>			\$26.00
N/A	New Window, Double, Aluminum Frame, Standard Tint	H	Full	<input type="checkbox"/>			\$26.00
N/A	New Window, Double, Vinyl Frame, Heat Mirror	H	Full	<input type="checkbox"/>			\$57.00
N/A	New Window, Double, Vinyl Frame, Standard Tint	H	Full	<input type="checkbox"/>			\$27.00
New Window, Single, Aluminum Frame, Clear	New Window, Single, Aluminum Frame, Low-E	H	Inc	<input type="checkbox"/>			\$2.24
New Window, Single, Aluminum Frame, Clear	New Window, Single, Aluminum Frame, Standard Tint	H	Inc	<input type="checkbox"/>			\$1.48
New Window, Single, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Clear	H	Inc	<input type="checkbox"/>			\$2.78
New Window, Single, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Argon Gas	H	Inc	<input type="checkbox"/>			\$3.18
New Window, Single, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E	H	Inc	<input type="checkbox"/>			\$5.02
New Window, Single, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E2	H	Inc	<input type="checkbox"/>			\$4.66
New Window, Single, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Clear	H	Inc	<input type="checkbox"/>			\$1.30
New Window, Single, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Argon Gas	H	Inc	<input type="checkbox"/>			\$1.70
New Window, Single, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E	H	Inc	<input type="checkbox"/>			\$3.54
New Window, Single, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E2	H	Inc	<input type="checkbox"/>			\$3.18
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Argon Gas	H	Inc	<input type="checkbox"/>			\$0.40
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E	H	Inc	<input type="checkbox"/>			\$2.24
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E2	H	Inc	<input type="checkbox"/>			\$1.88
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Standard Tint	H	Inc	<input type="checkbox"/>			\$1.48
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Argon Gas	H	Inc	<input type="checkbox"/>			(\$1.08)
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E	H	Inc	<input type="checkbox"/>			\$0.75
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E2	H	Inc	<input type="checkbox"/>			\$0.40
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Heat Mirror	H	Inc	<input type="checkbox"/>			\$32.00
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Standard Tint	H	Inc	<input type="checkbox"/>			\$1.48
New Window, Single, Aluminum Frame, Clear	N/A	L	Full	<input type="checkbox"/>			\$24.00
New Window, Single, Aluminum Frame, Standard Tint	N/A	L	Full	<input type="checkbox"/>			\$25.00
New Window, Double, Aluminum Frame, Clear	N/A	L	Full	<input type="checkbox"/>			\$27.00
New Window, Double, Aluminum Frame, Standard Tint	N/A	L	Full	<input type="checkbox"/>			\$28.00
N/A	New Window, Double, Aluminum Frame, Argon Gas	L	Full	<input type="checkbox"/>			\$27.00
N/A	New Window, Double, Aluminum Frame, Clear	L	Full	<input type="checkbox"/>			\$27.00
N/A	New Window, Double, Aluminum Frame, Low-E	L	Full	<input type="checkbox"/>			\$29.00
N/A	New Window, Double, Aluminum Frame, Low-E2	L	Full	<input type="checkbox"/>			\$29.00


HVAC // Shell // Window-Upgrade // Window-Upgrade

Sector : Commercial
Channel : Contractor

Method : Weighted Average
No. Obs. : 87

Cost Unit : \$/sf
Vintage : New

CCIG: CHS-65

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	New Window, Double, Aluminum Frame, Standard Tint	L	Full	<input type="checkbox"/>			\$28.00
N/A	New Window, Double, Vinyl Frame, Heat Mirror	L	Full	<input type="checkbox"/>			\$62.00
N/A	New Window, Double, Vinyl Frame, Standard Tint	L	Full	<input type="checkbox"/>			\$29.00
New Window, Single, Aluminum Frame, Clear	New Window, Single, Aluminum Frame, Low-E	L	Inc	<input type="checkbox"/>			\$2.45
New Window, Single, Aluminum Frame, Clear	New Window, Single, Aluminum Frame, Standard Tint	L	Inc	<input type="checkbox"/>			\$1.63
New Window, Single, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Argon Gas	L	Inc	<input type="checkbox"/>			\$3.48
New Window, Single, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Clear	L	Inc	<input type="checkbox"/>			\$3.04
New Window, Single, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E	L	Inc	<input type="checkbox"/>			\$5.49
New Window, Single, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E2	L	Inc	<input type="checkbox"/>			\$5.10
New Window, Single, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Argon Gas	L	Inc	<input type="checkbox"/>			\$1.86
New Window, Single, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Clear	L	Inc	<input type="checkbox"/>			\$1.42
New Window, Single, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E	L	Inc	<input type="checkbox"/>			\$3.87
New Window, Single, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E2	L	Inc	<input type="checkbox"/>			\$3.48
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Argon Gas	L	Inc	<input type="checkbox"/>			\$0.44
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E	L	Inc	<input type="checkbox"/>			\$2.45
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E2	L	Inc	<input type="checkbox"/>			\$2.06
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Standard Tint	L	Inc	<input type="checkbox"/>			\$1.63
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Argon Gas	L	Inc	<input type="checkbox"/>			(\$1.19)
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E	L	Inc	<input type="checkbox"/>			\$0.83
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E2	L	Inc	<input type="checkbox"/>			\$0.43
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Heat Mirror	L	Inc	<input type="checkbox"/>			\$35.00
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Standard Tint	L	Inc	<input type="checkbox"/>			\$1.63


HVAC // Shell // Window-Upgrade // Window-Upgrade

Sector : Residential
Channel : Contractor

Method : Weighted Average
No. Obs. : 172

Cost Unit : \$/sf
Vintage : New

CCIG: RHS-65

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
New Window, Double, Aluminum Frame, Clear	N/A	H	Full	<input type="checkbox"/>			\$19.00
New Window, Double, Aluminum Frame, Standard Tint	N/A	H	Full	<input type="checkbox"/>			\$21.00
New Window, Double, Vinyl Frame, Clear	N/A	H	Full	<input type="checkbox"/>			\$19.00
New Window, Double, Vinyl Frame, Standard Tint	N/A	H	Full	<input type="checkbox"/>			\$21.00
N/A	New Window, Double, Aluminum Frame, Argon Gas	H	Full	<input type="checkbox"/>			\$20.00
N/A	New Window, Double, Aluminum Frame, High Performance Tint	H	Full	<input type="checkbox"/>			\$23.00
N/A	New Window, Double, Aluminum Frame, Low-E	H	Full	<input type="checkbox"/>			\$21.00
N/A	New Window, Double, Aluminum Frame, Low-E2	H	Full	<input type="checkbox"/>			\$21.00
N/A	New Window, Double, Aluminum Frame, Standard Tint	H	Full	<input type="checkbox"/>			\$21.00
N/A	New Window, Double, Vinyl Frame, Argon Gas	H	Full	<input type="checkbox"/>			\$20.00
N/A	New Window, Double, Vinyl Frame, Clear	H	Full	<input type="checkbox"/>			\$19.00
N/A	New Window, Double, Vinyl Frame, Heat Mirror	H	Full	<input type="checkbox"/>			\$36.00
N/A	New Window, Double, Vinyl Frame, High Performance Tint	H	Full	<input type="checkbox"/>			\$23.00
N/A	New Window, Double, Vinyl Frame, Insol-8	H	Full	<input type="checkbox"/>			\$40.00
N/A	New Window, Double, Vinyl Frame, Low-E	H	Full	<input type="checkbox"/>			\$21.00
N/A	New Window, Double, Vinyl Frame, Low-E2	H	Full	<input type="checkbox"/>			\$21.00
N/A	New Window, Double, Vinyl Frame, Standard Tint	H	Full	<input type="checkbox"/>			\$21.00
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Argon Gas	H	Inc	<input type="checkbox"/>			\$1.05
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, High Performance Tint	H	Inc	<input type="checkbox"/>			\$4.07
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E	H	Inc	<input type="checkbox"/>			\$1.68
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E2	H	Inc	<input type="checkbox"/>			\$2.22
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Standard Tint	H	Inc	<input type="checkbox"/>			\$1.86
New Window, Double, Aluminum Frame, Clear	New Window, Double, Vinyl Frame, Clear	H	Inc	<input type="checkbox"/>			\$0.17
New Window, Double, Aluminum Frame, Clear	New Window, Double, Vinyl Frame, Insol-8	H	Inc	<input type="checkbox"/>			\$21.00
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Argon Gas	H	Inc	<input type="checkbox"/>			(\$0.80)
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, High Performance Tint	H	Inc	<input type="checkbox"/>			\$2.21
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E	H	Inc	<input type="checkbox"/>			(\$0.18)
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E2	H	Inc	<input type="checkbox"/>			\$0.36
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Vinyl Frame, Clear	H	Inc	<input type="checkbox"/>			(\$1.68)
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Vinyl Frame, Insol-8	H	Inc	<input type="checkbox"/>			\$19.00
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Argon Gas	H	Inc	<input type="checkbox"/>			\$1.05
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Heat Mirror	H	Inc	<input type="checkbox"/>			\$17.00
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, High Performance Tint	H	Inc	<input type="checkbox"/>			\$4.07
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Insol-8	H	Inc	<input type="checkbox"/>			\$21.00
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Low-E	H	Inc	<input type="checkbox"/>			\$1.68
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Low-E2	H	Inc	<input type="checkbox"/>			\$2.22
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Standard Tint	H	Inc	<input type="checkbox"/>			\$1.86
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, Argon Gas	H	Inc	<input type="checkbox"/>			(\$0.80)


HVAC // Shell // Window-Upgrade // Window-Upgrade

Sector : Residential
Channel : Contractor

Method : Weighted Average
No. Obs. : 172

Cost Unit : \$/sf
Vintage : New

CCIG: RHS-65

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, Heat Mirror	H	Inc	<input type="checkbox"/>			\$15.00
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, High Performance Tint	H	Inc	<input type="checkbox"/>			\$2.21
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, Insol-8	H	Inc	<input type="checkbox"/>			\$19.00
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, Low-E	H	Inc	<input type="checkbox"/>			(\$0.18)
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, Low-E2	H	Inc	<input type="checkbox"/>			\$0.36
New Window, Double, Aluminum Frame, Clear	N/A	L	Full	<input type="checkbox"/>			\$22.00
New Window, Double, Aluminum Frame, Standard Tint	N/A	L	Full	<input type="checkbox"/>			\$24.00
New Window, Double, Vinyl Frame, Clear	N/A	L	Full	<input type="checkbox"/>			\$22.00
New Window, Double, Vinyl Frame, Standard Tint	N/A	L	Full	<input type="checkbox"/>			\$24.00
N/A	New Window, Double, Aluminum Frame, Argon Gas	L	Full	<input type="checkbox"/>			\$23.00
N/A	New Window, Double, Aluminum Frame, High Performance Tint	L	Full	<input type="checkbox"/>			\$27.00
N/A	New Window, Double, Aluminum Frame, Low-E	L	Full	<input type="checkbox"/>			\$24.00
N/A	New Window, Double, Aluminum Frame, Low-E2	L	Full	<input type="checkbox"/>			\$25.00
N/A	New Window, Double, Aluminum Frame, Standard Tint	L	Full	<input type="checkbox"/>			\$24.00
N/A	New Window, Double, Vinyl Frame, Argon Gas	L	Full	<input type="checkbox"/>			\$23.00
N/A	New Window, Double, Vinyl Frame, Clear	L	Full	<input type="checkbox"/>			\$22.00
N/A	New Window, Double, Vinyl Frame, Heat Mirror	L	Full	<input type="checkbox"/>			\$42.00
N/A	New Window, Double, Vinyl Frame, High Performance Tint	L	Full	<input type="checkbox"/>			\$27.00
N/A	New Window, Double, Vinyl Frame, Insol-8	L	Full	<input type="checkbox"/>			\$47.00
N/A	New Window, Double, Vinyl Frame, Low-E	L	Full	<input type="checkbox"/>			\$24.00
N/A	New Window, Double, Vinyl Frame, Low-E2	L	Full	<input type="checkbox"/>			\$25.00
N/A	New Window, Double, Vinyl Frame, Standard Tint	L	Full	<input type="checkbox"/>			\$24.00
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Argon Gas	L	Inc	<input type="checkbox"/>			\$1.22
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, High Performance Tint	L	Inc	<input type="checkbox"/>			\$4.71
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E	L	Inc	<input type="checkbox"/>			\$1.94
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Low-E2	L	Inc	<input type="checkbox"/>			\$2.57
New Window, Double, Aluminum Frame, Clear	New Window, Double, Aluminum Frame, Standard Tint	L	Inc	<input type="checkbox"/>			\$2.15
New Window, Double, Aluminum Frame, Clear	New Window, Double, Vinyl Frame, Clear	L	Inc	<input type="checkbox"/>			\$0.20
New Window, Double, Aluminum Frame, Clear	New Window, Double, Vinyl Frame, Insol-8	L	Inc	<input type="checkbox"/>			\$24.00
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Argon Gas	L	Inc	<input type="checkbox"/>			(\$0.93)
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, High Performance Tint	L	Inc	<input type="checkbox"/>			\$2.56
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E	L	Inc	<input type="checkbox"/>			(\$0.21)
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Aluminum Frame, Low-E2	L	Inc	<input type="checkbox"/>			\$0.42
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Vinyl Frame, Clear	L	Inc	<input type="checkbox"/>			(\$1.95)
New Window, Double, Aluminum Frame, Standard Tint	New Window, Double, Vinyl Frame, Insol-8	L	Inc	<input type="checkbox"/>			\$22.00
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Argon Gas	L	Inc	<input type="checkbox"/>			\$1.22
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Heat Mirror	L	Inc	<input type="checkbox"/>			\$19.00
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, High Performance Tint	L	Inc	<input type="checkbox"/>			\$4.71


HVAC // Shell // Window-Upgrade // Window-Upgrade

Sector : Residential
Channel : Contractor

Method : Weighted Average
No. Obs. : 172

Cost Unit : \$/sf
Vintage : New

CCIG: RHS-65

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Insol-8	L	Inc	<input type="checkbox"/>			\$24.00
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Low-E	L	Inc	<input type="checkbox"/>			\$1.94
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Low-E2	L	Inc	<input type="checkbox"/>			\$2.57
New Window, Double, Vinyl Frame, Clear	New Window, Double, Vinyl Frame, Standard Tint	L	Inc	<input type="checkbox"/>			\$2.15
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, Argon Gas	L	Inc	<input type="checkbox"/>			(\$0.93)
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, Heat Mirror	L	Inc	<input type="checkbox"/>			\$17.00
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, High Performance Tint	L	Inc	<input type="checkbox"/>			\$2.56
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, Insol-8	L	Inc	<input type="checkbox"/>			\$22.00
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, Low-E	L	Inc	<input type="checkbox"/>			(\$0.21)
New Window, Double, Vinyl Frame, Standard Tint	New Window, Double, Vinyl Frame, Low-E2	L	Inc	<input type="checkbox"/>			\$0.42


Lighting // Controls // Dimming System // System

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 12

Cost Unit : \$/Fixture
Vintage : Ret

CCIG: BLC-02

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Base Energy-Efficient Ballast, 2 Fixtures Per Zone	N/A	H	Full	<input type="checkbox"/>	\$63.00	\$58.00	\$121.00
Base Energy-Efficient Ballast, 10 Fixtures Per Zone	N/A	H	Full	<input type="checkbox"/>	\$63.00	\$68.00	\$131.00
N/A	Electronic Dimming System, 2 Fixtures Per Zone	H	Full	<input type="checkbox"/>	\$230.00	\$373.00	\$604.00
N/A	Electronic Dimming System, 10 Fixtures Per Zone	H	Full	<input type="checkbox"/>	\$101.00	\$148.00	\$249.00
Base Energy-Efficient Ballast, 2 Fixtures Per Zone	Electronic Dimming System, 2 Fixtures Per Zone	H	Inc	<input type="checkbox"/>	\$168.00	\$315.00	\$483.00
Base Energy-Efficient Ballast, 10 Fixtures Per Zone	Electronic Dimming System, 10 Fixtures Per Zone	H	Inc	<input type="checkbox"/>	\$38.00	\$90.00	\$128.00
Base Energy-Efficient Ballast, 2 Fixtures Per Zone	N/A	L	Full	<input type="checkbox"/>	\$63.00	\$68.00	\$131.00
Base Energy-Efficient Ballast, 10 Fixtures Per Zone	N/A	L	Full	<input type="checkbox"/>	\$63.00	\$58.00	\$121.00
N/A	Electronic Dimming System, 2 Fixtures Per Zone	L	Full	<input type="checkbox"/>	\$270.00	\$437.00	\$707.00
N/A	Electronic Dimming System, 10 Fixtures Per Zone	L	Full	<input type="checkbox"/>	\$107.00	\$174.00	\$281.00
Base Energy-Efficient Ballast, 2 Fixtures Per Zone	Electronic Dimming System, 2 Fixtures Per Zone	L	Inc	<input type="checkbox"/>	\$207.00	\$369.00	\$576.00
Base Energy-Efficient Ballast, 10 Fixtures Per Zone	Electronic Dimming System, 10 Fixtures Per Zone	L	Inc	<input type="checkbox"/>	\$45.00	\$105.00	\$150.00


Lighting // Controls // Occupancy Sensor // Occupancy Sensor

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 14


Cost Unit : \$/Unit
Vintage : New

CCIG: BLC-01

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Occupancy Sensor Ceiling	H	Full	<input type="checkbox"/>	\$39.00	\$80.00	\$119.00
N/A	Occupancy Sensor Power Pack	H	Full	<input type="checkbox"/>	\$10.00	\$21.00	\$32.00
N/A	Occupancy Sensor Wall	H	Full	<input type="checkbox"/>	\$4.70	\$42.00	\$47.00
N/A	Occupancy Sensor Ceiling	L	Full	<input type="checkbox"/>	\$47.00	\$94.00	\$141.00
N/A	Occupancy Sensor Power Pack	L	Full	<input type="checkbox"/>	\$16.00	\$25.00	\$41.00
N/A	Occupancy Sensor Wall	L	Full	<input type="checkbox"/>	\$6.30	\$49.00	\$56.00


Lighting // Controls // Occupancy Sensor // Occupancy SensorSector : Commercial
Channel : ContractorMethod : Unweighted Average plus Markup
No. Obs. : 14Cost Unit : \$/Unit
Vintage : Ret

CCIG: BLC-01

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Occupancy Sensor Ceiling	H	Full	<input type="checkbox"/>	\$39.00	\$80.00	\$119.00
N/A	Occupancy Sensor Power Pack	H	Full	<input type="checkbox"/>	\$10.00	\$21.00	\$32.00
N/A	Occupancy Sensor Wall	H	Full	<input type="checkbox"/>	\$4.70	\$42.00	\$47.00
N/A	Occupancy Sensor Ceiling	L	Full	<input type="checkbox"/>	\$47.00	\$94.00	\$141.00
N/A	Occupancy Sensor Power Pack	L	Full	<input type="checkbox"/>	\$16.00	\$25.00	\$41.00
N/A	Occupancy Sensor Wall	L	Full	<input type="checkbox"/>	\$6.30	\$49.00	\$56.00


Lighting // Controls // Photocell // Switching PhotocellSector : Commercial
Channel : ContractorMethod : Unweighted Average plus Markup
No. Obs. : 5Cost Unit : \$/System
Vintage : New

CCIG: BLC-02

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Switching Photocell	L	Full	<input type="checkbox"/>	\$56.00	\$51.00	\$107.00


Lighting // Controls // Timeclock // 24-Hour ElectromechanicalSector : Commercial
Channel : RetailMethod : Unweighted Average
No. Obs. : 41Cost Unit : \$/unit
Vintage : Ret

CCIG: CLC-03

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Timeclock, 24-Hour, Electromechanical	L	Full	<input type="checkbox"/>	\$87.00	\$41.00	\$128.00


Lighting // Controls // Timeclock // 7-Day Digital

Sector : Commercial Method : Unweighted Average Cost Unit : \$/unit CCIG: CLC-03
Channel : Retail No. Obs. : 41 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Timeclock, 7-day, Digital Timer	L	Full	<input type="checkbox"/>	\$73.00	\$28.00	\$100.00


Lighting // Controls // Timeclock // 7-Day Electromechanical

Sector : Commercial Method : Unweighted Average Cost Unit : \$/unit CCIG: CLC-03
Channel : Retail No. Obs. : 41 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Timeclock, 7-Day, Electromechanical	L	Full	<input type="checkbox"/>	\$87.00	\$108.00	\$195.00

Lighting // Controls // Timeclock // 7-Day Electromechanical, 3-Phase

Sector : Commercial Method : Unweighted Average Cost Unit : \$/unit CCIG: CLC-03
Channel : Retail No. Obs. : 41 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Timeclock, 7-day, Electromechanical, 3 Phase	L	Full	<input type="checkbox"/>	\$87.00	\$309.00	\$396.00


Lighting // Equipment // Compact Fluorescent // Ballasts

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 36

Cost Unit : \$/Unit
Vintage : All

CCIG: CLE-03

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Compact Fluorescent Ballasts 14-26 Watts	H	Full	<input type="checkbox"/>		\$5.60	
N/A	Compact Fluorescent Ballasts 5-13 Watts	H	Full	<input type="checkbox"/>		\$4.20	
N/A	Compact Fluorescent Ballasts 14-26 Watts	L	Full	<input type="checkbox"/>		\$6.60	
N/A	Compact Fluorescent Ballasts 5-13 Watts	L	Full	<input type="checkbox"/>		\$5.00	


Lighting // Equipment // Compact Fluorescent // Lamps

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 36

Cost Unit : \$/Unit
Vintage : All

CCIG: CLE-03

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Compact Fluorescent Lamps 14-26 Watts	H	Full	<input checked="" type="checkbox"/>		\$8.80	
N/A	Compact Fluorescent Lamps 5-13 Watts	H	Full	<input checked="" type="checkbox"/>		\$5.90	
N/A	Compact Fluorescent Lamps 14-26 Watts	L	Full	<input checked="" type="checkbox"/>		\$10.00	
N/A	Compact Fluorescent Lamps 5-13 Watts	L	Full	<input checked="" type="checkbox"/>		\$6.90	


Lighting // Equipment // Compact Fluorescent // Lamps

Sector : Residential
Channel : Utility Files

Method : Unweighted Average
No. Obs. : 46

Cost Unit : \$/Unit
Vintage : Ret

CCIG: RLE-03

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low Income, Indoor Lamp	H	Full	<input checked="" type="checkbox"/>			\$14.00


Lighting // Equipment // Compact Fluorescent // System

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 36

Cost Unit : \$/System
Vintage : All

CCIG: CLE-03

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	CFL System Integral 5-13 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$17.00	
N/A	CFL System Integral 5-13 Watts Reflector	L	Full	<input checked="" type="checkbox"/>		\$17.00	
N/A	CFL System Modular 5-13 Watts Reflector	L	Full	<input checked="" type="checkbox"/>		\$16.00	
N/A	CFL System Modular 5-13 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$15.00	
N/A	CFL System Integral 14-26 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$26.00	
N/A	CFL System Modular 14-26 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$22.00	
N/A	CFL System Integral 14-26 Watts Reflector	L	Full	<input checked="" type="checkbox"/>		\$27.00	
N/A	CFL System Modular 14-26 Watts Reflector	L	Full	<input checked="" type="checkbox"/>		\$23.00	
N/A	CFL System Modular 27-30 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$45.00	
N/A	CFL System, Modular, 27-30 Watts	L	Full	<input checked="" type="checkbox"/>		\$45.00	
N/A	CFL System, Integral, 27-30 Watts	L	Full	<input checked="" type="checkbox"/>		\$20.00	
N/A	CFL System Integral 27-30 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$20.00	
Incandescent 20-100 Watts A-Line	CFL System Integral 5-13 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$16.00	
Incandescent 20-100 Watts PAR	CFL System Modular 5-13 Watts Reflector	L	Inc	<input checked="" type="checkbox"/>		\$14.00	
Incandescent 20-100 Watts A-Line	CFL System Modular 5-13 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$14.00	
Incandescent 20-100 Watts PAR	CFL System Integral 5-13 Watts Reflector	L	Inc	<input checked="" type="checkbox"/>		\$15.00	
Incandescent 20-100 Watts A-Line	CFL System Modular 14-26 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$21.00	
Incandescent 20-100 Watts A-Line	CFL System Integral 14-26 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$25.00	
Incandescent 20-100 Watts PAR	CFL System Integral 14-26 Watts Reflector	L	Inc	<input checked="" type="checkbox"/>		\$25.00	
Incandescent 20-100 Watts PAR	CFL System Modular 14-26 Watts Reflector	L	Inc	<input checked="" type="checkbox"/>		\$21.00	
Incandescent 20-100 Watts A-Line	CFL System Integral 27-30 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$19.00	
Incandescent 20-100 Watts A-Line	CFL System Modular 27-30 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$45.00	


Lighting // Equipment // Compact Fluorescent // System

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 36

Cost Unit : \$/System
Vintage : New

CCIG: CLE-03

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	New CFL, Hard-Wired, Modular, 5-13 Watts	H	Full	<input checked="" type="checkbox"/>	\$40.00	\$13.00	\$53.00
N/A	New CFL, Hard-Wired, Modular, 14-26 Watts	H	Full	<input checked="" type="checkbox"/>	\$40.00	\$19.00	\$59.00
New Incandescent, 20-100 Watt	New CFL, Hard-Wired, Modular, 5-13 Watts	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$12.00	\$12.00
New Incandescent, 20-100 Watt	New CFL, Hard-Wired, Modular, 14-26 Watts	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$18.00	\$18.00
N/A	New CFL, Hard-Wired, Modular, 5-13 Watts	L	Full	<input checked="" type="checkbox"/>	\$47.00	\$15.00	\$62.00
N/A	New CFL, Hard-Wired, Modular, 14-26 Watts	L	Full	<input checked="" type="checkbox"/>	\$47.00	\$22.00	\$69.00
New Incandescent, 20-100 Watt	New CFL, Hard-Wired, Modular, 5-13 Watts	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$14.00	\$14.00
New Incandescent, 20-100 Watt	New CFL, Hard-Wired, Modular, 14-26 Watts	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$21.00	\$21.00


Lighting // Equipment // Compact Fluorescent // System

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 36

Cost Unit : \$/System
Vintage : New/ROB

CCIG: CLE-03

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Incandescent 200 Watts, A-lamps, Exterior, Multi-Family	N/A	L	Full	<input type="checkbox"/>		\$2.60	
Incandescent 20-100 Watt A-line	N/A	L	Full	<input type="checkbox"/>		\$0.38	
Incandescent 20-100 Watt PAR	N/A	L	Full	<input type="checkbox"/>		\$3.39	
N/A	CFL System Integral 5-13 Watts Reflector	L	Full	<input checked="" type="checkbox"/>		\$15.00	
N/A	CFL System Modular 5-13 Watts Reflector	L	Full	<input checked="" type="checkbox"/>		\$14.00	
N/A	CFL System Modular 5-13 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$8.69	
N/A	CFL System Integral 5-13 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$10.00	
N/A	CFL System Modular 14-26 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$13.00	
N/A	CFL System Modular 14-26 Watts Reflector	L	Full	<input checked="" type="checkbox"/>		\$18.00	
N/A	CFL System Integral 14-26 Watts Reflector	L	Full	<input checked="" type="checkbox"/>		\$18.00	
N/A	CFL System Integral 14-26 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$13.00	
N/A	CFL System Integral 27-30 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$12.00	
N/A	CFL System Modular 27-30 Watts No Reflector	L	Full	<input checked="" type="checkbox"/>		\$16.00	
N/A	CFL System Modular 39-55 Watts, Exterior Multi-Family	L	Full	<input checked="" type="checkbox"/>		\$30.00	
Incandescent 20-100 Watt A-line	CFL System Integral 5-13 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$9.17	
Incandescent 20-100 Watt A-line	CFL System Modular 5-13 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$8.31	
Incandescent 20-100 Watt PAR	CFL System Modular 5-13 Watts Reflector	L	Inc	<input checked="" type="checkbox"/>		\$10.00	
Incandescent 20-100 Watt PAR	CFL System Integral 5-13 Watts Reflector	L	Inc	<input checked="" type="checkbox"/>		\$11.00	
Incandescent 20-100 Watt PAR	CFL System Modular 14-26 Watts Reflector	L	Inc	<input checked="" type="checkbox"/>		\$15.00	
Incandescent 20-100 Watt PAR	CFL System Integral 14-26 Watts Reflector	L	Inc	<input checked="" type="checkbox"/>		\$14.00	
Incandescent 20-100 Watt A-line	CFL System Integral 14-26 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$12.00	
Incandescent 20-100 Watt A-line	CFL System Modular 14-26 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$13.00	
Incandescent 20-100 Watt A-line	CFL System Integral 27-30 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$12.00	
Incandescent 20-100 Watt A-line	CFL System Modular 27-30 Watts No Reflector	L	Inc	<input checked="" type="checkbox"/>		\$16.00	
Incandescent 200 Watts, A-lamps, Exterior, Multi-Family	CFL System Modular 39-55 Watts, Exterior Multi-Family	L	Inc	<input checked="" type="checkbox"/>		\$27.00	


Lighting // Equipment // Compact Fluorescent // System

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 36

Cost Unit : \$/System
Vintage : Ret

CCIG: CLE-03

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	CFL, Hard-Wired, Modular, 5-13 Watts	H	Full	<input checked="" type="checkbox"/>	\$19.00	\$13.00	\$31.00
N/A	CFL, Hard-Wired, Modular, 14-26 Watts	H	Full	<input checked="" type="checkbox"/>	\$19.00	\$19.00	\$37.00
N/A	CFL, Screw-in, Integral, 14-26 Watts	H	Full	<input checked="" type="checkbox"/>	\$4.10	\$8.80	\$13.00
New Incandescent, 20-100 Watt	CFL, Hard-Wired, Modular, 5-13 Watts	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$12.00	\$12.00
New Incandescent, 20-100 Watt	CFL, Hard-Wired, Modular, 14-26 Watts	H	Inc	<input checked="" type="checkbox"/>	\$0.00	\$18.00	\$18.00
N/A	CFL, Hard-Wired, Modular, 5-13 Watts	L	Full	<input checked="" type="checkbox"/>	\$22.00	\$15.00	\$37.00
N/A	CFL, Screw-in, Integral, 14-26 Watts	L	Full	<input checked="" type="checkbox"/>	\$5.00	\$10.00	\$15.00
N/A	CFL, Hard-Wired, Modular, 14-26 Watts	L	Full	<input checked="" type="checkbox"/>	\$22.00	\$22.00	\$44.00
New Incandescent, 20-100 Watt	CFL, Hard-Wired, Modular, 5-13 Watts	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$14.00	\$14.00
New Incandescent, 20-100 Watt	CFL, Hard-Wired, Modular, 14-26 Watts	L	Inc	<input checked="" type="checkbox"/>	\$0.00	\$21.00	\$21.00


Lighting // Equipment // Compact Fluorescent // System

Sector : Residential
Channel : Utility Files

Method : Unweighted Average
No. Obs. : 46

Cost Unit : \$/Unit
Vintage : Ret

CCIG: CLE-03

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low Income, Exterior Fixture	H	Full	<input checked="" type="checkbox"/>			\$70.00
N/A	Low Income, Indoor Fixture	H	Full	<input checked="" type="checkbox"/>			\$70.00


Lighting // Equipment // Compact Fluorescent // System/Torchiere

Sector : Residential
Channel : Retail

Method : Unweighted Average
No. Obs. : 36

Cost Unit : \$/System
Vintage : New/ROB

CCIG: RLE-09

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Halogen Torchiere Floor Lap, 300 Watts, Dimmable	N/A	L	Full	<input type="checkbox"/>		\$18.00	
N/A	CFL Torchiere Floor Lamp, 2-level, 55 Watts Total	L	Full	<input checked="" type="checkbox"/>		\$23.00	
N/A	CFL Torchiere Floor Lamp, 2-level, 63 Watts Total	L	Full	<input checked="" type="checkbox"/>		\$36.00	
Halogen Torchiere Floor Lap, 300 Watts, Dimmable	CFL Torchiere Floor Lamp, 2-level, 55 Watts Total	L	Inc	<input checked="" type="checkbox"/>		\$5.00	
Halogen Torchiere Floor Lap, 300 Watts, Dimmable	CFL Torchiere Floor Lamp, 2-level, 63 Watts Total	L	Inc	<input checked="" type="checkbox"/>		\$18.00	


Lighting // Equipment // Exit Signs // LED

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 12


Cost Unit : \$/Unit
Vintage : New

CCIG: CLE-03

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Exit Signs LED	H	Full	<input type="checkbox"/>	\$53.00	\$41.00	\$94.00
N/A	Exit Signs LED Retrofit Kit	H	Full	<input type="checkbox"/>	\$10.00	\$22.00	\$32.00
N/A	Exit Signs LED	L	Full	<input type="checkbox"/>	\$63.00	\$48.00	\$111.00
N/A	Exit Signs LED Retrofit Kit	L	Full	<input type="checkbox"/>	\$13.00	\$25.00	\$38.00

Lighting // Equipment // Fluorescent U-Lamp // Lamps

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Unit CCIG: BLE-04
 Channel : Contractor No. Obs. : 16 Vintage : All

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Fluorescent U-Lamp Lamps 32 Watts	H	Full	<input type="checkbox"/>		\$7.10	
N/A	Fluorescent U-Lamp Lamps 32 Watts	L	Full	<input type="checkbox"/>		\$8.40	


Lighting // Equipment // Fluorescent U-Lamp // System 2-Lamp

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/System CCIG: BLE-04
 Channel : Contractor No. Obs. : 16 Vintage : New

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Two 31W U-Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$63.00	\$72.00	\$134.00

Lighting // Equipment // Fluorescent U-Lamp // System 2-Lamp

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/System CCIG: BLE-04
 Channel : Contractor No. Obs. : 16 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Two 31W U-Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$9.40	\$28.00	\$37.00


Lighting // Equipment // Fluorescent-Eight Foot // Ballasts

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 46

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
8-Foot Ballast Standard 2 Lamp	N/A	H	Full	<input type="checkbox"/>		\$25.00	
N/A	8-Foot Ballast Electronic 2 Lamp	H	Full	<input type="checkbox"/>		\$26.00	
8-Foot Ballast Standard 2 Lamp	8-Foot Ballast Electronic 2 Lamp	H	Inc	<input type="checkbox"/>		\$1.80	
8-Foot Ballast Standard 2 Lamp	N/A	L	Full	<input type="checkbox"/>		\$29.00	
N/A	8-Foot Ballast Electronic 2 Lamp	L	Full	<input type="checkbox"/>		\$31.00	
8-Foot Ballast Standard 2 Lamp	8-Foot Ballast Electronic 2 Lamp	L	Inc	<input type="checkbox"/>		\$2.10	


Lighting // Equipment // Fluorescent-Eight Foot // Lamps

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 46

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Fluorescent-Eight Foot Lamps 75 Watts	N/A	H	Full	<input type="checkbox"/>		\$2.70	
N/A	Fluorescent-Eight Foot Lamps 59 Watts	H	Full	<input type="checkbox"/>		\$6.40	
N/A	Fluorescent-Eight Foot Lamps 60 Watts	H	Full	<input type="checkbox"/>		\$3.20	
Fluorescent-Eight Foot Lamps 60 Watts	Fluorescent-Eight Foot Lamps 59 Watts	H	Inc	<input type="checkbox"/>		\$3.20	
Fluorescent-Eight Foot Lamps 75 Watts	Fluorescent-Eight Foot Lamps 60 Watts	H	Inc	<input type="checkbox"/>		\$0.57	
Fluorescent-Eight Foot Lamps 75 Watts	N/A	L	Full	<input type="checkbox"/>		\$3.10	
N/A	Fluorescent-Eight Foot Lamps 59 Watts	L	Full	<input type="checkbox"/>		\$7.50	
N/A	Fluorescent-Eight Foot Lamps 60 Watts	L	Full	<input type="checkbox"/>		\$3.80	
Fluorescent-Eight Foot Lamps 60 Watts	Fluorescent-Eight Foot Lamps 59 Watts	L	Inc	<input type="checkbox"/>		\$3.80	
Fluorescent-Eight Foot Lamps 75 Watts	Fluorescent-Eight Foot Lamps 60 Watts	L	Inc	<input type="checkbox"/>		\$0.67	


Lighting // Equipment // Fluorescent-Eight Foot // Reflector

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 46

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Fluorescent-Eight Foot Reflector	H	Full	<input type="checkbox"/>		\$28.00	
N/A	Fluorescent-Eight Foot Reflector	L	Full	<input type="checkbox"/>		\$33.00	


Lighting // Equipment // Fluorescent-Eight Foot // System 1-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 46

Cost Unit : \$/System
Vintage : New

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
One 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	H	Full	<input type="checkbox"/>	\$36.00	\$45.00	\$81.00
N/A	One 8' 60W Lamp, Electronic Ballast, & Reflector, Includes Fixture	H	Full	<input type="checkbox"/>	\$36.00	\$78.00	\$114.00
N/A	One 8' 60W Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$36.00	\$50.00	\$86.00
One 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	One 8' 60W Lamp, Electronic Ballast, & Reflector, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$33.00	\$33.00
One 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	One 8' 60W Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$5.00	\$5.00
One 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	L	Full	<input type="checkbox"/>	\$36.00	\$52.00	\$88.00
N/A	One 8' 60W Lamp, Electronic Ballast, & Reflector, Includes Fixture	L	Full	<input type="checkbox"/>	\$36.00	\$91.00	\$127.00
N/A	One 8' 60W Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$36.00	\$58.00	\$94.00
One 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	One 8' 60W Lamp, Electronic Ballast, & Reflector, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$39.00	\$39.00
One 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	One 8' 60W Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$5.80	\$5.80


Lighting // Equipment // Fluorescent-Eight Foot // System 1-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 46

Cost Unit : \$/System
Vintage : Ret

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	One 8' 60W Lamp, Eff. Mag. Ballast	H	Full	<input type="checkbox"/>	\$17.00	\$28.00	\$45.00
N/A	One 8' 60W Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$17.00	\$34.00	\$51.00
N/A	One 8' 60W Lamp, Electronic Ballast, & Reflector	H	Full	<input type="checkbox"/>	\$17.00	\$62.00	\$79.00
N/A	One 8' 60W Lamp, Eff. Mag. Ballast	L	Full	<input type="checkbox"/>	\$17.00	\$33.00	\$50.00
N/A	One 8' 60W Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$17.00	\$40.00	\$57.00
N/A	One 8' 60W Lamp, Electronic Ballast, & Reflector	L	Full	<input type="checkbox"/>	\$17.00	\$72.00	\$90.00


Lighting // Equipment // Fluorescent-Eight Foot // System 2-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 46

Cost Unit : \$/System
Vintage : New

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Two 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	H	Full	<input type="checkbox"/>	\$56.00	\$48.00	\$104.00
N/A	Two 8' 60W Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$56.00	\$58.00	\$114.00
Two 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 8' 60W Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$10.00	\$10.00
Two 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	L	Full	<input type="checkbox"/>	\$56.00	\$56.00	\$112.00
N/A	Two 8' 60W Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$56.00	\$68.00	\$124.00
Two 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 8' 60W Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$12.00	\$12.00


Lighting // Equipment // Fluorescent-Eight Foot // System 2-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 46

Cost Unit : \$/System
Vintage : Ret

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Two 8' 60W Lamp, Eff. Mag. Ballast	H	Full	<input type="checkbox"/>	\$17.00	\$31.00	\$48.00
N/A	Two 8' 60W Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$17.00	\$41.00	\$58.00
N/A	Two 8' 60W Lamp, Eff. Mag. Ballast	L	Full	<input type="checkbox"/>	\$17.00	\$36.00	\$54.00
N/A	Two 8' 60W Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$17.00	\$48.00	\$65.00


Lighting // Equipment // Fluorescent-Four Foot // Ballasts

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
4-Foot Ballast Standard 2 Lamp	N/A	H	Full	<input type="checkbox"/>		\$9.60	
N/A	4-Foot Ballast Dimmable 2 Lamp	H	Full	<input type="checkbox"/>		\$45.00	
N/A	4-Foot Ballast Electronic 2 Lamp	H	Full	<input type="checkbox"/>		\$14.00	
N/A	4-Foot Ballast Electronic 3 Lamp	H	Full	<input type="checkbox"/>		\$16.00	
N/A	4-Foot Ballast Electronic 4 Lamp	H	Full	<input type="checkbox"/>		\$17.00	
4-Foot Ballast Standard 2 Lamp	4-Foot Ballast Dimmable 2 Lamp	H	Inc	<input type="checkbox"/>		\$36.00	
4-Foot Ballast Standard 2 Lamp	4-Foot Ballast Electronic 2 Lamp	H	Inc	<input type="checkbox"/>		\$4.00	
Two 4-Foot Ballasts Standard 2 Lamp	4-Foot Ballast Electronic 3 Lamp	H	Inc	<input type="checkbox"/>		(\$3.20)	
Two 4-Foot Ballasts Standard 2 Lamp	4-Foot Ballast Electronic 4 Lamp	H	Inc	<input type="checkbox"/>		(\$2.40)	
4-Foot Ballast Standard 2 Lamp	N/A	L	Full	<input type="checkbox"/>		\$11.00	
N/A	4-Foot Ballast Dimmable 2 Lamp	L	Full	<input type="checkbox"/>		\$53.00	
N/A	4-Foot Ballast Electronic 2 Lamp	L	Full	<input type="checkbox"/>		\$16.00	
N/A	4-Foot Ballast Electronic 3 Lamp	L	Full	<input type="checkbox"/>		\$19.00	
N/A	4-Foot Ballast Electronic 4 Lamp	L	Full	<input type="checkbox"/>		\$20.00	
4-Foot Ballast Standard 2 Lamp	4-Foot Ballast Dimmable 2 Lamp	L	Inc	<input type="checkbox"/>		\$42.00	
4-Foot Ballast Standard 2 Lamp	4-Foot Ballast Electronic 2 Lamp	L	Inc	<input type="checkbox"/>		\$4.70	
Two 4-Foot Ballasts Standard 2 Lamp	4-Foot Ballast Electronic 3 Lamp	L	Inc	<input type="checkbox"/>		(\$3.80)	
Two 4-Foot Ballasts Standard 2 Lamp	4-Foot Ballast Electronic 4 Lamp	L	Inc	<input type="checkbox"/>		(\$2.90)	


Lighting // Equipment // Fluorescent-Four Foot // Lamps

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Fluorescent-Four Foot Lamps 34 Watts	N/A	H	Full	<input type="checkbox"/>		\$0.96	
N/A	Fluorescent-Four Foot Lamps 32 Watts	H	Full	<input type="checkbox"/>		\$1.80	
Fluorescent-Four Foot Lamps 34 Watts	Fluorescent-Four Foot Lamps 32 Watts	H	Inc	<input type="checkbox"/>		\$0.85	
Fluorescent-Four Foot Lamps 34 Watts	N/A	L	Full	<input type="checkbox"/>		\$1.10	
N/A	Fluorescent-Four Foot Lamps 32 Watts	L	Full	<input type="checkbox"/>		\$2.10	
Fluorescent-Four Foot Lamps 34 Watts	Fluorescent-Four Foot Lamps 32 Watts	L	Inc	<input type="checkbox"/>		\$1.00	


Lighting // Equipment // Fluorescent-Four Foot // Reflector

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Fluorescent-Four Foot Reflector	H	Full	<input type="checkbox"/>		\$16.00	
N/A	Fluorescent-Four Foot Reflector	L	Full	<input type="checkbox"/>		\$19.00	


Lighting // Equipment // Fluorescent-Four Foot // System 1-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/System
Vintage : New

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
One 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	H	Full	<input type="checkbox"/>	\$56.00	\$57.00	\$113.00
N/A	One 4' 32W Lamp, Electronic Ballast, & Reflector, Includes Fixture	H	Full	<input type="checkbox"/>	\$56.00	\$79.00	\$134.00
N/A	One 4' 32W Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$56.00	\$62.00	\$118.00
N/A	One 4' HO-T5 Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$63.00	\$151.00	\$214.00
N/A	One 4' T5 Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$63.00	\$148.00	\$210.00
One 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	One 4' T5 Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$90.00	\$90.00
Two 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	One 4' HO-T5 Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$93.00	\$93.00
One 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	One 4' 32W Lamp, Electronic Ballast, & Reflector, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$21.00	\$21.00
One 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	One 4' 32W Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$4.90	\$4.90
One 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	L	Full	<input type="checkbox"/>	\$56.00	\$67.00	\$123.00
N/A	One 4' 32W Lamp, Electronic Ballast, & Reflector, Includes Fixture	L	Full	<input type="checkbox"/>	\$56.00	\$92.00	\$148.00
N/A	One 4' 32W Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$56.00	\$73.00	\$129.00
N/A	One 4' HO-T5 Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$63.00	\$177.00	\$239.00
N/A	One 4' T5 Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$63.00	\$173.00	\$236.00
One 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	One 4' T5 Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$106.00	\$106.00
Two 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	One 4' HO-T5 Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$108.00	\$108.00
One 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	One 4' 32W Lamp, Electronic Ballast, & Reflector, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$25.00	\$25.00
One 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	One 4' 32W Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$5.70	\$5.70


Lighting // Equipment // Fluorescent-Four Foot // System 1-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/System
Vintage : Ret

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	One 4' 32W Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$7.80	\$15.00	\$23.00
N/A	One 4' 32W Lamp, Electronic Ballast, & Reflector	H	Full	<input type="checkbox"/>	\$13.00	\$32.00	\$45.00
N/A	One 4' 34W Lamp, Eff. Mag. Ballast	H	Full	<input type="checkbox"/>	\$7.80	\$11.00	\$18.00
N/A	One 4' HO-T5 Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$7.80	\$29.00	\$37.00
N/A	One 4' T5 Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$7.80	\$20.00	\$28.00
N/A	One 4' 32W Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$7.80	\$18.00	\$26.00
N/A	One 4' 32W Lamp, Electronic Ballast, & Reflector	L	Full	<input type="checkbox"/>	\$13.00	\$37.00	\$50.00
N/A	One 4' 34W Lamp, Eff. Mag. Ballast	L	Full	<input type="checkbox"/>	\$7.80	\$12.00	\$20.00
N/A	One 4' HO-T5 Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$7.80	\$34.00	\$42.00
N/A	One 4' T5 Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$7.80	\$24.00	\$32.00


Lighting // Equipment // Fluorescent-Four Foot // System 2-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/System
Vintage : New

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Two 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	H	Full	<input type="checkbox"/>	\$16.00	\$58.00	\$75.00
N/A	Two 4' 32W Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$16.00	\$64.00	\$81.00
N/A	Two 4' HO-T5 Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$63.00	\$160.00	\$223.00
N/A	Two 4' T5 Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$63.00	\$154.00	\$216.00
Four 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 4' HO-T5 Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$92.00	\$92.00
Three 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 4' HO-T5 Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$93.00	\$93.00
Two 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 4' T5 Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$95.00	\$95.00
One 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 4' 32W Lamp, Electronic Ballast, Includes Fixture, Base=1 8' Lamps	H	Inc	<input type="checkbox"/>	\$0.00	\$20.00	\$20.00
Two 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 4' 32W Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$5.70	\$5.70
Two 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	L	Full	<input type="checkbox"/>	\$16.00	\$68.00	\$85.00
N/A	Two 4' 32W Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$16.00	\$75.00	\$92.00
N/A	Two 4' HO-T5 Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$63.00	\$187.00	\$250.00
N/A	Two 4' T5 Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$63.00	\$180.00	\$243.00
Four 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 4' HO-T5 Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$107.00	\$107.00
Three 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 4' HO-T5 Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$109.00	\$109.00
Two 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 4' T5 Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$112.00	\$112.00
One 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 4' 32W Lamp, Electronic Ballast, Includes Fixture, Base=1 8' Lamps	L	Inc	<input type="checkbox"/>	\$0.00	\$23.00	\$23.00
Two 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Two 4' 32W Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$6.70	\$6.70


Lighting // Equipment // Fluorescent-Four Foot // System 2-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/System
Vintage : Ret

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Two 4' 34W Lamp, Eff. Mag. Ballast	H	Full	<input type="checkbox"/>	\$9.40	\$12.00	\$21.00
N/A	Two 4' 32W Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$9.40	\$17.00	\$27.00
N/A	Two 4' 32W Lamp, Electronic Ballast, Base=1 8' Lamps, 1 Ballast	H	Full	<input type="checkbox"/>	\$16.00	\$17.00	\$33.00
N/A	Two 4' HO-T5 Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$9.40	\$59.00	\$68.00
N/A	Two 4' T5 Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$9.40	\$40.00	\$49.00
N/A	Two 4' 34W Lamp, Eff. Mag. Ballast	L	Full	<input type="checkbox"/>	\$9.40	\$14.00	\$23.00
N/A	Two 4' 32W Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$9.40	\$20.00	\$30.00
N/A	Two 4' 32W Lamp, Electronic Ballast, Base=1 8' Lamps, 1 Ballast	L	Full	<input type="checkbox"/>	\$16.00	\$20.00	\$36.00
N/A	Two 4' HO-T5 Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$9.40	\$68.00	\$77.00
N/A	Two 4' T5 Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$9.40	\$47.00	\$56.00


Lighting // Equipment // Fluorescent-Four Foot // System 3-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/System
Vintage : New

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Three 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	H	Full	<input type="checkbox"/>	\$63.00	\$67.00	\$130.00
N/A	Three 4' 32W Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$63.00	\$67.00	\$129.00
Three 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Three 4' 32W Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	(\$0.65)	(\$0.65)
Three 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	L	Full	<input type="checkbox"/>	\$63.00	\$79.00	\$141.00
N/A	Three 4' 32W Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$63.00	\$78.00	\$141.00
Three 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Three 4' 32W Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	(\$0.76)	(\$0.76)


Lighting // Equipment // Fluorescent-Four Foot // System 3-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/System
Vintage : Ret

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Three 4' 32W Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$12.00	\$21.00	\$33.00
N/A	Three 4' 34W Lamp, Eff. Mag. Ballast	H	Full	<input type="checkbox"/>	\$12.00	\$22.00	\$34.00
N/A	Three 4' 32W Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$14.00	\$25.00	\$39.00
N/A	Three 4' 34W Lamp, Eff. Mag. Ballast	L	Full	<input type="checkbox"/>	\$14.00	\$26.00	\$40.00


Lighting // Equipment // Fluorescent-Four Foot // System 4-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/System
Vintage : New

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Four 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	H	Full	<input type="checkbox"/>	\$63.00	\$68.00	\$131.00
N/A	Four 4' 32W Lamp, Electronic Ballast, & Reflector, Includes Fixture	H	Full	<input type="checkbox"/>	\$63.00	\$86.00	\$148.00
N/A	Four 4' 32W Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$26.00	\$69.00	\$96.00
Four 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Four 4' 32W Lamp, Electronic Ballast, & Reflector, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$17.00	\$17.00
Four 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Four 4' 32W Lamp, Electronic Ballast, Includes Fixture	H	Inc	<input type="checkbox"/>	\$0.00	\$0.95	\$0.95
Two 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	Four 4' 32W Lamp, Electronic Ballast, Includes Fixture, Base=2 8' Lamp	H	Inc	<input type="checkbox"/>	\$0.00	\$22.00	\$22.00
Four 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	N/A	L	Full	<input type="checkbox"/>	\$63.00	\$80.00	\$143.00
N/A	Four 4' 32W Lamp, Electronic Ballast, & Reflector, Includes Fixture	L	Full	<input type="checkbox"/>	\$63.00	\$100.00	\$163.00
N/A	Four 4' 32W Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$26.00	\$81.00	\$108.00
Four 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Four 4' 32W Lamp, Electronic Ballast, & Reflector, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$20.00	\$20.00
Four 4' 34W Lamp, Eff. Mag. Ballast, Includes Fixture	Four 4' 32W Lamp, Electronic Ballast, Includes Fixture	L	Inc	<input type="checkbox"/>	\$0.00	\$1.10	\$1.10
Two 8' 60W Lamp, Eff. Mag. Ballast, Includes Fixture	Four 4' 32W Lamp, Electronic Ballast, Includes Fixture, Base=2 8' Lamp	L	Inc	<input type="checkbox"/>	\$0.00	\$25.00	\$25.00


Lighting // Equipment // Fluorescent-Four Foot // System 4-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 94

Cost Unit : \$/System
Vintage : Ret

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Four 4' 34W Lamp, Eff. Mag. Ballast	H	Full	<input type="checkbox"/>	\$13.00	\$23.00	\$36.00
N/A	Four 4' 32W Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$13.00	\$24.00	\$37.00
N/A	Four 4' 32W Lamp, Electronic Ballast, & Reflector, Base=3 4' Lamps, 2 B	H	Full	<input type="checkbox"/>	\$16.00	\$40.00	\$56.00
N/A	Four 4' 32W Lamp, Electronic Ballast, & Reflector, Base=4 4' Lamps, 2 B	H	Full	<input type="checkbox"/>	\$13.00	\$40.00	\$53.00
N/A	Four 4' 32W Lamp, Electronic Ballast, Base=2 8' Lamps, 1 Ballast	H	Full	<input type="checkbox"/>	\$19.00	\$24.00	\$43.00
N/A	Four 4' 34W Lamp, Eff. Mag. Ballast	L	Full	<input type="checkbox"/>	\$15.00	\$27.00	\$42.00
N/A	Four 4' 32W Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$15.00	\$28.00	\$43.00
N/A	Four 4' 32W Lamp, Electronic Ballast, & Reflector, Base=3 4' Lamps, 2 B	L	Full	<input type="checkbox"/>	\$16.00	\$47.00	\$63.00
N/A	Four 4' 32W Lamp, Electronic Ballast, & Reflector, Base=4 4' Lamps, 2 B	L	Full	<input type="checkbox"/>	\$13.00	\$47.00	\$60.00
N/A	Four 4' 32W Lamp, Electronic Ballast, Base=2 8' Lamps, 1 Ballast	L	Full	<input type="checkbox"/>	\$23.00	\$28.00	\$51.00


Lighting // Equipment // Fluorescent-Two Foot // Ballasts

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 28

Cost Unit : \$/Unit
Vintage : Ret

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Two 2' 17W Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$11.00	\$18.00	\$29.00
N/A	Two 2' 17W Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$11.00	\$22.00	\$33.00


Lighting // Equipment // Fluorescent-Two Foot // System 2-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 28

Cost Unit : \$/System
Vintage : New

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Two 2' 17W Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$23.00	\$61.00	\$84.00
N/A	Two 2' 17W Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$23.00	\$71.00	\$94.00


Lighting // Equipment // Fluorescent-Two Foot // System 4-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 28

Cost Unit : \$/System
Vintage : New

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Four 2' 17W Lamp, Electronic Ballast, Includes Fixture	H	Full	<input type="checkbox"/>	\$56.00	\$66.00	\$121.00
N/A	Four 2' 17W Lamp, Electronic Ballast, Includes Fixture	L	Full	<input type="checkbox"/>	\$56.00	\$77.00	\$133.00


Lighting // Equipment // Fluorescent-Two Foot // System 4-Lamp

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 28

Cost Unit : \$/System
Vintage : Ret

CCIG: BLE-04

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Four 2' 17W Lamp, Electronic Ballast	H	Full	<input type="checkbox"/>	\$11.00	\$26.00	\$37.00
N/A	Four 2' 17W Lamp, Electronic Ballast	L	Full	<input type="checkbox"/>	\$11.00	\$31.00	\$42.00


Lighting // Equipment // High-Pressure Sodium // Ballasts

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 42

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-06

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	High-Pressure Sodium Ballast	H	Full	<input type="checkbox"/>		\$56.00	
N/A	High-Pressure Sodium Ballast	L	Full	<input type="checkbox"/>		\$66.00	


Lighting // Equipment // High-Pressure Sodium // Lamps

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 42

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-06

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	High-Pressure Sodium Lamp	H	Full	<input type="checkbox"/>		\$20.00	
N/A	High-Pressure Sodium Lamp	L	Full	<input type="checkbox"/>		\$23.00	


Lighting // Equipment // High-Pressure Sodium // System

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 42

Cost Unit : \$/System
Vintage : Ret

CCIG: BLE-06

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	HPS Retrofit, High/Low-Bay Fixture, 50-400 Watts	H	Full	<input type="checkbox"/>	\$51.00	\$72.00	\$123.00
N/A	HPS Retrofit, Round, Surface-Mounted Fixture, 50-400 Watts	H	Full	<input type="checkbox"/>	\$51.00	\$76.00	\$127.00
N/A	HPS Retrofit, High/Low-Bay Fixture, 50-400 Watts	L	Full	<input type="checkbox"/>	\$60.00	\$84.00	\$144.00
N/A	HPS Retrofit, Round, Surface-Mounted Fixture, 50-400 Watts	L	Full	<input type="checkbox"/>	\$60.00	\$89.00	\$149.00


Lighting // Equipment // Incandescent // Lamps

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 64

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-05

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Incandescent > 100 Watts, A-Line	N/A	H	Full	<input type="checkbox"/>		\$0.99	
Incandescent, 20-100 Watts, A-Line	N/A	H	Full	<input type="checkbox"/>		\$0.60	
N/A	Incandescent > 100 Watts, PAR	H	Full	<input type="checkbox"/>		\$2.50	
N/A	Incandescent, 20-100 Watts, PAR	H	Full	<input type="checkbox"/>		\$1.70	
Incandescent > 100 Watts, A-Line	N/A	L	Full	<input type="checkbox"/>		\$1.20	
Incandescent, 20-100 Watts, A-Line	N/A	L	Full	<input type="checkbox"/>		\$0.71	
N/A	Incandescent > 100 Watts, PAR	L	Full	<input type="checkbox"/>		\$2.90	
N/A	Incandescent, 20-100 Watts, PAR	L	Full	<input type="checkbox"/>		\$2.00	


Lighting // Equipment // Incandescent // Lamps

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 64

Cost Unit : \$/Unit
Vintage : New

CCIG: BLE-05

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
New Incandescent, 20-100 Watt A-Line	N/A	H	Full	<input type="checkbox"/>	\$40.00	\$0.21	\$40.00
N/A	New Incandescent, 20-100 Watt PAR	H	Full	<input type="checkbox"/>	\$40.00	\$1.70	\$42.00
New Incandescent, 20-100 Watt A-Line	New Incandescent, 20-100 Watt PAR	H	Inc	<input type="checkbox"/>	\$0.00	\$1.50	\$1.50
New Incandescent, 20-100 Watt A-Line	N/A	L	Full	<input type="checkbox"/>	\$47.00	\$0.25	\$47.00
N/A	New Incandescent, 20-100 Watt PAR	L	Full	<input type="checkbox"/>	\$47.00	\$2.00	\$49.00
New Incandescent, 20-100 Watt A-Line	New Incandescent, 20-100 Watt PAR	L	Inc	<input type="checkbox"/>	\$0.00	\$1.80	\$1.80


Lighting // Equipment // Incandescent // Lamps

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 64

Cost Unit : \$/Unit
Vintage : Ret

CCIG: BLE-05

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Incandescent Replacement, 20-100 Watt	N/A	H	Full	<input type="checkbox"/>	\$4.10	\$0.21	\$4.30
N/A	Incandescent Replacement, 20-100 Watt PAR	H	Full	<input type="checkbox"/>	\$4.10	\$1.70	\$5.80
Incandescent Replacement, 20-100 Watt	N/A	L	Full	<input type="checkbox"/>	\$5.00	\$0.25	\$5.30
N/A	Incandescent Replacement, 20-100 Watt PAR	L	Full	<input type="checkbox"/>	\$5.00	\$2.00	\$7.10


Lighting // Equipment // Metal Halide // Ballast

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 41

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-07

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Metal Halide Ballast	H	Full	<input type="checkbox"/>		\$60.00	
N/A	Metal Halide Ballast	L	Full	<input type="checkbox"/>		\$70.00	


Lighting // Equipment // Metal Halide // Lamps

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 41

Cost Unit : \$/Unit
Vintage : All

CCIG: BLE-07

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Metal Halide Lamp	H	Full	<input type="checkbox"/>		\$30.00	
N/A	Metal Halide Lamp	L	Full	<input type="checkbox"/>		\$35.00	


Lighting // Equipment // Metal Halide // System

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 41

Cost Unit : \$/System
Vintage : Ret

CCIG: BLE-07

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Metal Halide Retrofit, High/Low-Bay Fixture, 50-400 Watts	H	Full	<input type="checkbox"/>	\$51.00	\$194.00	\$245.00
N/A	Metal Halide Retrofit, High/Low-Bay Fixture, 50-400 Watts	L	Full	<input type="checkbox"/>	\$60.00	\$227.00	\$287.00


Lighting // Equipment // Traffic Lights, LED // LED Traffic Signal

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 24

Cost Unit : \$/Unit
Vintage : Ret

CCIG: CLE-10

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	LED Traffic Light, Green Arrow, 12 in.	H	Full	<input type="checkbox"/>	\$66.00	\$119.00	\$185.00
N/A	LED Traffic Light, Green Ball, 12 in.	H	Full	<input type="checkbox"/>	\$66.00	\$212.00	\$278.00
N/A	LED Traffic Light, Green Ball, 8 in.	H	Full	<input type="checkbox"/>	\$66.00	\$130.00	\$196.00
N/A	LED Traffic Light, Red Arrow, 12 in.	H	Full	<input type="checkbox"/>	\$66.00	\$76.00	\$142.00
N/A	LED Traffic Light, Red Ball, 12 in.	H	Full	<input type="checkbox"/>	\$66.00	\$97.00	\$163.00
N/A	LED Traffic Light, Red Ball, 8 in.	H	Full	<input type="checkbox"/>	\$66.00	\$76.00	\$142.00
N/A	LED Traffic Light, Yellow Ball, 12 in.	H	Full	<input type="checkbox"/>	\$66.00	\$96.00	\$162.00
N/A	LED Traffic Light, Yellow Ball, 8 in.	H	Full	<input type="checkbox"/>	\$66.00	\$93.00	\$158.00


Motor // Equipment // Variable-Speed Drive // Variable-Speed Drive

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 41

Cost Unit : \$/hp
Vintage : Ret

CCIG: CME-02

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Variable-Speed Drive, 5 hp Motor, 230 Volts, 3 Phase	L	Full	<input type="checkbox"/>	\$171.00	\$214.00	\$385.00
N/A	Variable-Speed Drive, 10 hp Motor, 460 Volts, 3 Phase	L	Full	<input type="checkbox"/>	\$128.00	\$137.00	\$265.00
N/A	Variable-Speed Drive, 15 hp Motor, 460 Volts, 3 Phase	L	Full	<input type="checkbox"/>	\$102.00	\$129.00	\$231.00
N/A	Variable-Speed Drive, 20 hp Motor, 460 Volts, 3 Phase	L	Full	<input type="checkbox"/>	\$75.00	\$127.00	\$202.00
N/A	Variable-Speed Drive, 40 hp Motor, 460 Volts, 3 Phase	L	Full	<input type="checkbox"/>	\$37.00	\$120.00	\$157.00
N/A	Variable-Speed Drive, 50 hp Motor, 460 Volts, 3 Phase	L	Full	<input type="checkbox"/>	\$30.00	\$106.00	\$136.00
N/A	Variable-Speed Drive, 200 hp Motor, 460 Volts, 3 Phase	L	Full	<input type="checkbox"/>	\$11.00	\$78.00	\$89.00
N/A	Variable-Speed Drive, 400 hp Motor, 460 Volts, 3 Phase	L	Full	<input type="checkbox"/>	\$8.00	\$76.00	\$84.00


Refrigeration // Controls // Display Case // Anti-Condensate Heater Controls

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 9


Cost Unit : \$/LF
Vintage : New

CCIG: CRC-01

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Anti-Condensate Heater Controls	L	Full	<input type="checkbox"/>		\$34.00	


Refrigeration // Controls // Display Case // Anti-Condensate Heater Controls

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/LF CCIG: CRC-01
 Channel : Contractor No. Obs. : 9 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Anti-Condensate Heater Controls	L	Full	<input type="checkbox"/>			\$56.00


Refrigeration // Controls // Refrigeration System // Commissioning

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Ton CCIG: CRC-04
 Channel : Contractor No. Obs. : 1 Vintage : New


Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Commissioning	L	Full	<input type="checkbox"/>		\$171.00	

Refrigeration // Controls // Refrigeration System // Commissioning


Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Ton CCIG: CRC-04
 Channel : Contractor No. Obs. : 1 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Commissioning	L	Full	<input type="checkbox"/>			\$113.00


Refrigeration // Controls // Refrigeration System // Energy Management SystemSector : Commercial
Channel : ContractorMethod : Unweighted Average plus Markup
No. Obs. : 2Cost Unit : \$/Ton
Vintage : New**CCIG: CRC-03**

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Energy Management System	L	Full	<input type="checkbox"/>		\$126.00	

Refrigeration // Controls // Refrigeration System // Energy Management SystemSector : Commercial
Channel : ContractorMethod : Unweighted Average plus Markup
No. Obs. : 2Cost Unit : \$/Ton
Vintage : Ret**CCIG: CRC-03**

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Energy Management System	L	Full	<input type="checkbox"/>			\$617.00

Refrigeration // Equipment // Compressor // High EfficiencySector : Commercial
Channel : ContractorMethod : Unweighted Average plus Markup
No. Obs. : 2Cost Unit : \$/hp
Vintage : ROB**CCIG: CRC-01**

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	High Effic Compressor	L	Full	<input type="checkbox"/>			\$118.00


Refrigeration // Equipment // Condenser // High Efficiency Fan Control

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 10

Cost Unit : \$/Ton
Vintage : New

CCIG: CRE-07

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	High Effic Fan Control	L	Full	<input type="checkbox"/>		\$203.00	


Refrigeration // Equipment // Condenser // High Efficiency Fan Control

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 10

Cost Unit : \$/Ton
Vintage : Ret

CCIG: CRE-07

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	High Effic Fan Control	L	Full	<input type="checkbox"/>			\$265.00


Refrigeration // Equipment // Condenser // Oversized Air-Cooled

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 10


Cost Unit : \$/Ton
Vintage : New

CCIG: CRE-07

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Oversized Air-Cooled Condenser	L	Full	<input type="checkbox"/>		\$106.00	


Refrigeration // Equipment // Condenser // Oversized Air-Cooled

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Ton CCIG: CRE-07
 Channel : Contractor No. Obs. : 10 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Oversized Air-Cooled Condenser	L	Full	<input type="checkbox"/>			\$702.00


Refrigeration // Equipment // Condenser // Oversized Evaporative

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Ton CCIG: CRE-07
 Channel : Contractor No. Obs. : 10 Vintage : New

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Oversized Evaporative Condenser	L	Full	<input type="checkbox"/>		\$144.00	


Refrigeration // Equipment // Condenser // Oversized Evaporative

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Ton CCIG: CRE-07
 Channel : Contractor No. Obs. : 10 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Oversized Evaporative Condenser	L	Full	<input type="checkbox"/>			\$781.00


Refrigeration // Equipment // Display Case // High Efficiency Evaporator Fan Motors

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Unit CCIG: CRE-02
 Channel : Contractor No. Obs. : 9 Vintage : New

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	High Effic Evaporator Fan Motors	L	Full	<input type="checkbox"/>		\$14.00	


Refrigeration // Equipment // Display Case // High Efficiency Evaporator Fan Motors

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Unit CCIG: CRE-02
 Channel : Contractor No. Obs. : 9 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	High Effic Evaporator Fan Motors	L	Full	<input type="checkbox"/>			\$161.00


Refrigeration // Equipment // Display Case // Low-Temperature Glass Doors

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Unit CCIG: CRE-02
 Channel : Contractor No. Obs. : 9 Vintage : All

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low-Temperature Glass Doors	L	Full	<input type="checkbox"/>		\$160.00	


Refrigeration // Equipment // Display Case // Medium-Temperature Glass Doors

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/LF CCIG: CRE-02
 Channel : Contractor No. Obs. : 9 Vintage : All

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Medium-Temperature Glass Doors	L	Full	<input type="checkbox"/>		\$105.00	


Refrigeration // Equipment // Heat Exchanger // Low-Temperature External Liquid Suction

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Unit CCIG: CRE-09
 Channel : Contractor No. Obs. : 2 Vintage : New

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low-Temperature External Liquid Suction	L	Full	<input type="checkbox"/>		\$60.00	

Refrigeration // Equipment // Heat Exchanger // Low-Temperature External Liquid Suction

Sector : Commercial Method : Unweighted Average plus Markup Cost Unit : \$/Unit CCIG: CRE-09
 Channel : Contractor No. Obs. : 2 Vintage : Ret

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
N/A	Low-Temperature External Liquid Suction	L	Full	<input type="checkbox"/>			\$132.00


Refrigeration // Equipment // Low-Head Pressure // Multiplex System

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 1

Cost Unit : \$/Ton
Vintage : All

CCIG: CRE-06

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Multiplex System	L	Full	<input type="checkbox"/>		\$450.00	


Refrigeration // Insulation // Display Case // Reflective Case Shields

Sector : Commercial
Channel : Contractor

Method : Unweighted Average plus Markup
No. Obs. : 9

Cost Unit : \$/Unit
Vintage : Ret

CCIG: CRI-01

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Reflective Case Shields	L	Full	<input type="checkbox"/>			\$67.00


Refrigerator // Equipment // Refrigerator // Side-by-Side

Sector : Residential
Channel : Retail

Method : Unweighted Average
No. Obs. : 2012

Cost Unit : \$/Unit
Vintage : New/ROB

CCIG: RRE-21

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Refrigerator, Side-by-Side, 20 Cubic Feet, 0% >93 Std	N/A	L	Full	<input type="checkbox"/>		\$905.00	
Refrigerator, Side-by-Side, 25 Cubic Feet, 0% >93 Std	N/A	L	Full	<input type="checkbox"/>		\$1,222.00	
Refrigerator, Side-by-Side, 30 Cubic Feet, 0% >93 Std	N/A	L	Full	<input type="checkbox"/>		\$1,508.00	
N/A	Refrigerator, Side-by-Side, 15 Cubic Feet, 20-30 Pct. >93 Std	L	Full	<input checked="" type="checkbox"/>		\$728.00	
N/A	Refrigerator, Side-by-Side, 20 Cubic Feet, 12-20 Pct. >93 Std	L	Full	<input type="checkbox"/>		\$983.00	
N/A	Refrigerator, Side-by-Side, 20 Cubic Feet, 20-30 Pct. >93 Std	L	Full	<input checked="" type="checkbox"/>		\$1,109.00	
N/A	Refrigerator, Side-by-Side, 20 Cubic Feet, 30+ Pct. >93 Std	L	Full	<input checked="" type="checkbox"/>		\$1,228.00	
N/A	Refrigerator, Side-by-Side, 25 Cubic Feet, 12-20 Pct. >93 D114Std	L	Full	<input type="checkbox"/>		\$1,321.00	
N/A	Refrigerator, Side-by-Side, 25 Cubic Feet, 20-30 Pct. >93 D114Std	L	Full	<input checked="" type="checkbox"/>		\$1,477.00	
N/A	Refrigerator, Side-by-Side, 25 Cubic Feet, 30+ Pct. >93 D114Std	L	Full	<input checked="" type="checkbox"/>		\$1,626.00	
N/A	Refrigerator, Side-by-Side, 30 Cubic Feet, 12-20 Pct. >93 Std	L	Full	<input type="checkbox"/>		\$1,626.00	
N/A	Refrigerator, Side-by-Side, 30 Cubic Feet, 20-30 Pct. >93 Std	L	Full	<input checked="" type="checkbox"/>		\$1,814.00	
N/A	Refrigerator, Side-by-Side, 30 Cubic Feet, 30+ Pct. >93 Std	L	Full	<input checked="" type="checkbox"/>		\$1,993.00	
Refrigerator, Side-by-Side, 20 Cubic Feet, 0% >93 Std	Refrigerator, Side-by-Side, 20 Cubic Feet, 12-20 Pct. >93 Std	L	Inc	<input type="checkbox"/>		\$79.00	
Refrigerator, Side-by-Side, 20 Cubic Feet, 0% >93 Std	Refrigerator, Side-by-Side, 20 Cubic Feet, 20-30 Pct. >93 Std	L	Inc	<input checked="" type="checkbox"/>		\$204.00	
Refrigerator, Side-by-Side, 20 Cubic Feet, 0% >93 Std	Refrigerator, Side-by-Side, 20 Cubic Feet, 30+ Pct. >93 Std	L	Inc	<input checked="" type="checkbox"/>		\$323.00	
Refrigerator, Side-by-Side, 30 Cubic Feet, 0% >93 Std	Refrigerator, Side-by-Side, 30 Cubic Feet, 12-20 Pct. >93 Std	L	Inc	<input type="checkbox"/>		\$118.00	
Refrigerator, Side-by-Side, 30 Cubic Feet, 0% >93 Std	Refrigerator, Side-by-Side, 30 Cubic Feet, 20-30 Pct. >93 Std	L	Inc	<input checked="" type="checkbox"/>		\$306.00	
Refrigerator, Side-by-Side, 30 Cubic Feet, 0% >93 Std	Refrigerator, Side-by-Side, 30 Cubic Feet, 30+ Pct. >93 Std	L	Inc	<input checked="" type="checkbox"/>		\$485.00	


Refrigerator // Equipment // Refrigerator // Top-Mount Freezer

Sector : Residential
Channel : Retail

Method : Unweighted Average
No. Obs. : 2012

Cost Unit : \$/Unit
Vintage : New/ROB

CCIG: RRE-21

Base Description	Replacement Description	Vol	Cost Type		Labor	Equip	Installed
Refrigerator, Top Mount, 15 Cubic Feet, 0% >93 Std	N/A	L	Full	<input type="checkbox"/>		\$395.00	
Refrigerator, Top Mount, 20 Cubic Feet, 0% >93 Std	N/A	L	Full	<input type="checkbox"/>		\$363.00	
Refrigerator, Top Mount, 25 Cubic Feet, 0% >93 Std	N/A	L	Full	<input type="checkbox"/>		\$857.00	
Refrigerator, Top Mount, 30 Cubic Feet, 0% >93 Std	N/A	L	Full	<input type="checkbox"/>		\$1,108.00	
N/A	Refrigerator, Top Mount, 15 Cubic Feet, 12-20 Pct. >93 Std	L	Full	<input type="checkbox"/>		\$454.00	
N/A	Refrigerator, Top Mount, 15 Cubic Feet, 20-30 Pct. >93 Std	L	Full	<input checked="" type="checkbox"/>		\$548.00	
N/A	Refrigerator, Top Mount, 15 Cubic Feet, 30+ Pct. >93 Std	L	Full	<input checked="" type="checkbox"/>		\$637.00	
N/A	Refrigerator, Top Mount, 20 Cubic Feet, 12-20 Pct. >93 Std	L	Full	<input type="checkbox"/>		\$714.00	
N/A	Refrigerator, Top Mount, 20 Cubic Feet, 20-30 Pct. >93 Std	L	Full	<input checked="" type="checkbox"/>		\$840.00	
N/A	Refrigerator, Top Mount, 20 Cubic Feet, 30+ Pct. >93 Std	L	Full	<input checked="" type="checkbox"/>		\$959.00	
N/A	Refrigerator, Top Mount, 25 Cubic Feet, 12-20 Pct. >93 D127Std	L	Full	<input type="checkbox"/>		\$955.00	
N/A	Refrigerator, Top Mount, 25 Cubic Feet, 20-30 Pct. >93 D127Std	L	Full	<input checked="" type="checkbox"/>		\$1,112.00	
N/A	Refrigerator, Top Mount, 25 Cubic Feet, 30+ Pct. >93 D127Std	L	Full	<input checked="" type="checkbox"/>		\$1,261.00	
N/A	Refrigerator, Top Mount, 30 Cubic Feet, 12-20 Pct. >93 D130Std	L	Full	<input type="checkbox"/>		\$1,227.00	
N/A	Refrigerator, Top Mount, 30 Cubic Feet, 20-30 Pct. >93 D130Std	L	Full	<input checked="" type="checkbox"/>		\$1,415.00	
N/A	Refrigerator, Top Mount, 30 Cubic Feet, 30+ Pct. >93 D130Std	L	Full	<input checked="" type="checkbox"/>		\$1,593.00	
Refrigerator, Top Mount, 15 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 15 Cubic Feet, 12-20 Pct. >93 Std	L	Inc	<input type="checkbox"/>		\$59.00	
Refrigerator, Top Mount, 15 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 15 Cubic Feet, 20-30 Pct. >93 Std	L	Inc	<input checked="" type="checkbox"/>		\$153.00	
Refrigerator, Top Mount, 15 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 15 Cubic Feet, 30+ Pct. >93 Std	L	Inc	<input checked="" type="checkbox"/>		\$242.00	
Refrigerator, Top Mount, 20 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 20 Cubic Feet, 12-20 Pct. >93 Std	L	Inc	<input type="checkbox"/>		\$79.00	
Refrigerator, Top Mount, 20 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 20 Cubic Feet, 20-30 Pct. >93 Std	L	Inc	<input checked="" type="checkbox"/>		\$204.00	
Refrigerator, Top Mount, 20 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 20 Cubic Feet, 30+ Pct. >93 Std	L	Inc	<input checked="" type="checkbox"/>		\$323.00	
Refrigerator, Top Mount, 25 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 25 Cubic Feet, 12-20 Pct. >93 D127Std	L	Inc	<input type="checkbox"/>		\$98.00	
Refrigerator, Top Mount, 25 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 25 Cubic Feet, 20-30 Pct. >93 D127Std	L	Inc	<input checked="" type="checkbox"/>		\$255.00	
Refrigerator, Top Mount, 25 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 25 Cubic Feet, 30+ Pct. >93 D127Std	L	Inc	<input checked="" type="checkbox"/>		\$404.00	
Refrigerator, Top Mount, 30 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 30 Cubic Feet, 12-20 Pct. >93 D130Std	L	Inc	<input type="checkbox"/>		\$118.00	
Refrigerator, Top Mount, 30 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 30 Cubic Feet, 20-30 Pct. >93 D130Std	L	Inc	<input checked="" type="checkbox"/>		\$306.00	
Refrigerator, Top Mount, 30 Cubic Feet, 0% >93 Std	Refrigerator, Top Mount, 30 Cubic Feet, 30+ Pct. >93 D130Std	L	Inc	<input checked="" type="checkbox"/>		\$485.00	


Refrigerator // Equipment // Refrigerator Replacement // Refrigerator Replacement

Sector : Residential
 Channel : Utility Files

Method : Unweighted Average
 No. Obs. : 1

Cost Unit : \$/Unit
 Vintage : Ret

CCIG: RRE-21

Base Description	Replacement Description	Vol	Cost Type	<i>Energy</i> 	Labor	Equip	Installed
N/A	Low Income, Refrigerator Replacement	H	Full	<input type="checkbox"/>			\$600.00

This section provides documentation of the unit energy savings analysis associated with residential energy-efficiency measures in California. The results themselves are presented in the tables that make up Chapter 6 of this report. This first part of this chapter is the guide to those tables; the remainder provides documentation on the methods of developing the unit savings estimates.

5.1 GUIDE TO THE UNIT RESIDENTIAL ENERGY SAVINGS RESULTS

The methods and results for the residential energy savings part of this study were grouped into two categories: those that are sensitive to weather conditions and those that, for the most part, are not. For weather-sensitive measures, the DOE-2 building simulation software was used as the principal tool for estimating savings. For non-weather-sensitive measures, a combination of engineering spreadsheet analysis and simple difference methods were used. As a result of this difference in methods, two sets of tables are presented in Chapter 6.

5.1.1 Guide to Weather-Sensitive Measure Savings Results

The weather-sensitive residential energy savings calculations are presented in Section 6.1. That section is divided into two parts: one set of tables for single-family homes and one set for multi-family buildings. These results were reviewed as part of a previous deliverable for this study.

As described in Section 5.2, energy savings estimates were calculated from DOE-2 simulations for a wide variety of measures that were applied to prototypical homes with varying climate, orientation, and age. Each of 59 measures for single-family homes and 51 measures for multi-family homes and a base case were modeled for:

- Two orientations of each prototype to normalize the results in space
- Ten *climate zones*. **Note that California Energy Commission demand forecasting zones** are used for the climate zone definitions, not Title-24 standard climate zones. Readers unfamiliar with the demand forecasting zone definitions should refer to Figure 5-1 and Table 5-1.
- Four vintages of homes (pre-1978, 1978-1992, 1992-1998, and post-1998).

A brief description of each measure appears at the top of each page in Section 6.1. To guide the reader through the format and definitions used in these tables, the following is an example showing the energy savings from using a 12 SEER split-system air conditioner rather than a 10 SEER air conditioner. The energy savings are shown on a per-ton basis. For most measures, to obtain the total estimated energy savings for a single home, multiply the values for energy, demand, and gas savings in the first table by the number of units shown in the bottom section of the first table. Note that for several measures the units are square feet of ceiling, wall, floor, or window area. In these cases, *the per-unit savings sometimes appear as zero due to decimal place limits*. For such measures, readers should use the percent savings shown in the second table to derive total savings estimates (i.e., multiply the percent savings in the second table by the base case consumption in the third table to obtain total savings per home).

SECTION 5 ENERGY SAVINGS RESULTS FOR RESIDENTIAL MEASURES

So, in the example, the air conditioner is 4.3 tons for a home in Forecasting Climate Zone 3. The total electric energy savings for a home in Climate Zone 3 built before 1978 is then:

$$98.1 \text{ kWh/ton} \times 4.3 \text{ tons/home} = 423 \text{ kWh/home.}$$

10 to 12 SEER Split A/C
Measure base: SEER 10
Measure description: SEER 12

Measure units: Cooling Tons

Note the measure units and the number of units

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	47.2	98.1	40.3	9.7	44.5	55.4	60.8	46.2	39.3	177.0	
	1978-1992	0.0	50.8	108.4	31.2	6.8	45.9	57.1	60.9	40.9	31.3	169.4	
	1992-1998	0.0	41.8	103.0	41.6	16.6	56.4	58.2	54.7	67.4	42.9	111.3	
	Post-1998	0.0	39.5	99.0	41.4	16.5	55.7	56.8	59.3	66.7	42.3	na	
Peak1 kW/unit	Pre-1978	0.00	0.07	0.10	0.08	0.05	0.09	0.09	0.07	0.09	0.08	0.11	
	1978-1992	0.00	0.07	0.11	0.07	0.05	0.10	0.09	0.07	0.10	0.07	0.11	
	1992-1998	0.00	0.06	0.10	0.07	0.06	0.10	0.08	0.06	0.13	0.08	0.07	
	Post-1998	0.00	0.06	0.09	0.07	0.06	0.10	0.08	0.07	0.12	0.07	na	
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0	
	1978-1992	0	0	0	0	0	0	0	0	0	0	0	
	1992-1998	0	0	0	0	0	0	0	0	0	0	0	
	Post-1998	0	0	0	0	0	0	0	0	0	0	na	
Units	Pre-1978	3.8	4.3	4.3	3.8	3.8	3.0	4.3	5.0	3.0	3.8	5.0	
	1978-1992	3.8	4.0	4.0	3.8	3.8	2.8	3.8	4.5	2.8	3.8	4.5	
	1992-1998	3.5	4.3	4.3	3.5	3.5	2.8	3.8	4.3	2.8	3.5	4.3	
	Post-1998	3.5	4.0	4.0	3.5	3.5	2.8	4.0	4.8	2.8	3.5	na	

"Peak 1," the reported demand savings, is defined as the average demand savings between noon and 6 P.M. and from May through October.¹

The second table on each page displays the measure savings as a percentage of the base case usage. This table is especially useful for measures that have very small absolute savings values and for measures whose savings are reported in small units such as square feet.

The third and last table on each page shows the base energy usage from which the savings were calculated. Development of the base case values is described in Sections 5.2 and 5.3.

The standard weather file for Climate Zone 1 (Arcata) has no cooling degree-days, and therefore zero values are reported for such measures as changing from 10 to 12 SEER air conditioners (e.g., see page 6-6). For cases where cooling results are desired for cities in Climate Zone 1, use the data reported under the heading "1 (clg)." The values in that column are for Napa, a city in Climate Zone 1 that is much warmer than the standard weather file for that climate zone.

Note that there are no gas savings reported for the multi-family duct repair measure since for multi-family buildings, most of the ductwork is located in interior walls and spaces so leakage actually still contributes to space conditioning.

¹ Demand and energy savings are available in electronic format for the billing periods: summer-peak, mid and off, and winter-mid and off.

Note that measures with savings less than 1 percent should be considered as having very small or zero savings. Savings values in this range are within the error of the modeling program.

Also note that all of the electric results are for homes that have air conditioners, regardless of the saturation of air conditioners in the climate zone. If an air conditioner is present, the cooling penalty exists. If an air conditioner is not present, then only the gas benefits would be included in an analysis.

Note also that some measures apply only to certain vintages, in these cases, “n/a” is shown for the vintages for which the measure is not applicable.

5.1.2 Guide to Non-Weather-Sensitive Measure Savings Results

The non-weather-sensitive residential energy savings estimates are presented in Section 6.2. That section is divided into two parts: one for electric measures and one for gas measures. All of the savings are presented on a per unit basis, e.g., savings per lamp for lighting and savings per appliance for non-lighting measures. Each column in the electric savings table is described below, the columns in the gas table are analogous:

- **Measure** – This column provides a description of the energy savings measures and their associated base cases. The measures are generally self-explanatory. In the case of lighting, the results are presented on a per-lamp basis and are segmented into three base case lamp sizes and three hour-of-use scenarios. Base cases are included in the table to show annual energy usage and peak demand of units that are currently at average efficiency levels. Base technologies are always preceded with the word “Base” in the measure field.
- **Building Type** – This column shows the building type associated with each measure and savings estimate. Building types are based on the forecasting categories used by the California Energy Commission in its latest demand forecast (namely, single-family and multi-family by utility). Results are presented for PG&E, SCE, SDG&E, and SCG.
- **Energy Savings Fraction** – The estimated percent annual energy savings associated with each measure. Sources used to develop these savings estimates are discussed in Section 5.4. In general, savings percentages are derived from engineering estimates and evaluation studies. The energy savings fraction is applied to the Base kWh/Unit.
- **Base kWh/Unit [Unit Energy Consumption (UEC)]**– This column shows the annual energy consumption associated with the base case for each measure. For the appliance base cases (e.g., “Base Refrigerator,” “Base Clothes Washer,” etc.), the values shown were developed by the California Energy Commission as part of its latest demand forecast.

For appliances, the Base kWh/Unit values for the individual measures are usually higher than the average shown for the Base technology. This is because the Base kWh/Unit for the Base technology is an average for *all units in the population* (which includes some units that are already high-efficiency), whereas the Base kWh/Unit for the high-efficiency

measures represents the average kWh/unit for *only those units that have not been converted to the high-efficiency measure.*

For lighting, the Base kWh/Unit are segmented by hours of operation for the CFL measures. Notice that the three hour-of-operation scenarios capture a range of operation hours. As a result, the Base kWh/Unit scenarios vary in proportion to the hours of operation shown under the measure description.

- **High-Efficiency (“HE”) kWh/Unit** – This column shows the annual energy consumption associated with technologies that have been converted to the high-efficiency measures and is equal to Base kWh/Unit times the Energy Savings Fraction.
- **HE kWh/Unit Savings** – This column shows the annual energy savings in kWh associated with each measure and is calculated as Base kWh/Unit minus HE kWh/Unit.
- **Base Peak Watts/Unit** – This column shows the peak Watts associated with the base case for each measure. The values shown were developed using residential end-use load shape data obtained from the California Energy Commission. These load shapes are used in the Commission’s peak demand forecasting models. The load shapes are based principally on end use metering studies conducted by the California utilities in the late 1980s and early 1990s. The peak period was defined as 2 to 4 P.M. on the hottest summer weekdays of the year.
- **HE Peak Watts/Unit** – This column shows the peak demand associated with technologies that have been converted to the high-efficiency measures and is equal to Base Peak Watts/Unit times the Energy Savings Fraction.
- **HE Peak Watt Savings** – This column shows the peak demand savings in Watts associated with each measure and is calculated as Base Peak Watts/Unit minus the HE Peak Watts/Unit.

5.2 DEVELOPMENT OF WEATHER-SENSITIVE MEASURES

5.2.1 Overview of Approach

There are several methods for determining base energy use and energy savings for an energy-efficiency measure. These methods include using measured data, taking estimates from results of previous surveys, taking estimates from forecasting models developed by the California Energy Commission or by utilities, or estimating energy use and savings with engineering models that are consistent with the assumptions used in the forecasting models.

Estimates of energy use and savings and load impacts for weather-sensitive technologies and measures were prepared in this study using building simulation analysis with the DOE-2 model. A simulation-based engineering analysis was used as the approach for this study because it is appropriate for measures that are highly sensitive to differences in weather among California’s diverse climate zones and because it can easily accommodate the large number of measure, climate zone, building type, and fuel types for which results are desired.

A "before and after" analysis was used to calculate the change in end use loads between a base case measure load shape and an energy-efficiency measure load shape. That is, the load impact of an energy-efficiency measure is estimated as the difference between the load shape for a base case building and the same building equipped with the energy-efficiency measure. Two different measures of an energy-efficiency measure's load impact are developed: a measure of the reduction in load (measured in kW) and a measure of the reduction in annual kWh usage.

The process for performing the analysis was as follows:

- *Define Prototype Buildings.* A series of files were manually created that represent a set of baseline conditions for prototype residential buildings.
- *Characterize Energy Efficiency Measures.* A database of energy-efficiency measures was created in BDL and applied to the base case buildings.
- *Apply DOE 2.2 Pre-processor.* The pre-processor took the base case files with the parameters defining the prototype buildings and, using the measures database, created a series of parametric BDL files used in the analysis.
- *Prepare Weather Files.* A set of weather files was made available to the DOE 2.2 program.
- *Perform DOE 2.2 Analysis.* Full 8,760 hour simulations were performed using the parametric input files.
- *Apply DOE 2.2 Post-processor.* The load shapes and energy savings were extracted from the output reports and used to develop the energy savings and peak demand reductions associated with each measure in the database.

Weather data consistent with the Commission's *forecast* climate zones were used for the analysis. These climate zones are used in the Commission's demand forecast process. This process includes modeling of energy savings potential for which the DEER 2001 Update Study will provide inputs. Note that **these climate zones are not the same as the Commission's climate zones that are used for compliance with Title 24 Standards**. Table 5-1 identifies the Commission's forecast climate zones for the investor-owned utilities and the weather station associated with each. The zones are shown geographically in Figure 5-1.²

Base case heating and cooling estimates from the models were compared to the UECs available from the Commission's latest end-use forecast by utility, vintage, and climate zone. The estimated cooling and heating consumption from the DOE-2 prototypes were calibrated to these values.

² To round out the full distribution of cooling consumption in the State, we provide results for two additional locations: Napa and Palm Springs.

Figure 5-1
Map of California Energy Commission Demand Forecasting Zones

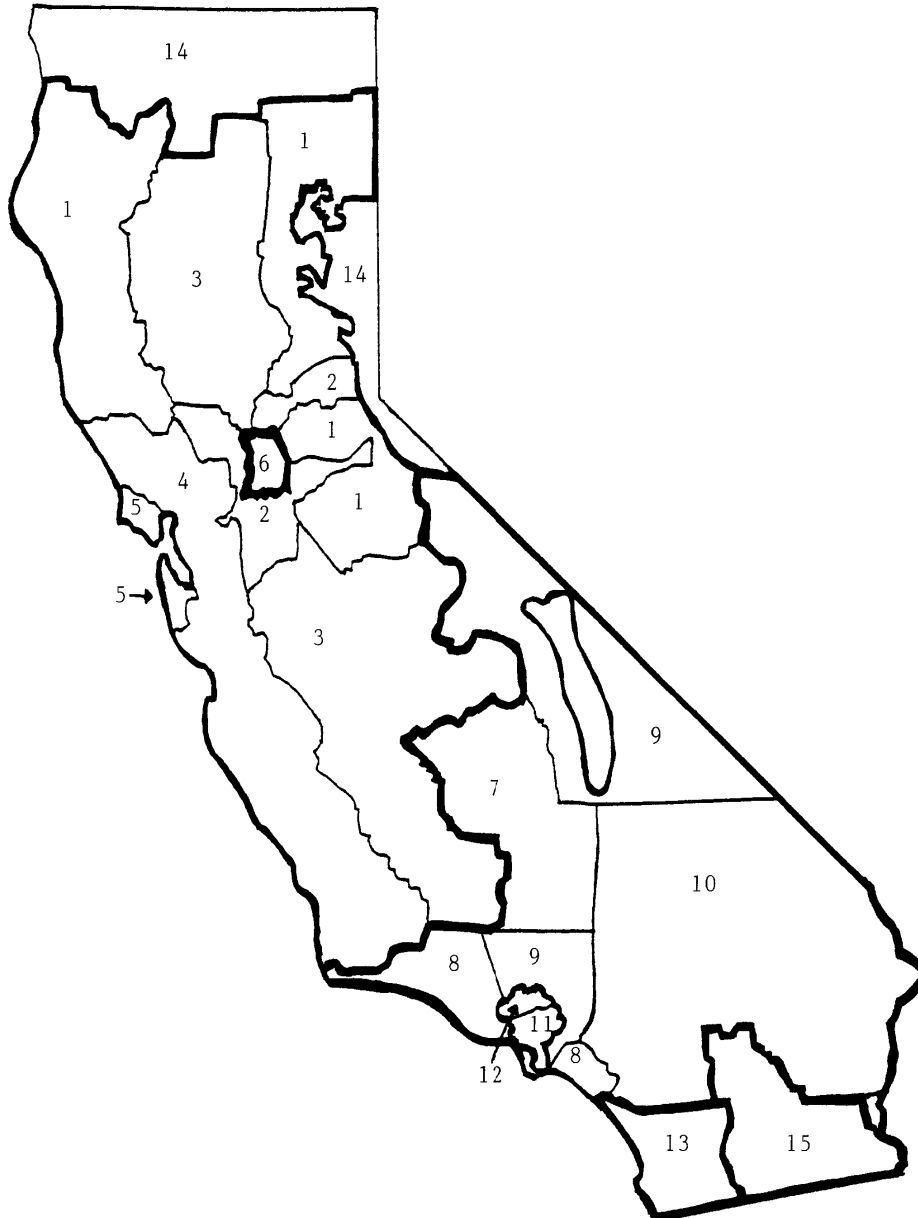


Table 5-1
Commission Demand Forecasting Climate Zones and Associated
Weather Stations Used for DOE-2 Runs

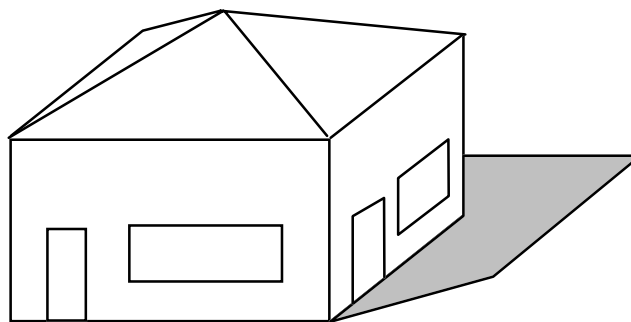
Utility	Forecast-Based Climate Zone	Weather Station Used
PG&E	1	Arcata
	2	Sacramento
	3	Fresno
	4	San Jose
	5	S.F. Airport
SCE	7	Fresno
	8	Long Beach
	9	Burbank
	10	San Bernardino
SDG&E	13	San Diego
"Extra Stations" Provided		Napa and Palm Springs

5.2.2 Prototype Diversification

The weather-sensitive measures for this project were evaluated using the latest version of the DOE-2 building energy simulation program. An early step in the process was to calibrate the simulation models so that the annual energy consumption for space heating and cooling agreed with values established by the relevant utilities.

Previous projects that attempted to determine the energy use and savings of various conservation measures for typical houses have used simplified simulation models that represented an "average" house (see Figure 5-2). This average house would have equal wall, roof, door, and window areas facing each cardinal direction and an average number of floors. Calibration of such a model would typically involve altering the heating and cooling thermostat setpoints until the annual energy use matched the target annual energy use.

Figure 5-2
Typical Model Used to Simulate Average Heating and Cooling Energy



SINGLE FAMILY HOUSE: perspective

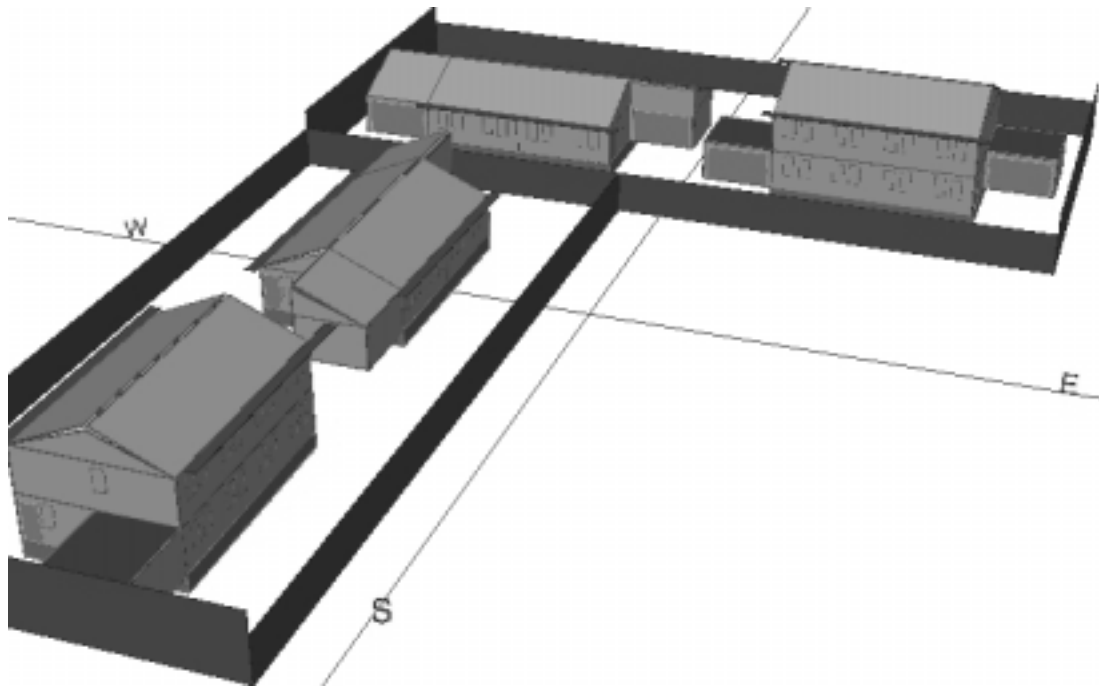
While this approach can yield reasonable results, there are a number of shortcomings. First, it must be recognized that this *average* house is very different than a real *typical* house. On a community level, houses may have equal window and wall area facing each direction, but no actual house has such a configuration. In the real population of houses, some are single story with the majority of window and wall area facing east-west that are shaded by nearby two-story homes with windows facing north and south, etc. The diverse configuration of homes in a community will tend to use heating or cooling equipment across a wider range of ambient conditions than a single house.

Another shortcoming of this process is the method of adjusting the annual energy use via the thermostat. A simulation model that sets the thermostat at a typical value of 78 °F during the entire cooling season, for example, will usually overestimate cooling energy. To compensate, the simulation may raise the thermostat setpoint until the annual energy use is close to the target value. Doing so, however, shifts the energy profile to fewer and fewer hours and creates a load use profile that is less and less representative of a larger community of houses.

XENERGY and The Partnership for Resource Conservation (PRC) have created an updated approach to the modeling and calibration process that utilizes more realistic single- and multi-family home models and calibration factors that are applied after the simulation process. This new approach is based on the fact that detailed simulation models are very good predictors of actual energy use in real buildings when occupancy patterns and equipment usage periods are known.

The single-family model used for this project, shown in Figure 5-3, also has equal wall, roof, door, and window areas facing each direction. This model includes two one-story homes and two two-story homes facing perpendicular directions. Realistic shading from overhangs and nearby obstructions are included in the model. Two conditioned zones are modeled for each house, a living and a sleeping area, along with an attic, garage and optional crawlspace. The models are created such that when the results for the individual homes are weighted to achieve the proper number of floors, the weighted conditioned area is equal to the average floor area desired.

Figure 5-3
Single-Family Model Used for the DEER Project



For example, if the average floor area for a given location is 2,000 square feet and the average number of floors is 1.5, the two-story house would have 2,667 square feet of conditioned area and the single-family house would have 1,333 square feet of conditioned area. When the simulation is run, the results for each house would be weighted and the average area would be 2,000 square feet and the average number of stories would be 1.5 (in this simple case the weighting is 0.25 for each house).

The simulation models are customized for each location based on the average size (conditioned square feet) and number of floors as well as other building characteristics. The two-story model is always twice the total area of the single floor model. The area of the single story model is determined as:

$$\text{Area (1-story)} = (\text{Ave Floor Area}) / (\text{Ave number of floors})$$

$$\text{Area (2-story)} = (\text{Ave Floor Area}) / (\text{Ave number of floors}) \times 2$$

Each DOE-2 run actually consists of four building models, as described above. The results for each individual building must be weighted to determine the average energy use of a building with the required number of floors.

$$\text{Average Usage} = \frac{(\text{EWsingle} + \text{NSsingle})}{2} * (2 - (\text{Ave number of floors})) + \frac{(\text{EWdouble} + \text{NSdouble})}{2} * ((\text{Ave number of floors}) - 1)$$

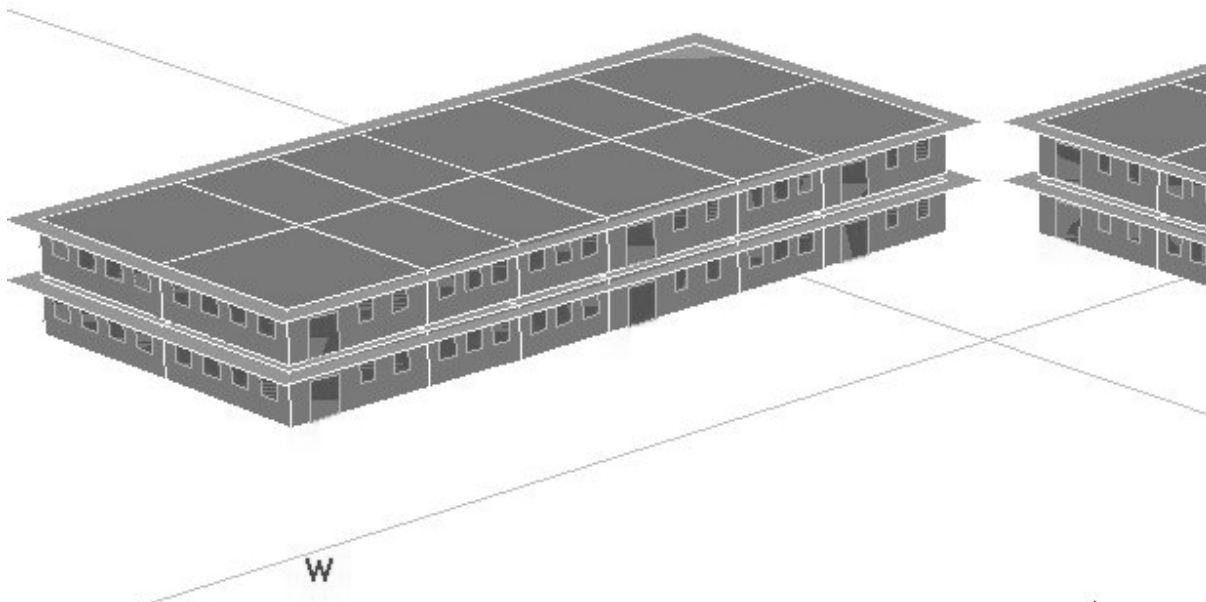
where:

- EWsingle energy usage of the single story building with the majority of glass and wall area facing East-West
- NSsingle energy usage of the single story building with the majority of glass and wall area facing North-South
- EWdouble energy usage of the two story building with the majority of glass and wall area facing East-West
- NSdouble energy usage of the two story building with the majority of glass and wall area facing North-South

The modeling approach for the multi-family housing type is similar to the single-family approach, except that 2 double-story buildings each with 12 unique apartments is used (See Figure 5-4). Since the number of stories is not an issue, each apartment is weighted equally:

$$\text{Average Usage} = (\text{Total Usage of all Apartments}) / 24$$

Figure 5-4
Multi-Family Model Used for the DEER Project



5.2.3 Review of Sources

In 1994, a study similar to the one presented here was conducted for the California Conservation Inventory Group and published by the California Energy Commission. This study, referred to as

the *Technology Energy Savings Study*, defined 60 prototypical residential buildings, reflecting 2 housing types (single family, multi-family), 2 heating fuels (electricity, natural gas), 3 vintages (pre-1978, 1978-1992, and post-1992), and 5 climate regions (South Coast, South Interior Valleys, North Coast, North Interior Valleys, and Desert). As part of its Request for Proposal for the DEER 2001 Update Study, the Commission requested that the previous study be leveraged as much as possible in the new work. In addition to leveraging the work done previously for the Commission, a critical early task in the current project was to review secondary sources with respect to updating and improving the previous prototypes. The results of this review are presented in this subsection.

The definitions and parameter characterizations used for the various prototypes in the *Technology Energy Savings Study* were based on work performed for the California Energy Commission in the early 1990s. A review of these prototypes lead to three areas in which the prototypical buildings defined previously needed major refinement. The first dimension was with respect to the vintages that were used, the second pertained to the definition of prototypical buildings for the multi-family sector, and the third major area had to do with the use of a single prototype for each segment.

The definitions of the prototypical buildings for the pre-1978 and 1978-1992 vintages were based on considerable analysis of available survey data and did not require modification. However, the work done previously occurred during the time when the 1992 Title 24 standards were just coming into effect. The amount of information that was available to them to characterize post-1992 prototypes was relatively limited. Therefore, for the current study, we refined the definitions of the prototypical buildings for the post-1992 vintage. Changes made in 1998 in the minimum requirements of the Title 24 standards also made it appropriate to define new prototypical buildings for a vintage representing houses built after 1998 (as it turns out, however, the principal differences between the 1992 and 1998 prototypes we developed are associated with the size of homes).

The second dimension in which the prototypical buildings defined previously warranted refinement was with respect to the characterization of multi-family housing. The prototypes previously defined for multifamily housing are essentially characteristic of an attached or townhouse dwelling. Data on California's housing stock published by the California Department of Finance (Table 5-2) show that the bulk of multifamily housing in California is in buildings with five or more units. Accordingly, the multifamily prototypes were redefined to better reflect the predominant type of multi-family housing (see Sections 5.2.4 and 5.2.5 for specification details).

The third aspect in which the previous prototypes were changed was described above in Section 5.2.

Table 5-2
Composition of California's Housing Stock
as of January 1, 2000

Type of Housing Unit	Number of Housing Units
Single Family, Detached	6,853,693
Single Family, Attached	840,801
Multifamily, 2 to 4 units per building	1,012,613
Multifamily, 5 or more units per building	2,950,373
Mobile Homes	585,096
Total	12,242,576

Several sets of data on post-1992 housing became available since NEOS and ITEM Systems performed their work that allowed for developing refined versions of the prototypical buildings.

One major set of data for refining the definitions of the prototypical buildings is that developed for the California Energy Commission's *Post Occupancy Residential Survey*. The purpose of that study was to provide information on newly constructed single-family detached homes after the original owner had occupied them for at least a year. The authors of the *Post Occupancy Residential Survey* collected data on post-occupancy characteristics from 400 owners occupying single-family houses built since July 1, 1989 in all 16 standard climate zones in California. Data were collected that pertained to occupancy, operation, and envelope characteristics of the house and various equipment used in the house.

The authors used the data they collected from the 400 houses to investigate actions a homeowner might undertake during occupancy of a newly constructed single-family residence and the effects of these actions on the energy efficiency of the dwelling. Characteristics of occupancy, structure, HVAC, domestic hot water, and other equipment were defined for an average home for each of the 16 climate zones in California.

Although the report on the *Post Occupancy Residential Survey* was published in April 1997, the data pertain primarily to houses built between 1989 and 1995. Of the 400 houses surveyed by NEOS, 354 were built from 1989 to 1993, while 46 were built from 1994 to 1995. Similarly, the Residential Appliance Saturation Survey studies that PG&E and SCE conducted in 1995 also pertain to houses built in 1995 or earlier.

However, there are some additional studies that provide information on houses built after 1995. The key new source is the *Residential Market Share Tracking Study* conducted by Regional Economic Research, Inc. (RER). A major component of this study is to develop market shares and track the energy efficiency of measures installed in new houses being built in the service areas of PG&E, SCE, SDG&E and SCG. A comprehensive on-site survey has been made of a representative sample of 800 newly constructed housing units throughout California, including 650 single-family houses and 150 multi-family residences. Detailed data on building shell characteristics and equipment efficiencies were collected through this survey. Additional data on

the characteristics of new housing units are being obtained by collecting copies of CF-6R installation forms from building departments throughout California.

Another source of data is the *Statewide Residential Lighting and Appliance Saturation Study Efficiency Inventory Study* conducted by RLW Analytics, information pertaining to existing energy efficiencies and saturation for appliances, HVAC systems, and lighting was gathered through on-site surveys at the homes of residential customers of PG&E, SCE, SDG&E, and SMUD. A total of 1,258 on-site surveys were completed between December 1999 and March 2000. While on site, the surveyors collected data on the major appliances and lighting systems in the home. Nameplate data were collected for eight major appliances: refrigerator-freezers, self-standing freezers, dishwashers, clothes washers, clothes dryers, water heaters, heating equipment, and cooling equipment. Data on lamps and fixtures were collected for each lighting fixture in the home, as well as the front porch fixture. Data were also collected on attic, floor, and wall insulation R-values, wall construction, and window type.

The data from these two studies provided more recent and detailed data with which to examine the characteristics of houses built since 1992 and therefore to define better the prototypical single-family houses for the 1992-1998 vintage and the post-1998 vintage.

Another statewide study that provided information on multifamily housing is the *Statewide Survey of Multi-Family Common Area/Building Owners Market* that was conducted by ADM Associates, Inc. (ADM). Between December 1999 and April 2000 ADM collected data on site for the common areas of 541 apartment complexes and 303 condominium/homeowner associations in the service areas of PG&E, SCE, SDG&E, and SCG. While the focus of the data collection was on equipment used in the common areas of multifamily housing complexes, data were also collected on the numbers of buildings and units at the complexes, their square footage, and date of construction. These data allowed for the defining of a prototypical multifamily building in terms of number of housing units and square footage of each unit.

5.2.4 Refined Definitions of Prototypical Buildings

To simplify the analysis for this study and to make the results comparable to those produced in the *Technology Energy Savings Study* and previously incorporated into DEER, the definitions of prototypical buildings from the *Technology Energy Savings Study* were used as the starting point to define the prototypical buildings that were the basis for the analysis of weather-sensitive technologies and measures in this study. However, as just discussed, the definitions of the prototypical buildings were refined in several ways.

The final specifications for the characteristics of the redefined prototypical buildings developed for the current study are shown in Tables 5-4 through 5-7 for single-family housing and in Tables 5-8 through 5-13 for multi-family housing. The specifications for the pre-1978 and 1978-1992 single-family prototypes follow the specifications used in the previous study. However, as discussed above, the specifications for the 1992-1998 and post-1998 single family prototypes and for the multi-family prototypes were developed using the new data sources.

The major characteristics defined for the final prototypes are as follows:

- The single-family prototype was represented in all cases by a building with an equal amount of wall, window, door, and roof area facing each cardinal direction. The number of stories, floor area, roof area, window area, and wall area per home vary by climate region and vintage. Values for 1992-1998 and post-1998 vintages were developed primarily from the information provided by the *Post Occupancy Residential Survey* and the *Residential Market Share Tracking Study*.
- The specifications for the redefined multifamily prototypical buildings represent a major change from the specifications used by NEOS for its study. In particular, data collected during the *Statewide Survey of Multi-Family Common Area/Building Owners Market* were used to define prototypical multi-family buildings in terms of number of housing units and square footage of each unit. Based on these data, the multi-family prototype is now represented in all cases by a building with 2 stories and 12 units per building. The prototypical building has equal amount of wall, window, door, and roof area facing each cardinal direction. The number of stories, number of units per building, floor area, roof area, window area, and wall area per home vary by climate region and vintage. Note that, for reporting purposes, we will divide the dwelling impacts by 12, the number of units in a prototype building.
- The internal load profiles used in DOE-2 simulations for all cases were the aggregate profiles defined for the analysis of the non-weather-sensitive measures. These load profiles were obtained from the Commission's peak load forecasting model.
- The specifications for the window area, glass U-value, wall insulation, roof insulation, and heating and cooling efficiencies are the minimum requirements listed in the prescriptive packages for each vintage and climate region.³
- An explicit attic zone was defined for each prototype to provide a more accurate simulation of the duct losses and duct insulation for this project. This is in agreement with the approach that was taken by NEOS in its definition of the prototypes.
- As a starting point, both the single-family and multi-family buildings were modeled as a single zone with thermostat setpoints of 68 °F for heating and 78 °F for cooling. A setback of 10 °F for heating is utilized between 11 P.M. and 6 A.M. However, these settings were adjusted during the benchmarking process to calibrate the simulation results with UECs obtained from the Commission's latest end-use forecast.

The heating setpoint of 68 °F and cooling setpoint of 78 °F used in CALRES are based on Residential ACM Approval Manual's requirements. Under section 4, titled "Required Modeling Assumptions and Algorithms," it states, "Most of the modeling assumptions and algorithms about building operation and climate are either fixed or restricted when an ACM is used for compliance." Under subsection 4.1 titled "Thermostats," the manual provides the standard thermostat settings in a tabular form in Table 4-1 and states, "It is

³ See California Energy Commission, *Residential Manual for Compliance with the 1998 Energy Efficiency Standards (for Low-Rise Residential Buildings)*, July 1999.

assumed that the building has a constant cooling setpoint of 78 °F. When the building is in heating mode, the heating setpoint is 68 °F with night setback to 60 °F. The heating thermostat is set back from 11:00 P.M. until 7:00 A.M. During the summer or when the building is in cooling mode, the heating setpoint is a constant 60 °F.”

- The manual is reasonably consistent with the thermostat results developed through monitoring of thermostats in homes built in the late 1980s as reported in the California Energy Commission’s *Occupancy Patterns and Energy Consumption in New California Homes (1984 to 1988), Phase Two of the Residential Monitoring Project*, CEC #400-90-012, March 18, 1993, prepared by Berkeley Solar Group. A key result of the monitoring study was that it found the following thermostat setpoints for cooling, along with the fraction of the monitoring period when the cooling system was turned off:

Period	Average Observed Thermostat Setpoint	T24 Modeling Assumptions	Fraction of the Monitoring Period When System Was Off
Setup	76.5	78	0.85
Morning	76.9	78	0.58
Afternoon	80.1	78	0.37
Evening	80.0	78	0.54
Night	77.9	78	0.87

The result in the study cited above provided the first clear-cut empirical demonstration of the link between occupant thermostat/on-off behavior and cooling energy consumption in new homes in California. There are a significant number of days when a significant share of occupants do not use their heating/cooling system when they might otherwise be expected to. Unoccupied homes (due to all members working), vacation days and economic discretion are the apparent reasons for not using the systems. We used a “discretionary use factor” that is a direct multiplier on the UECs for a given climate derived for each climate zone based on our calibration process. The average cooling energy use profile of a thermostat set to off and one set at 78 °F is not well approximated by a temperature setpoint higher than 78 °F, but rather by multiplying the energy use of the 78 °F thermostat by the discretionary use factor.

- The cooling capacity of the air conditioning unit for each climate zone and vintage was first determined by using DOE-2 default and then fixed by rounding it off to the higher 0.5 ton. Similarly, the heating capacity of each unit for each climate zone and vintage is first determined by using DOE-2 default and then fixed by rounding it off to the higher 5 kBtu/hr.
- The supply cubic feet per minute (CFM) is estimated at 400 CFM per ton of the cooling capacity. From investigating a variety of models and their specifications in manufacturer’s product data, the average found was approximately 400 CFM per ton of cooling capacity. A few representative examples are given in Table 2. 400 CFM is an industry standard for systems with cooling coils, as it is enough airflow to assure that the cooling coil will not freeze.

- Roof construction is composed of shingles, plywood on wood frame (10 percent framing factor) and insulation. The roof type will be modeled as tile for post-1992 period, and shake for before 1992. The ceiling type will be modeled with the breakdown of cathedral construction by vintage shown in Table 5-3.

Table 5-3

DOE-2 Cathedral Ceiling Area as Percent of Footprint Area

Period	Percent Cathedral
Pre-1978	0%
1978-1992	0%
1992-1998	25%
Post-1998	25%

- Exterior wall construction is composed of stucco, wood frame (15 percent framing factor), insulation and gypsum board.
- For multi-family buildings, the coastal regions are assumed to have window/wall HVAC units and all the other regions have central units.
- For both single family and multi family buildings, a 20-percent thermal mass is modeled for the 1992-1998 vintage under all climate zones.
- To normalize the results by direction, two runs were performed for each unit, one with the front facing north and another with the front facing east. This takes care of all four orientations because the glazing area on the front equals the area on the back and the glazing area on both sides are equal.
- The floor type was modeled with the following breakdown of slab and raised construction by vintage:

DOE-2 Floor Type Modeling Choices

Period	Raised	Slab
Pre-1978	100%	0%
1978-1992	0%	100%
1992-1998	0%	100%
Post-1998	0%	100%

- Explicit to approximate normal transition between heating and cooling in a typical residence were used in this study. These were a cooling season of May 1 through October 31 and a heating season of November 1 through April 30. No variability in the seasons was assumed between locations.

5.2.5 Detailed Prototype Specification Tables

The following tables provide the final detailed specifications for the prototypes.

**Table 5-4
Single-Family Dimensions**

Climate Zone	Vintage				Vintage			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
	Total Floor Area				Window Area			
North Coast	1591	1904	2164	2296	223	219	433	459
South Coast	1528	2064	2270	2393	238	260	454	479
South Inland	1636	1811	2118	2423	214	290	424	485
Central Valley	1528	1704	2056	1949	200	273	329	312
Desert	1555	1741	1643	2161	267	244	263	346
	Roof Area				Wall Area			
North Coast	1164	1582	1382	1501	1854	1848	1993	2011
South Coast	1071	1382	1370	1338	1778	1940	2103	2248
South Inland	1340	1382	1278	1589	1906	1699	2046	2049
Central Valley	1321	1505	1595	1676	1816	1627	1817	1672
Desert	1562	1690	1487	2012	1775	1687	1513	1663
	Occupants				Number of Stories			
North Coast	3.0	3.1	3.0	3.0	1.5	1.3	1.7	1.7
South Coast	2.6	3.2	3.0	3.0	1.5	1.6	1.8	1.9
South Inland	2.7	2.8	3.0	3.0	1.3	1.4	1.8	1.7
Central Valley	3.0	3.4	3.0	3.0	1.3	1.2	1.4	1.3
Desert	2.8	3.0	3.0	3.0	1.1	1.1	1.2	1.2
	Exterior Wall Height				Footprint Area			
North Coast	15.9	13.5	17	17	1072	1457	1273	1382
South Coast	16.0	15.4	18	19	986	1273	1261	1232
South Inland	15.1	13.9	18	17	1234	1273	1177	1463
Central Valley	14.5	12.8	14	13	1216	1386	1469	1544
Desert	13.5	12.2	12	12	1438	1556	1369	1852
	Roof Type				Floor Type			
North Coast	Shingles	Shingles	Tile	Tile	Raised	Slab	Slab	Slab
South Coast	Shingles	Shingles	Tile	Tile	Raised	Slab	Slab	Slab
South Inland	Shingles	Shingles	Tile	Tile	Raised	Slab	Slab	Slab
Central Valley	Shingles	Shingles	Tile	Tile	Raised	Slab	Slab	Slab
Desert	Shingles	Shingles	Tile	Tile	Raised	Slab	Slab	Slab
	Cathedral Ceiling Area							
North Coast	0%	0%	25%	25%				
South Coast	0%	0%	25%	25%				
South Inland	0%	0%	25%	25%				
Central Valley	0%	0%	25%	25%				
Desert	0%	0%	25%	25%				

**Table 5-5
Single-Family Gas Heating Characteristics**

Climate Zone	Vintage				Vintage			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
	Cooling Capacity (tons)				Heating Capacity (kBtu)			
North Coast	3.5	3.0	*	*	48	36	**	**
South Coast	3.0	2.5	*	*	36	30	**	**
South Inland	4.0	3.5	*	*	51	48	**	**
Central Valley	4.0	3.5	*	*	57	48	**	**
Desert	5.0	4.0	*	*	90	72	**	**
	Cooling SEER				Heating AFUE			
North Coast	8.5	9.0	10.0	10.0	70%	74%	78%	78%
South Coast	8.5	9.5	10.0	10.0	70%	74%	78%	78%
South Inland	8.5	9.0	10.0	10.0	70%	74%	78%	78%
Central Valley	8.5	9.5	10.0	10.0	70%	74%	78%	78%
Desert	8.5	9.5	10.0	10.0	70%	74%	78%	78%
	Supply Air (CFM)				Cooling Energy (kWh)			
North Coast	1050	900	***	***	1318	498		
South Coast	900	750	***	***	762	410		
South Inland	1236	1082	***	***	2549	1113		
Central Valley	1200	1050	***	***	2578	1113		
Desert	1515	1212	***	***	11310	5303		
	Gas Heating Energy (therms)				DHW Gas (therms)			
North Coast	477	204			343	204		
South Coast	125	79			323	192		
South Inland	198	96			317	189		
Central Valley	576	315			341	203		
Desert	167	59			263	157		

* Cooling capacity is DOE-2 default and rounded off to the next 0.5-ton

** Heating capacity is DOE-2 default and rounded off to the next 5 kBtu

*** CFM will be 400 CFM/ton

**Table 5-6
Single-Family Electric Heating Characteristics**

Climate Zone	Vintage				Vintage			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
	Cooling Capacity (tons)				Heating Capacity (kBtu)			
North Coast	3.5	3.0	*	*	42	36	**	**
South Coast	3.0	2.5	*	*	36	30	**	**
South Inland	4.0	3.5	*	*	48	42	**	**
Central Valley	4.0	3.5	*	*	48	42	**	**
Desert	5.0	4.0	*	*	60	48	**	**
	Cooling SEER				Heating HSPF			
North Coast	8.5	9.0	10.0	10.0	4.7	5.7	6.8	6.8
South Coast	8.5	9.5	10.0	10.0	4.7	5.7	6.8	6.8
South Inland	8.5	9.0	10.0	10.0	4.7	5.7	6.8	6.8
Central Valley	8.5	9.5	10.0	10.0	4.7	5.7	6.8	6.8
Desert	8.5	9.5	10.0	10.0	4.7	5.7	6.8	6.8
	Supply Air (CFM)				Cooling Energy (kWh)			
North Coast	1050	900	***	***	1318	498		
South Coast	900	750	***	***	762	410		
South Inland	1236	1082	***	***	2549	1143		
Central Valley	1200	1050	***	***	2578	1143		
Desert	1515	1212	***	***	11280	5333		
	Electric Heating Energy (kWh)				DHW Electricity (kWh)			
North Coast	5977	2168			3692	2784		
South Coast	1699	820			3457	2608		
South Inland	2725	1055			3399	2549		
Central Valley	7325	3340			3663	2754		
Desert	2227	645			2842	2139		

* Cooling capacity is DOE-2 default and rounded off to the next 0.5-ton

** Heating capacity is DOE-2 default and rounded off to the next 5 kBtu

*** CFM will be 400 CFM/ton

**Table 5-7
Single-Family Shell Details**

Climate Zone	Roof Insulation (Elec)				Roof Insulation (Gas)			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
North Coast	5.1	28.0	30	30	5	24.0	30	30
South Coast	5.9	21.5	30	30	6	18.4	30	30
South Inland	5.3	23.5	30	30	5	19.0	30	30
Central Valley	5.3	20.1	38	38	5	19.6	38	38
Desert	5.3	21.3	38	38	5	19.0	38	38

Climate Zone	Wall Insulation (Total)			
	Pre-1978	1978-1992	1992-1998	Post-1998
North Coast	2.0	14.7	13	13
South Coast	5.1	12.1	13	13
South Inland	3.7	12.6	13	13
Central Valley	3.7	11.8	19	19
Desert	3.7	13.6	21	21

Climate Zone	Glass Area (% Floor)				Glass U-value			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
North Coast	14.0%	11.5%	20.0%	20.0%	1.31	0.91	0.75	0.75
South Coast	15.6%	12.6%	20.0%	20.0%	1.31	1.23	0.75	0.75
South Inland	13.1%	16.0%	20.0%	20.0%	1.31	1.26	0.75	0.75
Central Valley	13.1%	16.0%	16.0%	16.0%	1.31	1.12	0.65	0.65
Desert	17.2%	14.0%	16.0%	16.0%	1.31	1.30	0.65	0.65

**Table 5-8
Multi-Family Dimensions**

Climate Zone	Vintage				Vintage			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
	Total Floor Area/Unit				Window Area/Unit *			
North Coast	947	1024	860	880	62	94	117	119
South Coast	926	1159	1030	1075	69	71	128	131
South Inland	1085	1295	960	1000	81	98	124	126
Central Valley	974	1022	900	950	73	86	120	123
Desert	1267	1265	960	970	77	114	124	125
	Roof Area/Unit *				Wall Area/Unit *			
North Coast	563	839	467	478	668	572	489	494
South Coast	560	918	559	584	651	652	535	546
South Inland	559	696	521	543	715	681	516	527
Central Valley	521	869	489	516	670	579	500	514
Desert	668	667	521	527	806	653	516	519
	Units per Building				Number of Stories per Building			
North Coast	12	12	12	12	2	2	2	2
South Coast	12	12	12	12	2	2	2	2
South Inland	12	12	12	12	2	2	2	2
Central Valley	12	12	12	12	2	2	2	2
Desert	12	12	12	12	2	2	2	2
	Roof Type				Floor Type			
North Coast	Shingles	Shingles	Tile	Tile	Raised	Slab	Slab	Slab
South Coast	Shingles	Shingles	Tile	Tile	Raised	Slab	Slab	Slab
South Inland	Shingles	Shingles	Tile	Tile	Raised	Slab	Slab	Slab
Central Valley	Shingles	Shingles	Tile	Tile	Raised	Slab	Slab	Slab
Desert	Shingles	Shingles	Tile	Tile	Raised	Slab	Slab	Slab
	Occupants/ Unit							
North Coast	2.5	2.3	2.0	2.0				
South Coast	2.0	2.0	2.0	2.0				
South Inland	2.2	2.5	2.0	2.0				
Central Valley	2.1	2.3	2.0	2.0				
Desert	2.3	2.3	2.0	2.0				

* Average value per MF unit based on a 2unit x 3 unit x 2 floor configuration.

**Table 5-9
Multi-Family Central Gas Heating Characteristics******

Climate Zone	Vintage				Vintage			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
	Cooling Capacity (tons)				Heating Capacity (kBtu)			
North Coast	2.00	1.25	*	*	24	21	**	**
South Coast	1.25	1.00	*	*	15	12	**	**
South Inland	2.00	1.50	*	*	33	24	**	**
Central Valley	2.00	1.25	*	*	33	24	**	**
Desert	3.00	2.25	*	*	54	39	**	**
	Cooling SEER				Heating AFUE			
North Coast	8.5	9.0	10.0	10.0	70%	74%	78%	78%
South Coast	8.5	9.5	10.0	10.0	70%	74%	78%	78%
South Inland	8.5	9.0	10.0	10.0	70%	74%	78%	78%
Central Valley	8.5	9.5	10.0	10.0	70%	74%	78%	78%
Desert	8.5	9.5	10.0	10.0	70%	74%	78%	78%
	Supply Air (CFM)				Cooling Energy (kWh)			
North Coast	600	375	***	***	967	264		
South Coast	375	300	***	***	586	117		
South Inland	618	464	***	***	1875	527		
Central Valley	600	375	***	***	1875	439		
Desert	909	682	***	***	8526	2901		
	Gas Heating Energy (therms)				DHW Gas (therms)			
North Coast	347	81			239	138		
South Coast	135	26			225	130		
South Inland	184	37			221	128		
Central Valley	463	131			237	137		
Desert	186	27			183	106		

* Cooling capacity is DOE-2 default and rounded off to the next 0.5-ton

** Heating capacity is DOE-2 default and rounded off to the next 5 kBtu

*** CFM will be 400 CFM/ton

**** Window/Wall units for Coastal regions and Central units for other regions

**Table 5-10
Multi-Family Central Electric Heating Characteristics******

Climate Zone	Vintage				Vintage			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
	Cooling Capacity (tons)				Heating Capacity (kBtu)			
North Coast	2.00	1.25	*	*	24	15	**	**
South Coast	1.25	1.00	*	*	15	12	**	**
South Inland	2.00	1.50	*	*	24	18	**	**
Central Valley	2.00	1.25	*	*	24	15	**	**
Desert	3.00	2.25	*	*	36	27	**	**
	Cooling SEER				Heating HSPF			
North Coast	8.5	9.0	10.0	10.0	4.7	5.7	6.8	6.8
South Coast	8.5	9.5	10.0	10.0	4.7	5.7	6.8	6.8
South Inland	8.5	9.0	10.0	10.0	4.7	5.7	6.8	6.8
Central Valley	8.5	9.5	10.0	10.0	4.7	5.7	6.8	6.8
Desert	8.5	9.5	10.0	10.0	4.7	5.7	6.8	6.8
	Supply Air (CFM)				Cooling Energy (kWh)			
North Coast	600	375	***	***	967	264		
South Coast	375	300	***	***	586	117		
South Inland	618	464	***	***	1875	557		
Central Valley	600	375	***	***	1875	439		
Desert	909	682	***	***	8526	2901		
	Electric Heating Energy (kWh)				DHW Electricity (kWh)			
North Coast	4190	820			2491	1817		
South Coast	1582	264			2344	1699		
South Inland	2198	381			2315	1670		
Central Valley	5274	1260			2491	1787		
Desert	2256	293			1934	1377		

* Cooling capacity is DOE-2 default and rounded off to the next 0.5-ton

** Heating capacity is DOE-2 default and rounded off to the next 5 kBtu

*** CFM will be 400 CFM/ton

**** Window/Wall units for Coastal regions and Central units for other regions

**Table 5-11
Multi-Family Gas Window/Wall Units******

Climate Zone	Vintage				Vintage			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
	Cooling Capacity (tons)				Heating Capacity (kBtu)			
North Coast	2.00	1.25	*	*	24	21	**	**
South Coast	1.25	1.00	*	*	15	12	**	**
South Inland	2.00	1.50	*	*	33	24	**	**
Central Valley	2.00	1.25	*	*	33	24	**	**
Desert	3.00	2.25	*	*	54	39	**	**
	Cooling EER				Heating AFUE			
North Coast	8.5	9.0	8.5	8.5	70%	74%	73%	73%
South Coast	8.5	9.5	8.5	8.5	70%	74%	73%	73%
South Inland	8.5	9.0	8.5	8.5	70%	74%	73%	73%
Central Valley	8.5	9.5	8.5	8.5	70%	74%	73%	73%
Desert	8.5	9.8	8.5	8.5	70%	74%	73%	73%
	Supply Air (CFM)				Cooling Energy (kWh)			
North Coast	600	375	***	***	967	264		
South Coast	375	300	***	***	586	117		
South Inland	618	464	***	***	1875	527		
Central Valley	600	375	***	***	1875	439		
Desert	909	682	***	***	8526	2901		
	Gas Heating Energy (therms)				DHW Gas (therms)			
North Coast	347	81			239	138		
South Coast	135	26			225	130		
South Inland	184	37			221	128		
Central Valley	463	131			237	137		
Desert	186	27			183	106		

* Cooling capacity is DOE-2 default and rounded off to the next 0.5-ton

** Heating capacity is DOE-2 default and rounded off to the next 5 kBtu

*** CFM will be 400 CFM/ton

**** Window/Wall units for Coastal regions and Central units for other regions

Table 5-12
Multi-Family Electric Window/Wall Units****

Climate Zone	Vintage				Vintage			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
	Cooling Capacity (tons)				Heating Capacity (kBtu)			
North Coast	2.00	1.25	*	*	24	15	**	**
South Coast	1.25	1.00	*	*	15	12	**	**
South Inland	2.00	1.50	*	*	24	18	**	**
Central Valley	2.00	1.25	*	*	24	15	**	**
Desert	3.00	2.25	*	*	36	27	**	**
	Cooling EER				Heating HSPF			
North Coast	8.5	9.0	8.5	8.5	4.7	5.7	6.6	6.6
South Coast	8.5	9.5	8.5	8.5	4.7	5.7	6.6	6.6
South Inland	8.5	9.0	8.5	8.5	4.7	5.7	6.6	6.6
Central Valley	8.5	9.5	8.5	8.5	4.7	5.7	6.6	6.6
Desert	8.5	9.8	8.5	8.5	4.7	5.7	6.6	6.6
	Supply Air (CFM)				Cooling Energy (kWh)			
North Coast	600	375	***	***	967	264		
South Coast	375	300	***	***	586	117		
South Inland	618	464	***	***	1875	557		
Central Valley	600	375	***	***	1875	439		
Desert	909	682	***	***	8526	2901		
	Electric Heating Energy (kWh)				DHW Electricity (kWh)			
North Coast	4190	820			2491	1817		
South Coast	1582	264			2344	1699		
South Inland	2198	381			2315	1670		
Central Valley	5274	1260			2491	1787		
Desert	2256	293			1934	1377		

* Cooling capacity is DOE-2 default and rounded off to the next 0.5-ton

** Heating capacity is DOE-2 default and rounded off to the next 5 kBtu

*** CFM will be 400 CFM/ton

**** Window/Wall units for Coastal regions and Central units for other regions

**Table 5-13
Multi-Family Shell Details**

Climate Zone	Roof Insulation (Elec)				Roof Insulation (Gas)			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
North Coast	0	19.0	30	30	0	19.0	30	30
South Coast	0	19.0	30	30	0	19.0	30	30
South Inland	0	18.7	30	30	0	17.9	30	30
Central Valley	0	22.0	38	38	0	20.0	38	38
Desert	0	19.0	38	38	0	19.0	38	38

Climate Zone	Wall Insulation (Total)			
	Pre-1978	1978-1992	1992-1998	Post-1998
North Coast	0	14.4	13	13
South Coast	0	13.5	13	13
South Inland	0	13.7	13	13
Central Valley	0	13.6	19	19
Desert	0	13.5	21	21

Climate Zone	Glass Area (% Floor)				Glass U-value			
	Pre-1978	1978-1992	1992-1998	Post-1998	Pre-1978	1978-1992	1992-1998	Post-1998
North Coast	13.1%	18.4%	13.6%	13.5%	1.31	1.15	0.75	0.75
South Coast	14.9%	12.3%	12.5%	12.2%	1.31	1.27	0.75	0.75
South Inland	15.0%	15.2%	12.9%	12.6%	1.31	1.30	0.75	0.75
Central Valley	15.0%	16.9%	13.3%	13.0%	1.31	1.08	0.65	0.65
Desert	12.1%	18.0%	12.9%	12.8%	1.31	1.31	0.65	0.65

5.3 WEATHER-SENSITIVE CALIBRATION RESULTS

This subsection provides documentation for the DOE-2 calibration runs completed for the residential energy savings portion of the DEER Update 2001 Study.

5.3.1 Climate Zones

A summary of the weather stations used for the calibration process is shown in Table 5-14. This table shows the Commission forecasting zone associated with each utility. The most important thing to note about the calibration process is that the **Commission's demand forecasting zones are different than the Title-24 climate zones** with which many readers may be more familiar. The third column in the table shows the representative city for each forecast zone as defined by the Commission. The next two columns show base 75 and base 68 cooling and heating degree-days, respectively, for each representative city. Note that these base degree points are used simply to illustrate the relative characteristics of the forecast zones. The DOE-2 model uses a variety of weather parameters for each of the year in conjunction with the thermostat setpoint and building and household characteristics to estimate weather-sensitive usage. Finally, note that two additional weather zones are included in the list that are not associated with the

Commission's forecast zones. The first additional zone is Napa. We used this location as the cooling basis for Forecast Zone 1 because Arcata has virtually no cooling degree-days or associated usage. We also added Palm Springs as an extra climate zone simply to provide a very hot climate to round out the full set of results. Note that we did not actually run results for SMUD, LADWP, and BGP but that, because their weather stations are the same as those used for zones we did run, one could map our results into those territories if desired.

Table 5-14
Summary Weather Definitions Used for Calibration Runs

Utility	Forecast Climate	Representative City	CDD base75	HDD base68	Region
PG&E	1	Arcata	359	4207	North Coast
PG&E	2	Sacramento	527	3351	Central Valley
PG&E	3	Fresno	980	3003	Central Valley
PG&E	4	San Jose	198	3090	North Coast
PG&E	5	San Francisco	48	3108	North Coast
<i>SMUD</i>	6	<i>Sacramento</i>	<i>527</i>	<i>3351</i>	Central Valley
SCE	7	<i>Fresno</i>	<i>980</i>	<i>3003</i>	Central Valley
SCE	8	Long Beach	169	1706	South Coast
SCE	9	Burbank	498	2004	South Inland
SCE	10	San Bernardino	725	2361	Desert
<i>LADWP</i>	11	<i>Long Beach</i>	<i>169</i>	<i>1706</i>	South Coast
<i>LADWP</i>	12	<i>Burbank</i>	<i>498</i>	<i>2004</i>	South Inland
SDG&E	13	San Diego	98	1735	South Coast
<i>BGP</i>	16	<i>Burbank</i>	<i>498</i>	<i>2004</i>	South Inland
PG&E	17 (1)	napa	359	3809	North Coast
Other	18 (15)	palm springs	2399	1348	Desert

Note: the entries in italics utilize the same weather files and same building descriptions as other forecast climate zones, and are therefore not simulated separately.

5.3.2 Cooling Calibration

In Tables 5-15 and 5-16 show the California Energy Commission's target values for central air conditioning annual energy consumption and the unadjusted DOE-2 estimates of central air conditioning usage by climate zone, respectively. Comparison of these data show, as shown before, that DOE-2, like virtually all simulation models, tends to overestimate air conditioning usage in California. This is generally because of the discretionary component of residential air-conditioning usage in the state.

Table 5-15
Commission Target Values for Air Conditioning UECs

Forecasting CZ	CDD base75	Calibration Target (kWh)		
		Pre-1979	79 - 92	93 - 98
1	0	842	771	705
2	527	1389	1020	712
3	980	3255	2533	
4	198	901	704	535
5	48	165	123	109
6	527	1449	1227	1087
7	980	2838	2947	2486
8	169	786	648	496
9	498	1223	1088	768
10	725	1687	1534	1231
11	169	743		290
12	498	1765	1689	1317
13	98	1155	1192	1025
16	498	1683	1313	1018
17	359	842	771	705
18	2399			

*These target values were developed by the California Energy Commission through its demand forecast for 2000. Note that Climate Zone 17 (Napa) is used as the target for Climate Zone 1 because there are no CDD for Climate Zone 1. Blanks indicate that no target values were available from the California Energy Commission's latest demand forecast.

Table 5-16
Unadjusted DOE-2 Central Air Conditioning UECs

Forecast CZ	Central A/C Cooling kWh		
	Pre-1979	79 - 92	93 - 98
1	1,938	1,372	2,011
2	2,989	2,671	2,455
3	5,374	4,524	4,125
4	1,663	1,128	1,767
5	375	229	467
6	2,989	2,671	2,455
7	5,374	4,524	4,125
8	1,793	1,357	1,869
9	2,909	2,804	3,000
10	4,400	2,905	2,283
11	1,793	1,357	1,869
12	2,909	2,804	3,000
13	1,247	883	1,374
16	2,909	2,804	3,000
17	1,938	1,372	2,011
18	12,626	8,845	6,735

Table 5-17
Central Air Conditioning Adjustment Factors

Forecast CZ	Central A/C Adjustment Factor		
	Pre-1979	79 - 92	93 - 98
1	0.45	0.55	0.40
2	0.45	0.45	0.40
3	0.55	0.60	0.60
4	0.55	0.60	0.40
5	0.45	0.55	0.40
6	0.45	0.45	0.45
7	0.55	0.60	0.60
8	0.45	0.50	0.40
9	0.55	0.50	0.40
10	0.45	0.55	0.55
11	0.45	0.50	0.40
12	0.60	0.55	0.45
13	0.60	0.60	0.60
16	0.55	0.50	0.40
17	0.50	0.55	0.40
18	0.50	0.55	0.40

Our cooling setpoint assumptions for the DOE-2 models were based on a comprehensive thermostat behavior study conducted for the Commission in the late 1980s/early 1990s (*Occupancy Patterns and Energy Consumption in New California Homes (1984 to 1988), Phase Two of the Residential Monitoring Project, CEC #400-90-012, March 18, 1993, prepared by Berkeley Solar Group and XENERGY Inc.*) Key results of this study were its empirically measured estimates of thermostat setpoints for cooling, along with its measurement of the fraction of the monitoring period when the cooling system was turned off. As shown in Section 5.2.4, the results from the monitoring study cited above provided the first clear-cut empirical demonstration of the link between occupant thermostat on/off behavior and cooling energy consumption in California. The monitoring study showed that there are a significant number of days when a share of occupants do not use their heating/cooling system when they might otherwise be expected to. Unoccupied homes (due to all residents working), vacation days, and economic discretion are some of the reasons that occupants do not use their systems as extensively as predicted by simulation models.

As expected, when we compare the Commission's base UECs with the unadjusted DOE-2 results, we find that the DOE-2 estimates tend to be about twice the Commission values. Anticipating this, we proposed in our initial plan for the calibration process to use an adjustment factor that is a direct multiplier on the UECs for a given climate. This is because the average cooling energy use profile of a thermostat set to off and one set at 78 °F is not well approximated by a temperature setpoint higher than 78 °F. The effect of applying the adjustment factors can be seen in Figures 5-5 through 5-7, which show the unadjusted DOE-2, adjusted DOE-2, and target values (i.e., Commission base UECs) by vintage.

Figure 5- 5
Comparison of Central Air Conditioning Usage Estimates, Pre-1978 Vintage

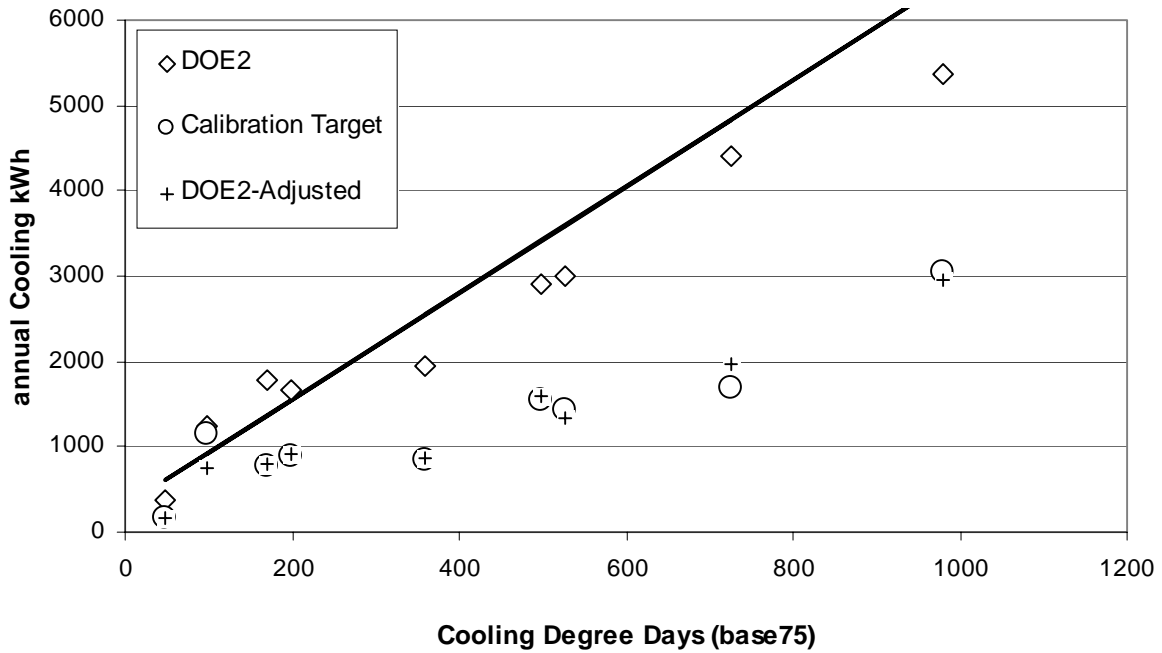


Figure 5-6
Comparison of Central Air Conditioning Usage Estimates, 1979-1992 Vintage

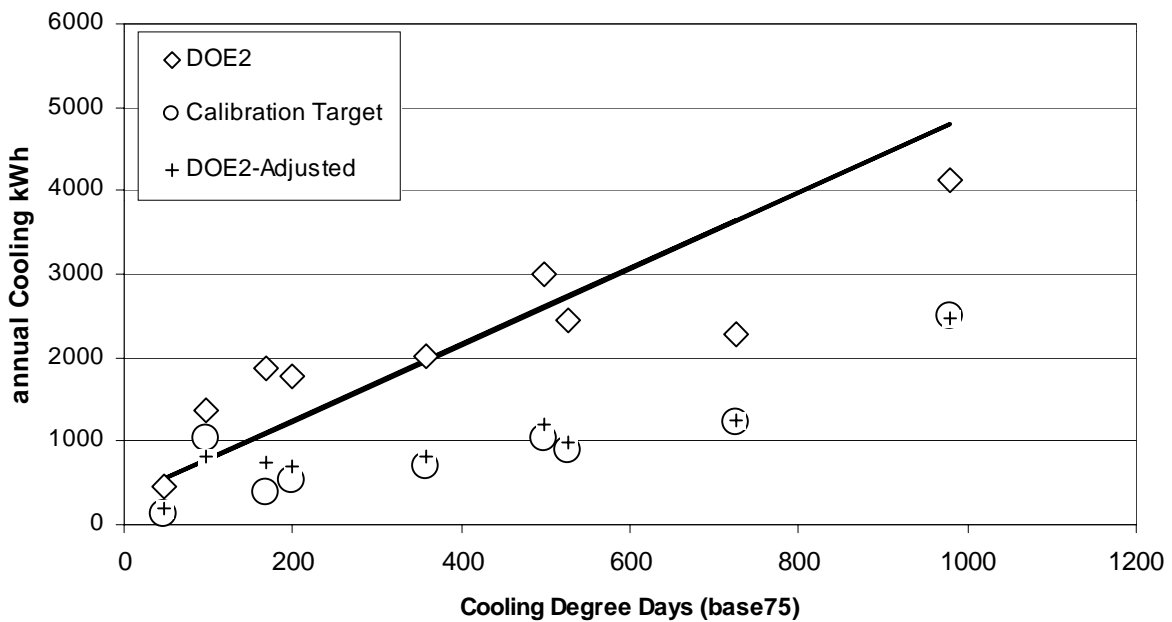
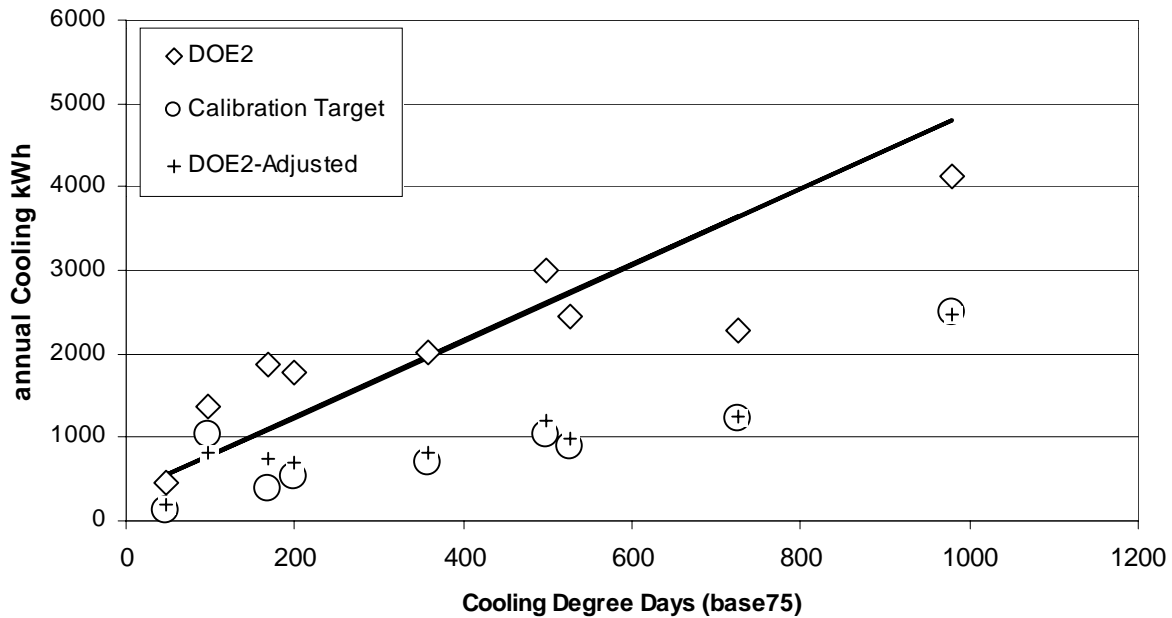


Figure 5-7
Comparison of Central Air Conditioning Usage Estimates, Post 1992 Vintage



The adjusted DOE-2 estimates shown in the figures above were used as the base case starting points for the measure simulations.

5.3.3 Heating Calibration

In Tables 5-18 and 5-19 we show the California Energy Commission's target therm values for central gas heating and the unadjusted DOE-2 estimates by climate zone, respectively. Comparison of these data show that DOE-2 does not overestimate furnace usage in California to the same extent that it does cooling. Adjustment factors for the calibration process are shown in Table 5-20. The adjustment factors tend to be close to 1.0 for most forecasting zones and vintages. In a few cases, an adjustment as low as 0.5 is needed. The effect of applying the adjustment factors can be seen in Figures 5-8 through 5-10, which show the unadjusted DOE-2, adjusted DOE-2, and target central heating values by vintage.

Table 5-18
Commission Target Values for Central Gas Heating UECs

Forecasting CZ	HDD base75	Calibration Target (therms)		
		Pre-1979	79 - 92	93 - 98
1	4,207	502	250	139
2	3,351	411	230	150
3	3,003	336	201	127
4	3,090	349	169	97
5	3,108	432	210	112
6	3,351	437	261	185
7	3,003	285	196	137
8	1,706	287	106	48
9	2,004	285	141	70
10	2,361	280	153	96
11	1,706	320		47
12	2,004	337		95
13	1,735	221	95	45
16	2,004	248	118	60
17	3,809			
18	1,348			

Table 5-19
Unadjusted DOE-2 Central Gas Heating UECs

Forecast CZ	Gas Furnace Heating therms		
	Pre-1979	79 - 92	93 - 98
1	634	290	287
2	520	301	192
3	476	274	177
4	411	164	133
5	476	182	142
6	520	301	192
7	476	274	177
8	270	114	51
9	282	124	44
10	290	107	41
11	270	114	51
12	282	124	44
13	207	87	43
16	282	124	44
17	517	189	198
18	161	48	11

**Table 5-20
Central Gas Heating Adjustment Factors**

Forecast CZ	Heating Use Adjustment Factor		
	Pre-1979	79 - 92	93 - 98
1	0.80	0.85	0.50
2	0.80	0.75	0.80
3	0.70	0.75	0.70
4	0.85	1.00	0.75
5	0.90	1.00	0.80
6	0.85	0.90	0.95
7	0.60	0.70	0.75
8	1.00	0.95	0.95
9	1.00	1.00	1.00
10	1.00	1.00	1.00
11	1.00	1.00	1.00
12	1.00	1.00	1.00
13	1.00	1.00	1.00
16	0.90	0.95	1.00
17	0.80	0.85	0.50
18	1.00	1.00	1.00

**Figure 5-8
Comparison of Central Gas Heating Usage Estimates, Pre-1978 Vintage**

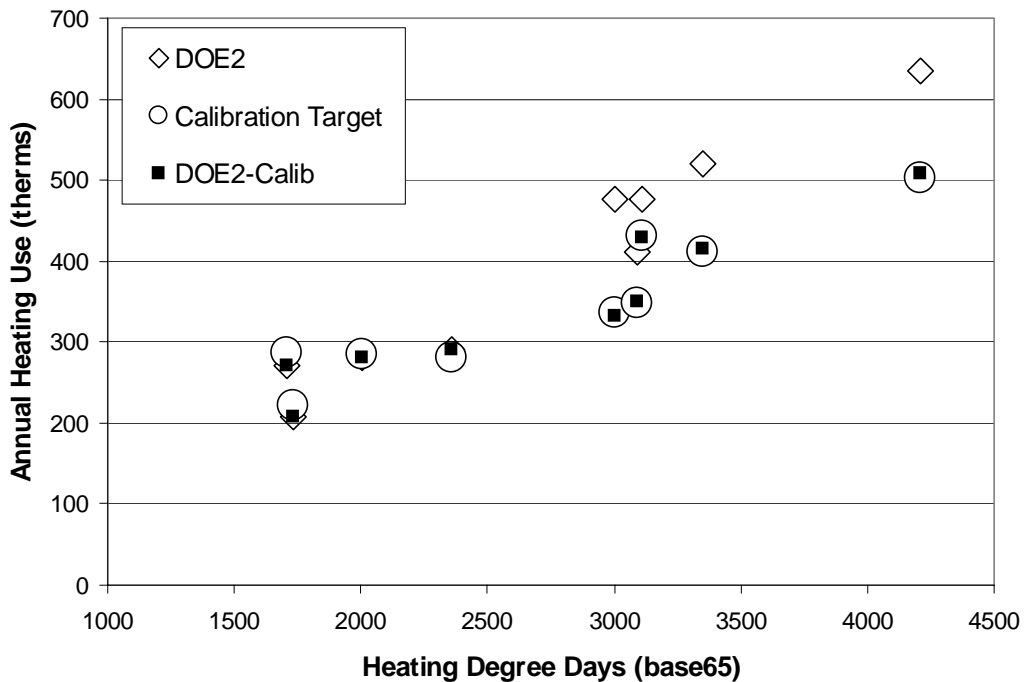


Figure 5-9
Comparison of Central Gas Heating Usage Estimates, 1979-1992 Vintage

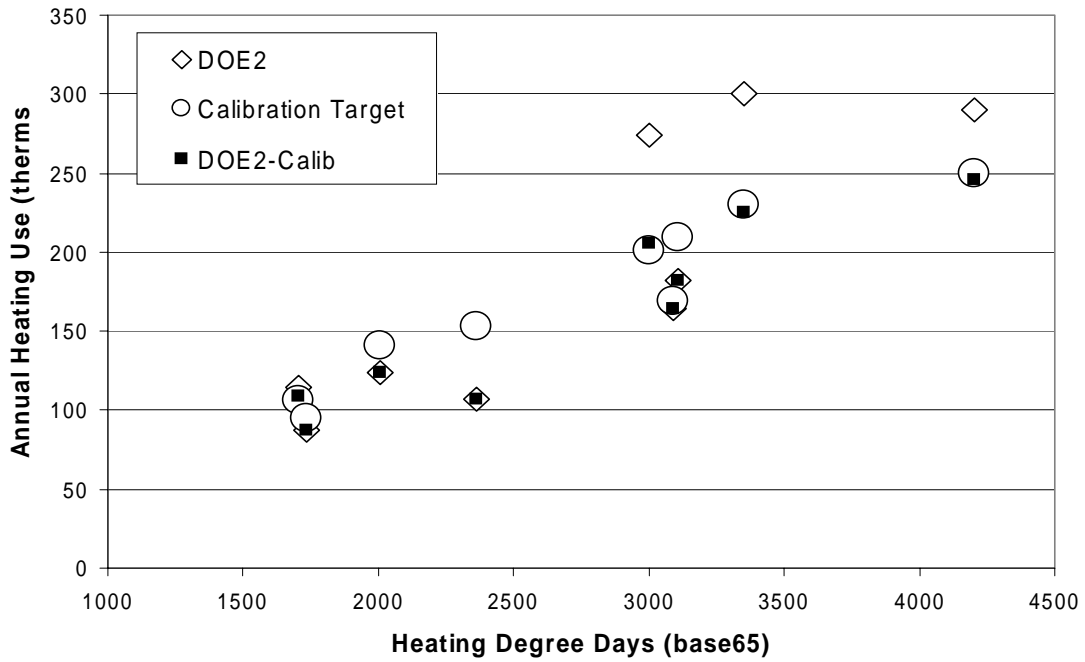
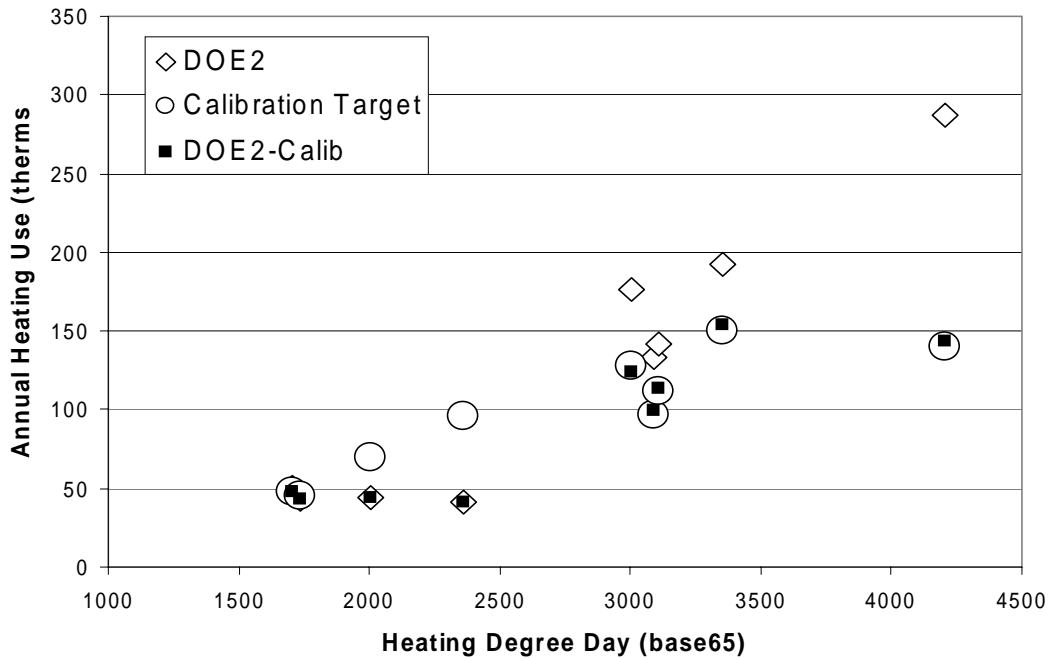


Figure 5-10
Comparison of Central Gas Heating Usage Estimates, Post 1992 Vintage



5.4 NON-WEATHER-SENSITIVE MEASURES

Measures with limited or no sensitivity to weather conditions were analyzed using engineering spreadsheet methods. The specific types of data used for estimation of savings from non-conditioning measures included:

- Base case electricity and gas usage by market segment, end-use, and utility;
- Base case electricity end-use load shapes;
- Saturation data on base case equipment and measures (to prioritize which base case situations are most common); and
- Per-unit energy savings and load impacts for each measure.

These data sources and their application to development of residential non-conditioning savings estimates are discussed in the remainder of this section.

UEC estimates in kWh/year were obtained from the Commission's latest end-use demand forecast. These values were shown in Appendices B and C of the documentation submitted for Task 5 of this study.⁴ Both average and marginal UECs were available from the Commission for most end uses. Average UECs represent the average consumption of all units in the entire applicable stock of homes, while marginal UECs represent the average consumption of all *new* units that are purchased. Thus, average UECs were used for measures that are purely retrofit items, for example, low-flow shower heads; while marginal UECs were used for measures that are replace-on-burnout, for example, a new water heater.

Base case end-use load shapes also were obtained from the Commission. The residential end-use load shapes used by the Commission in its peak demand forecasting model are already informed by the detailed residential end-use metering studies conducted by PG&E and SCE in the early- and mid-1990s. These end-use shapes were used to derive the peak demand impacts for the non-weather-sensitive measures.

Saturation and penetration data are required to determine the appropriate efficiency level for some of the base case technologies. We utilized the *Statewide Lighting and Appliance Efficiency Inventory Study*, the *Residential Market Share Tracking Study*, the *Commission's Directories of Certified Appliances*, and *ACEEE's Annual Guide to the Most Energy-Efficient Appliances* as the primary sources of this data. Sources for the base case efficiency levels are shown in Table 5-21.

Whenever available and applicable, we used the California Energy Commission's appliance saturation data. Note, however, that the scope of this study does not require much use of saturation data. The final products produced are *per-unit* incremental measure costs and savings,

⁴ *DEER Update 2001 Study, Task 5: Residential Energy Savings and Peak Reduction Methods Plan*, prepared by XENERGY Inc. for the California Energy Commission, January 24, 2001.

that is, cost and savings for those cases in which a particular base case is present (in contrast to estimation of total savings potential at a population level, which does require saturation data).

For the analysis of non-weather-sensitive technologies we used a variety of sources, including, in order of importance:

- Impact evaluation studies;
- Industry standard engineering calculations;
- Utility unit energy savings estimates provided in recent program filings;
- Results from our measure cost data collection activities, specifically, our surveys of retail stores (to identify/confirm which high-efficiency measures are actually on the market at which efficiency levels); and
- Our library of previous energy-efficiency potential studies and other sources (e.g., ACEEE).

For the non-conditioning savings, the estimation process is simply one of taking the base case UEC and multiplying by the estimated percent savings associated with the high-efficiency measure, i.e.,

$$\text{Savings (in kWh or therms/year)} = \text{Base UEC} \times \% \text{ Savings Estimated for Measure}$$

For most of the measures, the savings percentages can be derived directly from differences in estimated consumption for the base and high-efficiency technologies. For example, in the case of lighting measures, percent savings are estimated as:

$$\text{Percent Savings} = [1 - \text{Base Lighting Watts/High-Efficiency Lighting Watts}] * 100$$

Similarly, percent savings for measures with rated consumption, e.g., refrigerators, are calculated as:

$$\text{Percent Savings} = [1 - \text{Base Refrigerator Rated Consumption/High-Efficiency Refrigerator Rated Consumption}] * 100$$

For several other measures (e.g., water heaters), savings percentages are calculated analogously from efficiency ratings such as energy factor, e.g.:

$$\text{Percent Savings} = [1 - (1/\text{Base Technology Rated Energy Factor}) / (1/\text{High-Efficiency Technology Rated Energy Factor})] * 100$$

Sources and methods used for the non-conditioning measure savings estimates are provided in Tables 5-21 and 5-22.

Table 5-21
Documentation of Methods and Sources – Electric Non-Conditioning Measures

Measure	Base Efficiency	Percent Savings	Savings Method	Savings Source
CFL Measures	Incandescent wattage	77%	Engineering estimate	HMG, 1997 for hours of operation
HE Refrigerator - Energy Star	1993 NAECA	20%	Rated Consumption	CEE, 2001
HE Refrigerator – 2001 Compliant	1993 NAECA	30%	Rated Consumption	DOE, 2001
HE Refrigerator – Above 2001 Compliant	1993 NAECA	37%	Rated Consumption	Retail survey
Heat Pump Water Heater (EF=2.9)	CA Title 20 Standards	70%	Rated Efficiency	RER, 2000
HE Water Heater (EF=0.93)	CA Title 20 Standards	5.4%	Rated Efficiency	RER, 2000
Low Flow Showerhead	Non-Low Flow Unit	7.5%	Evaluation Studies	Average across several sources
Pipe Wrap	No Pipe Insulation	4.0%	Engineering estimate	NEOS, 1994
Faucet Aerators	No Aerator	3.0%	Engineering estimate	NEOS, 1994
Water Heater Blanket	No External Blanket	10%	Engineering estimate	CA Title 24 Calculation
Energy Star CW (EF=2.5)	1993 NAECA	53%	Rated Consumption	EPA, 2001 DOE, 2001
SEHA CW Tier 2 (EF=3.25)	1993 NAECA	64%	Rated Consumption	CEE, 2001 RER, 2000
Energy Star DW (EF=0.52)	1993 NAECA	13%	Rated Consumption	RLW, 2000 DOE, 2001 EPA, 2001
SEHA Dishwasher Tier 1 (0.58)	1993 NAECA	26%	Rated Consumption	RLW, 2000
High Efficiency Clothes Dryer (EF=0.52)	No Moisture Sensor	5.0%	Engineering estimate	Retail survey

Table 5-22
Documentation of Methods and Sources – Natural Gas Non-Conditioning Measures

Measure	Base Efficiency	Percent Savings	Savings Method	Savings Source
High Efficiency Water Heater (0.60 EF)	CA Title 24 Standards	10%	Rated Consumption	RER, 2000
High Efficiency Water Heater (EF = 0.63)	CA Title 24 Standards	14.3%	Rated Consumption	RER, 2000
Low Flow Showerhead	Non-Low Flow Unit	7.5%	Evaluation studies	Average across several sources
Pipe Wrap	No Pipe Insulation	4.0%	Engineering estimate/ Secondary Source	NEOS, 1994
Faucet Aerators	No Aerator	3.0%	Engineering estimate/ Secondary Source	NEOS, 1994
Water Heater Blanket	No External Blanket	10%	Engineering estimate	CA Title 24 Calculation
Energy Star Clothes Washer (EF=2.5)	1993 NAECA	53%	Rated Consumption	EPA, 2001 DOE, 2001
SEHA Clothes Washer Tier 2 (EF=3.25)	1993 NAECA	64%	Rated Consumption	CEE, 2001 RER, 2000
Energy Star Dishwasher (EF=0.52)	1993 NAECA	13%	Rated Consumption	RLW, 2000 DOE, 2001
SEHA Dishwasher Tier 1 (EF=0.58)	1993 NAECA	26%	Rated Consumption	RLW, 2000
High Efficiency Clothes Dryer	No Moisture Sensor	5.0%	Rated Consumption	Retail survey

6

RESIDENTIAL MEASURE ENERGY SAVINGS TABLES

In this chapter we present estimated energy savings for residential measures. Section 6.1 provides the tables with the weather-sensitive savings estimates. Section 6.2 provides the tables with the non-weather-sensitive savings estimates.

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6.1.1 *Single-Family Energy Savings Results*

Single-Family Measure Savings

Programmable Thermostat

Measure base: No heating or cooling thermostat setback

Measure description: Heating: 5 F setback from 10 p.m. to 6 a.m., weekdays from 9 a.m. to 4 p.m.

Cooling: setup weekdays from 9 a.m. to 4 p.m. to 85 F.

Measure units: house

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	98.8	313.6	382.1	351.7	179.4	326.9	422.2	350.5	384.6	266.7	439.9
	1978-1992	68.1	275.1	330.0	266.7	118.5	267.0	342.8	290.0	287.9	198.6	332.9
	1992-1998	63.2	214.1	288.0	267.5	159.2	256.2	255.8	213.3	349.2	198.4	196.9
	Post-1998	46.8	187.6	253.6	242.5	143.3	227.5	248.4	239.8	319.9	181.1	231.8
Peak1 kW/unit	Pre-1978	0.00	-0.61	-0.57	-0.71	-0.54	-0.23	-0.68	-0.75	-0.57	-0.62	-0.37
	1978-1992	0.00	-0.43	-0.41	-0.98	-0.56	-0.27	-0.41	-0.81	-0.57	-0.81	-0.46
	1992-1998	0.00	-0.64	-0.96	-0.46	-0.49	-0.04	-0.43	-0.98	-0.30	-0.42	-0.53
	Post-1998	0.00	-0.65	-0.99	-0.54	-0.51	-0.06	-0.50	-1.17	-0.41	-0.46	-0.72
Gas therms	Pre-1978	110	108	87	103	122	97	112	130	97	99	94
	1978-1992	74	67	60	67	76	59	69	66	63	55	43
	1992-1998	45	48	36	44	51	34	33	31	38	34	12
	Post-1998	42	40	30	38	44	25	25	25	26	30	7
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	22.8	18.9	12.3	26.0	28.0	26.8	22.6	15.6	32.1	19.4	7.1
	1978-1992	27.2	19.2	11.6	28.8	32.7	28.2	22.5	16.6	34.3	21.6	7.0
	1992-1998	28.9	18.3	10.8	26.6	30.4	25.5	19.1	15.5	29.6	19.2	7.1
	Post-1998	29.2	18.2	10.6	25.4	30.9	23.5	18.1	14.5	28.1	18.6	7.0
Peak1 kW/unit	Pre-1978	na	-28.1	-19.1	-33.0	-38.1	-12.9	-27.0	-30.7	-29.6	-28.7	-9.5
	1978-1992	na	-23.8	-15.3	-61.4	-46.7	-15.9	-19.4	-40.9	-34.5	-49.4	-15.3
	1992-1998	na	-42.2	-38.7	-31.9	-40.0	-2.4	-24.5	-62.4	-14.7	-26.1	-31.7
	Post-1998	na	-49.1	-45.2	-38.2	-42.3	-3.9	-27.1	-62.0	-20.8	-30.1	-37.3
Gas therms	Pre-1978	22.7	24.8	25.1	29.0	27.8	34.2	35.2	36.7	41.7	24.7	45.5
	1978-1992	28.6	28.5	28.2	36.4	36.1	45.3	45.6	46.8	53.2	31.8	60.3
	1992-1998	29.6	29.1	27.9	39.4	39.1	52.9	55.1	52.0	58.8	32.2	63.3
	Post-1998	30.4	29.5	28.3	40.0	39.6	53.5	57.2	56.0	59.4	32.6	67.9

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	432.7	1655.4	3100.4	1353.0	640.7	1219.3	1871.6	2247.2	1197.4	1376.1	6220.9
	1978-1992	250.7	1431.2	2838.7	924.8	362.6	945.4	1525.2	1746.5	840.2	920.1	4739.9
	1992-1998	218.5	1166.8	2658.8	1007.3	524.0	1006.7	1342.7	1376.2	1181.1	1030.8	2773.4
	Post-1998	160.3	1031.5	2397.3	954.2	464.0	967.6	1369.0	1654.8	1139.8	975.5	3309.5
Peak1 kW/unit	Pre-1978	0.0	2.2	3.0	2.1	1.4	1.8	2.5	2.5	1.9	2.2	3.9
	1978-1992	0.0	1.8	2.7	1.6	1.2	1.7	2.1	2.0	1.6	1.6	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	483.1	436.1	347.2	355.5	437.1	283.2	317.5	354.1	233.3	402.0	207.4
	1978-1992	259.3	236.0	211.2	183.0	209.6	129.5	151.9	140.0	118.1	171.5	71.1
	1992-1998	151.0	166.2	130.1	111.6	131.9	64.6	60.7	58.9	64.6	104.3	18.9
	Post-1998	137.0	135.4	106.0	94.2	110.5	46.4	43.2	45.3	44.1	92.3	10.9

Single-Family Measure Savings

10 to 11 SEER Split A/C

Measure base: SEER 10

Measure description: SEER 11

Measure units: Cooling Tons

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	25.7	53.5	22.0	5.3	24.3	30.2	33.2	25.2	21.4	96.6
	1978-1992	0.0	27.7	59.1	17.0	3.7	25.0	31.1	33.2	22.3	17.1	92.4
	1992-1998	0.0	22.8	56.2	22.7	9.0	30.8	31.8	29.8	36.8	23.4	60.7
	Post-1998	0.0	21.6	54.0	22.6	9.0	30.4	31.0	32.3	36.4	23.1	64.9
Peak1 kW/unit	Pre-1978	0.00	0.04	0.05	0.04	0.03	0.05	0.05	0.04	0.05	0.04	0.06
	1978-1992	0.00	0.04	0.06	0.04	0.03	0.05	0.05	0.04	0.05	0.04	0.06
	1992-1998	0.00	0.03	0.05	0.04	0.03	0.05	0.04	0.03	0.07	0.04	0.04
	Post-1998	0.00	0.03	0.05	0.04	0.03	0.05	0.04	0.04	0.07	0.04	0.04
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	3.8	4.3	4.3	3.8	3.8	3.0	4.3	5.0	3.0	3.8	5.0
	1978-1992	3.8	4.0	4.0	3.8	3.8	2.8	3.8	4.5	2.8	3.8	4.5
	1992-1998	3.5	4.3	4.3	3.5	3.5	2.8	3.8	4.3	2.8	3.5	4.3
	Post-1998	3.5	4.0	4.0	3.5	3.5	2.8	4.0	4.8	2.8	3.5	4.8

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	7.8	8.7	7.3	3.8	7.2	8.2	8.8	7.7	6.9	9.2
	1978-1992	0.0	8.3	8.9	8.0	4.7	8.1	8.7	9.1	8.2	7.9	9.3
	1992-1998	0.0	8.5	9.0	8.2	6.7	8.7	9.1	9.3	8.9	8.2	9.3
	Post-1998	0.0	8.6	9.1	8.6	7.4	8.9	9.2	9.3	9.0	8.5	9.3
Peak1 kW/unit	Pre-1978	na	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.1	9.2	9.2
	1978-1992	na	9.3	9.2	9.4	9.2	9.1	9.2	9.2	9.2	9.2	9.1
	1992-1998	na	9.3	9.2	9.2	9.2	9.2	9.1	9.3	9.1	9.1	9.2
	Post-1998	na	9.2	9.2	9.2	9.1	9.2	9.3	9.4	9.2	9.2	9.3
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1398.2	2622.9	1131.4	529.6	1008.2	1565.2	1888.1	980.3	1161.6	5257.0
	1978-1992	202.3	1333.3	2671.8	801.9	294.2	849.8	1338.4	1637.0	743.1	807.5	4484.1
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	1.9	2.5	1.8	1.2	1.5	2.1	2.1	1.6	1.8	3.3
	1978-1992	0.0	1.7	2.5	1.4	1.1	1.6	1.9	1.9	1.6	1.5	2.9
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	413.7	366.9	290.8	288.6	359.1	219.6	243.4	269.8	168.3	338.6	143.7
	1978-1992	209.3	191.3	171.2	135.3	155.5	86.9	102.5	93.6	70.2	133.1	39.0
	1992-1998	121.1	131.9	104.3	79.8	94.3	37.8	34.3	35.4	33.7	81.1	8.5
	Post-1998	108.3	106.5	84.4	66.0	77.6	26.3	23.1	24.7	22.0	70.9	4.3

Single-Family Measure Savings

10 to 12 SEER Split A/C

Measure base: SEER 10

Measure description: SEER 12

Measure units: Cooling Tons

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	47.2	98.1	40.3	9.7	44.5	55.4	60.8	46.2	39.3	177.0
	1978-1992	0.0	50.8	108.4	31.2	6.8	45.9	57.1	60.9	40.9	31.3	169.4
	1992-1998	0.0	41.8	103.0	41.6	16.6	56.4	58.2	54.7	67.4	42.9	111.3
	Post-1998	0.0	39.5	99.0	41.4	16.5	55.7	56.8	59.3	66.7	42.3	119.0
Peak1 kW/unit	Pre-1978	0.00	0.07	0.10	0.08	0.05	0.09	0.09	0.07	0.09	0.08	0.11
	1978-1992	0.00	0.07	0.11	0.07	0.05	0.10	0.09	0.07	0.10	0.07	0.11
	1992-1998	0.00	0.06	0.10	0.07	0.06	0.10	0.08	0.06	0.13	0.08	0.07
	Post-1998	0.00	0.06	0.09	0.07	0.06	0.10	0.08	0.07	0.12	0.07	0.07
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	3.8	4.3	4.3	3.8	3.8	3.0	4.3	5.0	3.0	3.8	5.0
	1978-1992	3.8	4.0	4.0	3.8	3.8	2.8	3.8	4.5	2.8	3.8	4.5
	1992-1998	3.5	4.3	4.3	3.5	3.5	2.8	3.8	4.3	2.8	3.5	4.3
	Post-1998	3.5	4.0	4.0	3.5	3.5	2.8	4.0	4.8	2.8	3.5	4.8

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	14.3	15.9	13.4	6.9	13.2	15.0	16.1	14.1	12.7	16.8
	1978-1992	0.0	15.2	16.2	14.6	8.7	14.9	16.0	16.8	15.1	14.5	17.0
	1992-1998	0.0	15.6	16.6	15.1	12.3	16.0	16.6	17.0	16.3	15.1	17.1
	Post-1998	0.0	15.7	16.6	15.7	13.6	16.3	16.8	17.1	16.5	15.6	17.1
Peak1 kW/unit	Pre-1978	na	16.9	17.0	17.0	16.7	16.8	17.0	16.9	16.8	16.8	17.0
	1978-1992	na	16.9	16.8	17.0	16.9	16.8	16.9	17.0	16.8	16.7	16.9
	1992-1998	na	17.0	16.9	16.9	16.7	16.8	16.9	17.1	16.8	16.8	16.9
	Post-1998	na	17.0	16.9	16.8	16.7	16.8	17.0	17.1	16.7	16.8	16.9
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1398.2	2622.9	1131.4	529.6	1008.2	1565.2	1888.1	980.3	1161.6	5257.0
	1978-1992	202.3	1333.3	2671.8	801.9	294.2	849.8	1338.4	1637.0	743.1	807.5	4484.1
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	1.9	2.5	1.8	1.2	1.5	2.1	2.1	1.6	1.8	3.3
	1978-1992	0.0	1.7	2.5	1.4	1.1	1.6	1.9	1.9	1.6	1.5	2.9
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	413.7	366.9	290.8	288.6	359.1	219.6	243.4	269.8	168.3	338.6	143.7
	1978-1992	209.3	191.3	171.2	135.3	155.5	86.9	102.5	93.6	70.2	133.1	39.0
	1992-1998	121.1	131.9	104.3	79.8	94.3	37.8	34.3	35.4	33.7	81.1	8.5
	Post-1998	108.3	106.5	84.4	66.0	77.6	26.3	23.1	24.7	22.0	70.9	4.3

Single-Family Measure Savings

10 to 13 SEER Split A/C

Measure base: SEER 10

Measure description: SEER 13

Measure units: Cooling Tons

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	65.3	135.8	55.8	13.5	61.6	76.7	84.2	63.9	54.4	245.1
	1978-1992	0.0	70.4	150.1	43.2	9.4	63.6	79.0	84.4	56.6	43.4	234.6
	1992-1998	0.0	57.9	142.5	57.6	23.0	78.1	80.6	75.7	93.3	59.4	154.1
	Post-1998	0.0	54.8	137.0	57.4	22.9	77.1	78.6	82.1	92.4	58.6	164.8
Peak1 kW/unit	Pre-1978	0.00	0.10	0.14	0.11	0.08	0.12	0.12	0.10	0.13	0.11	0.16
	1978-1992	0.00	0.10	0.15	0.09	0.07	0.14	0.12	0.10	0.13	0.09	0.15
	1992-1998	0.00	0.08	0.14	0.10	0.08	0.13	0.11	0.09	0.17	0.11	0.09
	Post-1998	0.00	0.08	0.13	0.09	0.08	0.13	0.11	0.09	0.17	0.10	0.10
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	3.8	4.3	4.3	3.8	3.8	3.0	4.3	5.0	3.0	3.8	5.0
	1978-1992	3.8	4.0	4.0	3.8	3.8	2.8	3.8	4.5	2.8	3.8	4.5
	1992-1998	3.5	4.3	4.3	3.5	3.5	2.8	3.8	4.3	2.8	3.5	4.3
	Post-1998	3.5	4.0	4.0	3.5	3.5	2.8	4.0	4.8	2.8	3.5	4.8

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	19.9	22.0	18.5	9.5	18.3	20.8	22.3	19.6	17.6	23.3
	1978-1992	0.0	21.1	22.5	20.2	12.0	20.6	22.1	23.2	20.9	20.1	23.5
	1992-1998	0.0	21.6	23.0	20.9	17.0	22.2	23.0	23.6	22.6	20.8	23.7
	Post-1998	0.0	21.7	23.0	21.8	18.8	22.6	23.3	23.7	22.9	21.6	23.7
Peak1 kW/unit	Pre-1978	na	23.4	23.4	23.4	23.2	23.4	23.6	23.4	23.2	23.3	23.4
	1978-1992	na	23.3	23.5	23.6	23.6	23.2	23.5	23.4	23.3	23.3	23.4
	1992-1998	na	23.5	23.4	23.3	23.4	23.3	23.4	23.5	23.2	23.2	23.4
	Post-1998	na	23.5	23.4	23.4	23.2	23.3	23.4	23.6	23.1	23.3	23.4
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1398.2	2622.9	1131.4	529.6	1008.2	1565.2	1888.1	980.3	1161.6	5257.0
	1978-1992	202.3	1333.3	2671.8	801.9	294.2	849.8	1338.4	1637.0	743.1	807.5	4484.1
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	1.9	2.5	1.8	1.2	1.5	2.1	2.1	1.6	1.8	3.3
	1978-1992	0.0	1.7	2.5	1.4	1.1	1.6	1.9	1.9	1.6	1.5	2.9
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	413.7	366.9	290.8	288.6	359.1	219.6	243.4	269.8	168.3	338.6	143.7
	1978-1992	209.3	191.3	171.2	135.3	155.5	86.9	102.5	93.6	70.2	133.1	39.0
	1992-1998	121.1	131.9	104.3	79.8	94.3	37.8	34.3	35.4	33.7	81.1	8.5
	Post-1998	108.3	106.5	84.4	66.0	77.6	26.3	23.1	24.7	22.0	70.9	4.3

Single-Family Measure Savings

10 to 14 SEER Split A/C

Measure base: SEER 10

Measure description: SEER 14

Measure units: Cooling Tons

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	80.9	168.1	69.1	16.7	76.2	95.0	104.2	79.2	67.3	303.5
	1978-1992	0.0	87.1	185.9	53.5	11.6	78.7	97.9	104.5	70.1	53.7	290.4
	1992-1998	0.0	71.7	176.5	71.3	28.4	96.6	99.8	93.7	115.5	73.6	190.8
	Post-1998	0.0	67.8	169.6	71.0	28.3	95.5	97.3	101.6	114.4	72.5	204.1
Peak1 kW/unit	Pre-1978	0.00	0.13	0.17	0.14	0.09	0.15	0.15	0.12	0.16	0.14	0.19
	1978-1992	0.00	0.12	0.18	0.11	0.08	0.17	0.15	0.12	0.16	0.11	0.18
	1992-1998	0.00	0.10	0.17	0.12	0.10	0.17	0.14	0.11	0.21	0.13	0.11
	Post-1998	0.00	0.10	0.16	0.12	0.10	0.16	0.13	0.12	0.21	0.13	0.12
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	3.8	4.3	4.3	3.8	3.8	3.0	4.3	5.0	3.0	3.8	5.0
	1978-1992	3.8	4.0	4.0	3.8	3.8	2.8	3.8	4.5	2.8	3.8	4.5
	1992-1998	3.5	4.3	4.3	3.5	3.5	2.8	3.8	4.3	2.8	3.5	4.3
	Post-1998	3.5	4.0	4.0	3.5	3.5	2.8	4.0	4.8	2.8	3.5	4.8

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	24.6	27.2	22.9	11.8	22.7	25.8	27.6	24.2	21.7	28.9
	1978-1992	0.0	26.1	27.8	25.0	14.8	25.5	27.4	28.7	25.9	24.9	29.1
	1992-1998	0.0	26.7	28.4	25.9	21.1	27.4	28.5	29.2	27.9	25.8	29.3
	Post-1998	0.0	26.9	28.5	27.0	23.2	27.9	28.8	29.3	28.4	26.7	29.3
Peak1 kW/unit	Pre-1978	na	29.0	29.0	29.0	28.9	28.9	29.1	29.0	28.8	28.9	29.0
	1978-1992	na	29.0	29.0	29.3	29.0	28.9	29.0	29.1	28.9	28.8	29.0
	1992-1998	na	29.0	29.0	28.9	28.9	28.8	28.9	29.1	28.7	28.8	29.0
	Post-1998	na	29.1	29.1	28.9	28.9	28.8	28.9	29.2	28.8	28.8	29.0
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1398.2	2622.9	1131.4	529.6	1008.2	1565.2	1888.1	980.3	1161.6	5257.0
	1978-1992	202.3	1333.3	2671.8	801.9	294.2	849.8	1338.4	1637.0	743.1	807.5	4484.1
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	1.9	2.5	1.8	1.2	1.5	2.1	2.1	1.6	1.8	3.3
	1978-1992	0.0	1.7	2.5	1.4	1.1	1.6	1.9	1.9	1.6	1.5	2.9
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	413.7	366.9	290.8	288.6	359.1	219.6	243.4	269.8	168.3	338.6	143.7
	1978-1992	209.3	191.3	171.2	135.3	155.5	86.9	102.5	93.6	70.2	133.1	39.0
	1992-1998	121.1	131.9	104.3	79.8	94.3	37.8	34.3	35.4	33.7	81.1	8.5
	Post-1998	108.3	106.5	84.4	66.0	77.6	26.3	23.1	24.7	22.0	70.9	4.3

Single-Family Measure Savings

10 to 16 SEER Split A/C

Measure base: SEER 10

Measure description: SEER 16

Measure units: Cooling Tons

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	106.2	220.7	90.7	21.9	100.1	124.7	136.8	103.9	88.4	398.3
	1978-1992	0.0	114.4	243.9	70.2	15.3	103.3	128.4	137.1	91.9	70.5	381.2
	1992-1998	0.0	94.1	231.6	93.6	37.3	126.8	131.0	123.0	151.6	96.6	250.4
	Post-1998	0.0	89.0	222.6	93.3	37.1	125.3	127.7	133.4	150.1	95.2	267.8
Peak1 kW/unit	Pre-1978	0.00	0.17	0.23	0.18	0.12	0.19	0.19	0.16	0.21	0.19	0.25
	1978-1992	0.00	0.16	0.24	0.15	0.11	0.22	0.19	0.16	0.22	0.15	0.24
	1992-1998	0.00	0.14	0.22	0.16	0.13	0.22	0.18	0.14	0.28	0.17	0.15
	Post-1998	0.00	0.13	0.21	0.15	0.13	0.21	0.18	0.15	0.27	0.17	0.16
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	3.8	4.3	4.3	3.8	3.8	3.0	4.3	5.0	3.0	3.8	5.0
	1978-1992	3.8	4.0	4.0	3.8	3.8	2.8	3.8	4.5	2.8	3.8	4.5
	1992-1998	3.5	4.3	4.3	3.5	3.5	2.8	3.8	4.3	2.8	3.5	4.3
	Post-1998	3.5	4.0	4.0	3.5	3.5	2.8	4.0	4.8	2.8	3.5	4.8

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	32.3	35.8	30.1	15.5	29.8	33.9	36.2	31.8	28.5	37.9
	1978-1992	0.0	34.3	36.5	32.8	19.5	33.4	36.0	37.7	34.0	32.7	38.3
	1992-1998	0.0	35.0	37.3	34.0	27.7	36.0	37.4	38.3	36.7	33.9	38.4
	Post-1998	0.0	35.3	37.4	35.4	30.5	36.7	37.8	38.5	37.2	35.0	38.5
Peak1 kW/unit	Pre-1978	na	38.1	38.0	38.0	37.9	37.9	38.2	38.1	37.8	37.9	38.1
	1978-1992	na	38.0	38.1	38.2	38.2	37.9	38.1	38.1	37.9	38.0	38.1
	1992-1998	na	38.1	38.1	38.1	37.8	37.9	38.0	38.2	37.7	37.8	38.1
	Post-1998	na	38.2	38.1	38.0	37.8	37.8	38.0	38.2	37.7	37.8	38.2
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1398.2	2622.9	1131.4	529.6	1008.2	1565.2	1888.1	980.3	1161.6	5257.0
	1978-1992	202.3	1333.3	2671.8	801.9	294.2	849.8	1338.4	1637.0	743.1	807.5	4484.1
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	1.9	2.5	1.8	1.2	1.5	2.1	2.1	1.6	1.8	3.3
	1978-1992	0.0	1.7	2.5	1.4	1.1	1.6	1.9	1.9	1.6	1.5	2.9
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	413.7	366.9	290.8	288.6	359.1	219.6	243.4	269.8	168.3	338.6	143.7
	1978-1992	209.3	191.3	171.2	135.3	155.5	86.9	102.5	93.6	70.2	133.1	39.0
	1992-1998	121.1	131.9	104.3	79.8	94.3	37.8	34.3	35.4	33.7	81.1	8.5
	Post-1998	108.3	106.5	84.4	66.0	77.6	26.3	23.1	24.7	22.0	70.9	4.3

Single-Family Measure Savings

Basic HVAC diagnostic testing and repair

Measure base: Degraded DX cooling, Leaky ducts (29% duct leakage)

Measure description: Standard SEER (by location and vintage)

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	212.3	441.4	160.0	38.6	141.3	249.4	321.8	146.7	156.0	937.2
	1978-1992	0.0	222.6	474.7	127.2	27.7	137.7	233.2	299.6	122.1	127.9	836.3
	1992-1998	0.0	199.0	492.0	161.7	64.5	173.2	242.5	260.6	206.4	167.8	534.6
	Post-1998	0.0	176.8	444.3	161.2	64.1	171.3	253.0	317.9	203.8	165.3	639.7
Peak1 kW/unit	Pre-1978	0.00	0.33	0.45	0.33	0.22	0.27	0.39	0.37	0.29	0.33	0.59
	1978-1992	0.00	0.32	0.46	0.27	0.20	0.30	0.35	0.35	0.29	0.27	0.53
	1992-1998	0.00	0.29	0.48	0.27	0.23	0.29	0.34	0.30	0.38	0.30	0.32
	Post-1998	0.00	0.25	0.42	0.27	0.23	0.29	0.35	0.37	0.37	0.29	0.37
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	11.6	12.6	11.0	6.4	10.9	12.1	12.7	11.5	10.6	13.1
	1978-1992	0.0	12.2	12.8	11.8	7.7	11.9	12.6	13.1	12.1	11.7	13.2
	1992-1998	0.0	12.4	13.0	12.1	10.3	12.6	13.0	13.2	12.8	12.0	13.3
	Post-1998	0.0	12.4	13.0	12.5	11.1	12.8	13.1	13.3	12.9	12.4	13.3
Peak1 kW/unit	Pre-1978	na	13.2	13.2	13.2	13.1	13.1	13.2	13.2	13.1	13.1	13.2
	1978-1992	na	13.2	13.1	13.2	13.2	13.2	13.2	13.2	13.1	13.2	13.2
	1992-1998	na	13.2	13.2	13.2	13.1	13.2	13.2	13.2	13.0	13.1	13.2
	Post-1998	na	13.1	13.2	13.1	13.1	13.1	13.1	13.2	13.0	13.1	13.2
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1822.9	3505.7	1451.4	606.9	1290.7	2064.0	2531.8	1273.7	1473.5	7131.3
	1978-1992	211.2	1826.9	3716.2	1080.9	360.0	1152.2	1846.6	2291.1	1008.9	1089.5	6323.8
	1992-1998	188.0	1610.8	3795.1	1338.2	628.7	1371.5	1866.6	1970.8	1612.7	1392.4	4031.7
	Post-1998	136.3	1423.6	3419.1	1294.8	578.9	1337.4	1930.5	2395.3	1574.3	1337.4	4820.9
Peak1 kW/unit	Pre-1978	0.0	2.5	3.4	2.5	1.6	2.1	2.9	2.8	2.2	2.5	4.5
	1978-1992	0.0	2.4	3.5	2.0	1.5	2.3	2.7	2.7	2.2	2.1	4.0
	1992-1998	0.0	2.2	3.6	2.1	1.8	2.2	2.6	2.3	3.0	2.3	2.4
	Post-1998	0.0	1.9	3.2	2.0	1.8	2.2	2.7	2.8	2.8	2.2	2.8
Gas therms	Pre-1978	413.7	366.9	290.8	288.6	359.1	219.6	243.4	269.8	168.3	338.6	143.7
	1978-1992	230.6	211.1	188.9	149.1	171.3	95.2	112.7	103.3	76.9	146.7	43.1
	1992-1998	144.8	159.0	125.8	95.5	112.8	45.0	40.9	42.7	40.3	97.0	10.3
	Post-1998	129.6	128.4	101.8	79.0	92.9	31.4	27.5	29.9	26.3	84.9	5.3

Single-Family Measure Savings

Advanced HVAC diagnostic testing and repair

Measure base: Degraded DX cooling, Leaky ducts (29% duct leakage)

Measure description: Standard SEER (by location and vintage)

15% Duct leakage

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	38.5	348.4	711.5	258.5	88.0	233.0	395.2	523.6	229.9	263.3	1522.5
	1978-1992	23.0	364.3	761.3	198.9	56.8	211.3	358.3	464.2	187.2	204.7	1341.6
	1992-1998	18.3	310.9	762.0	247.4	106.6	261.5	350.9	394.6	294.8	261.5	842.3
	Post-1998	13.5	273.1	682.0	238.9	101.4	258.0	370.6	492.9	296.0	252.7	1009.8
Peak1 kW/unit	Pre-1978	0.00	0.54	0.75	0.51	0.33	0.43	0.62	0.61	0.45	0.52	0.92
	1978-1992	0.00	0.48	0.70	0.41	0.30	0.47	0.56	0.58	0.44	0.44	0.85
	1992-1998	0.00	0.46	0.77	0.42	0.36	0.39	0.51	0.50	0.60	0.47	0.52
	Post-1998	0.00	0.41	0.68	0.41	0.35	0.42	0.54	0.60	0.57	0.45	0.59
Gas therms	Pre-1978	42	40	32	29	36	21	26	30	16	34	16
	1978-1992	24	23	20	16	18	9	11	11	7	16	5
	1992-1998	13	16	13	9	10	4	4	5	4	9	1
	Post-1998	12	13	11	7	9	3	2	3	2	8	1
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	10.4	19.1	20.3	17.8	14.5	18.0	19.1	20.7	18.0	17.9	21.3
	1978-1992	10.9	19.9	20.5	18.4	15.8	18.3	19.4	20.3	18.6	18.8	21.2
	1992-1998	9.7	19.3	20.1	18.5	17.0	19.1	18.8	20.0	18.3	18.8	20.9
	Post-1998	9.9	19.2	19.9	18.4	17.5	19.3	19.2	20.6	18.8	18.9	20.9
Peak1 kW/unit	Pre-1978	na	21.6	21.7	20.6	20.3	20.7	21.2	21.7	20.3	21.1	20.4
	1978-1992	na	20.1	20.0	20.4	20.1	20.7	20.9	22.0	20.2	21.2	21.1
	1992-1998	na	21.1	21.3	20.4	20.1	17.4	20.1	21.5	20.2	20.6	21.4
	Post-1998	na	21.0	21.3	20.2	20.2	18.8	20.3	21.7	20.1	20.4	20.9
Gas therms	Pre-1978	10.1	10.9	10.9	10.0	10.0	9.8	10.6	11.1	9.8	10.1	11.1
	1978-1992	10.5	10.8	10.8	10.5	10.5	9.2	10.1	10.8	9.3	10.6	10.7
	1992-1998	9.2	10.3	10.3	9.3	9.3	8.9	9.0	10.6	9.0	9.3	10.5
	Post-1998	9.4	10.3	10.3	9.4	9.3	9.0	9.0	10.8	9.1	9.4	11.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1822.9	3505.7	1451.4	606.9	1290.7	2064.0	2531.8	1273.7	1473.5	7131.3
	1978-1992	211.2	1826.9	3716.2	1080.9	360.0	1152.2	1846.6	2291.1	1008.9	1089.5	6323.8
	1992-1998	188.0	1610.8	3795.1	1338.2	628.7	1371.5	1866.6	1970.8	1612.7	1392.4	4031.7
	Post-1998	136.3	1423.6	3419.1	1294.8	578.9	1337.4	1930.5	2395.3	1574.3	1337.4	4820.9
Peak1 kW/unit	Pre-1978	0.0	2.5	3.4	2.5	1.6	2.1	2.9	2.8	2.2	2.5	4.5
	1978-1992	0.0	2.4	3.5	2.0	1.5	2.3	2.7	2.7	2.2	2.1	4.0
	1992-1998	0.0	2.2	3.6	2.1	1.8	2.2	2.6	2.3	3.0	2.3	2.4
	Post-1998	0.0	1.9	3.2	2.0	1.8	2.2	2.7	2.8	2.8	2.2	2.8
Gas therms	Pre-1978	413.7	366.9	290.8	288.6	359.1	219.6	243.4	269.8	168.3	338.6	143.7
	1978-1992	230.6	211.1	188.9	149.1	171.3	95.2	112.7	103.3	76.9	146.7	43.1
	1992-1998	144.8	159.0	125.8	95.5	112.8	45.0	40.9	42.7	40.3	97.0	10.3
	Post-1998	129.6	128.4	101.8	79.0	92.9	31.4	27.5	29.9	26.3	84.9	5.3

Single-Family Measure Savings

80 AFUE to Condensing 90 AFUE Furnace

Measure base: 80 AFUE furnace

Measure description: 90 AFUE Furnace

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	40	36	28	28	35	21	24	26	16	33	14	
	1978-1992	22	20	18	14	16	9	11	10	7	14	4	
	1992-1998	13	14	11	9	10	4	4	4	4	9	1	
	Post-1998	12	12	9	7	8	3	2	3	2	8	0	
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas therms	Pre-1978	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
	1978-1992	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
	1992-1998	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
	Post-1998	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1610.5	3064.3	1291.4	568.2	1149.4	1814.6	2209.9	1127.0	1317.5	6194.1
	1978-1992	202.3	1397.5	2808.7	879.9	311.2	889.7	1481.1	1723.6	778.6	885.8	4724.9
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	2.2	3.0	2.1	1.4	1.8	2.5	2.5	1.9	2.2	3.9
	1978-1992	0.0	1.8	2.7	1.6	1.2	1.7	2.1	2.0	1.6	1.6	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	362.0	321.0	254.4	252.5	314.2	192.2	212.9	236.1	147.2	296.3	125.8
	1978-1992	193.6	177.0	158.4	125.2	143.8	80.3	94.8	86.6	64.9	123.1	36.1
	1992-1998	118.1	128.6	101.7	77.8	91.9	36.8	33.4	34.5	32.9	79.1	8.3
	Post-1998	105.6	103.8	82.3	64.3	75.7	25.6	22.5	24.1	21.5	69.1	4.2

Single-Family Measure Savings

80 AFUE to Condensing 92 AFUE Furnace

Measure base: 80 AFUE furnace

Measure description: 92 AFUE Furnace

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	47	42	33	33	41	25	28	31	19	39	16	
	1978-1992	25	23	21	16	19	10	12	11	8	16	5	
	1992-1998	15	17	13	10	12	5	4	4	4	10	1	
	Post-1998	14	14	11	8	10	3	3	3	3	9	1	
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas therms	Pre-1978	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
	1978-1992	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
	1992-1998	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
	Post-1998	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1610.5	3064.3	1291.4	568.2	1149.4	1814.6	2209.9	1127.0	1317.5	6194.1
	1978-1992	202.3	1397.5	2808.7	879.9	311.2	889.7	1481.1	1723.6	778.6	885.8	4724.9
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	2.2	3.0	2.1	1.4	1.8	2.5	2.5	1.9	2.2	3.9
	1978-1992	0.0	1.8	2.7	1.6	1.2	1.7	2.1	2.0	1.6	1.6	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	362.0	321.0	254.4	252.5	314.2	192.2	212.9	236.1	147.2	296.3	125.8
	1978-1992	193.6	177.0	158.4	125.2	143.8	80.3	94.8	86.6	64.9	123.1	36.1
	1992-1998	118.1	128.6	101.7	77.8	91.9	36.8	33.4	34.5	32.9	79.1	8.3
	Post-1998	105.6	103.8	82.3	64.3	75.7	25.6	22.5	24.1	21.5	69.1	4.2

Single-Family Measure Savings

80 AFUE to Condensing 94 AFUE Furnace

Measure base: 80 AFUE furnace

Measure description: 94 AFUE Furnace

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	54	48	38	38	47	29	32	35	22	44	19	
	1978-1992	29	26	24	19	21	12	14	13	10	18	5	
	1992-1998	18	19	15	12	14	5	5	5	5	12	1	
	Post-1998	16	15	12	10	11	4	3	4	3	10	1	
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas therms	Pre-1978	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
	1978-1992	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
	1992-1998	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
	Post-1998	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1610.5	3064.3	1291.4	568.2	1149.4	1814.6	2209.9	1127.0	1317.5	6194.1
	1978-1992	202.3	1397.5	2808.7	879.9	311.2	889.7	1481.1	1723.6	778.6	885.8	4724.9
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	2.2	3.0	2.1	1.4	1.8	2.5	2.5	1.9	2.2	3.9
	1978-1992	0.0	1.8	2.7	1.6	1.2	1.7	2.1	2.0	1.6	1.6	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	362.0	321.0	254.4	252.5	314.2	192.2	212.9	236.1	147.2	296.3	125.8
	1978-1992	193.6	177.0	158.4	125.2	143.8	80.3	94.8	86.6	64.9	123.1	36.1
	1992-1998	118.1	128.6	101.7	77.8	91.9	36.8	33.4	34.5	32.9	79.1	8.3
	Post-1998	105.6	103.8	82.3	64.3	75.7	25.6	22.5	24.1	21.5	69.1	4.2

Single-Family Measure Savings

80 AFUE to Condensing 96 AFUE Furnace

Measure base: 80 AFUE furnace

Measure description: 96 AFUE Furnace

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	60	54	42	42	52	32	35	39	25	49	21	
	1978-1992	32	29	26	21	24	13	16	14	11	21	6	
	1992-1998	20	21	17	13	15	6	6	6	5	13	1	
	Post-1998	18	17	14	11	13	4	4	4	4	12	1	
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas therms	Pre-1978	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
	1978-1992	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
	1992-1998	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
	Post-1998	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1610.5	3064.3	1291.4	568.2	1149.4	1814.6	2209.9	1127.0	1317.5	6194.1
	1978-1992	202.3	1397.5	2808.7	879.9	311.2	889.7	1481.1	1723.6	778.6	885.8	4724.9
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	2.2	3.0	2.1	1.4	1.8	2.5	2.5	1.9	2.2	3.9
	1978-1992	0.0	1.8	2.7	1.6	1.2	1.7	2.1	2.0	1.6	1.6	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	362.0	321.0	254.4	252.5	314.2	192.2	212.9	236.1	147.2	296.3	125.8
	1978-1992	193.6	177.0	158.4	125.2	143.8	80.3	94.8	86.6	64.9	123.1	36.1
	1992-1998	118.1	128.6	101.7	77.8	91.9	36.8	33.4	34.5	32.9	79.1	8.3
	Post-1998	105.6	103.8	82.3	64.3	75.7	25.6	22.5	24.1	21.5	69.1	4.2

Single-Family Measure Savings

Duct Repair

Measure base: 20% duct leakage

Measure description: 6% duct leakage

1-story: 90% of ducts in Uncond./2-story: 65% of ducts in Uncond.

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	38.5	136.0	270.1	98.5	49.4	91.7	145.8	201.8	83.2	107.3	585.3
	1978-1992	23.4	128.9	258.4	68.7	28.7	67.3	118.8	148.0	59.3	73.6	451.6
	1992-1998	18.9	97.2	231.0	75.0	38.4	76.0	92.3	114.1	76.1	81.9	260.0
	Post-1998	14.0	83.6	203.2	67.8	33.3	74.3	100.1	148.5	79.0	75.8	312.4
Peak1 kW/unit	Pre-1978	0.00	0.21	0.30	0.18	0.12	0.16	0.23	0.24	0.16	0.20	0.32
	1978-1992	0.00	0.15	0.21	0.14	0.10	0.15	0.20	0.21	0.14	0.16	0.28
	1992-1998	0.00	0.15	0.25	0.13	0.10	0.08	0.15	0.16	0.18	0.15	0.17
	Post-1998	0.00	0.13	0.22	0.12	0.10	0.11	0.16	0.20	0.17	0.14	0.18
Gas therms	Pre-1978	42	40	32	29	36	21	26	30	16	34	16
	1978-1992	23	22	20	15	17	8	11	11	7	15	4
	1992-1998	12	15	12	8	10	4	3	4	3	8	1
	Post-1998	11	12	10	7	8	3	2	3	2	7	1
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	10.4	8.4	8.8	7.6	8.7	8.0	8.0	9.1	7.4	8.1	9.4
	1978-1992	10.9	8.9	8.9	7.6	8.9	7.3	7.8	8.3	7.4	8.0	9.2
	1992-1998	9.7	8.0	8.2	7.4	7.6	7.4	6.7	7.9	6.4	7.7	8.8
	Post-1998	9.9	7.8	8.0	7.0	7.4	7.5	7.0	8.5	6.8	7.5	8.9
Peak1 kW/unit	Pre-1978	na	9.7	9.9	8.5	8.3	8.7	9.2	9.9	8.3	9.1	8.3
	1978-1992	na	8.1	7.8	8.4	7.8	8.5	9.0	10.1	8.1	9.4	9.1
	1992-1998	na	9.1	9.4	8.3	7.9	4.9	8.2	9.7	8.2	8.6	9.3
	Post-1998	na	9.1	9.5	8.2	8.1	6.5	8.3	9.7	8.2	8.4	9.0
Gas therms	Pre-1978	10.1	10.9	10.9	10.0	10.0	9.8	10.6	11.1	9.8	10.1	11.1
	1978-1992	10.5	10.8	10.9	10.5	10.5	9.2	10.1	10.8	9.3	10.6	10.8
	1992-1998	9.2	10.3	10.3	9.3	9.3	8.8	9.0	10.6	9.0	9.3	10.5
	Post-1998	9.3	10.3	10.4	9.4	9.3	8.9	9.0	10.7	9.1	9.4	11.1

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1610.5	3064.3	1291.4	568.2	1149.4	1814.6	2209.9	1127.0	1317.5	6194.1
	1978-1992	215.1	1449.4	2908.8	908.2	324.6	919.2	1527.1	1780.8	802.1	916.2	4890.1
	1992-1998	195.3	1212.9	2807.5	1016.8	503.8	1024.1	1378.9	1446.3	1198.9	1059.7	2945.0
	Post-1998	141.2	1070.0	2527.0	972.6	452.4	993.0	1420.5	1753.6	1164.7	1007.6	3517.8
Peak1 kW/unit	Pre-1978	0.0	2.2	3.0	2.1	1.4	1.8	2.5	2.5	1.9	2.2	3.9
	1978-1992	0.0	1.9	2.7	1.7	1.2	1.8	2.2	2.1	1.7	1.7	3.1
	1992-1998	0.0	1.6	2.7	1.5	1.3	1.6	1.9	1.7	2.2	1.7	1.8
	Post-1998	0.0	1.4	2.3	1.5	1.3	1.6	2.0	2.0	2.1	1.6	2.1
Gas therms	Pre-1978	413.7	366.9	290.8	288.6	359.1	219.6	243.4	269.8	168.3	338.6	143.7
	1978-1992	221.7	202.9	181.7	143.4	164.6	91.4	108.1	99.0	73.8	141.4	41.3
	1992-1998	134.6	147.4	116.8	88.7	104.5	41.6	37.7	39.5	37.2	90.6	9.5
	Post-1998	120.1	119.1	94.5	73.2	85.9	29.0	25.4	27.6	24.3	79.0	4.9

Single-Family Measure Savings

Ceiling R-19 to R-30 batts

Measure base: R-19 Ceiling insulation (between attic and house)

Measure description: R-30 Ceiling insulation

Measure units: Ceiling Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	1978-1992	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1071.8	1216.4	1216.4	1071.8	1071.8	986.2	1233.9	1438.3	986.2	1071.8	1438.3	
	1978-1992	1456.7	1385.8	1385.8	1456.7	1456.7	1272.6	1272.6	1556.2	1272.6	1456.7	1556.2	
	1992-1998	1300.3	1500.1	1500.1	1300.3	1300.3	1288.2	1202.0	1398.6	1288.2	1300.3	1398.6	
	Post-1998	1379.4	1421.9	1421.9	1379.4	1379.4	1358.0	1375.0	1839.5	1358.0	1379.4	1839.5	

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	2.4	2.8	2.7	1.7	2.1	2.2	2.2	2.9	2.3	2.0	2.5
	1978-1992	6.5	2.5	2.8	3.2	4.7	2.1	1.8	3.6	2.6	4.1	2.7
	1992-1998	4.0	2.3	2.4	1.6	1.9	1.4	1.1	2.7	1.8	1.3	2.5
	Post-1998	5.0	2.8	2.6	1.9	0.8	2.2	1.3	3.2	1.9	1.6	2.7
Peak1 kW/unit	Pre-1978	na	1.8	1.8	0.9	1.2	1.2	1.1	1.7	0.7	0.9	1.7
	1978-1992	na	1.8	1.9	1.0	0.8	1.3	1.2	2.9	1.0	2.4	2.3
	1992-1998	na	1.9	2.0	0.8	1.0	0.6	0.8	1.9	0.7	0.7	2.2
	Post-1998	na	2.2	2.0	0.8	2.1	0.9	1.1	2.2	0.7	1.0	2.4
Gas therms	Pre-1978	2.7	4.0	4.0	3.1	2.6	3.2	4.2	6.1	3.4	3.3	8.3
	1978-1992	7.0	6.0	6.0	9.5	8.0	6.5	6.8	11.3	7.1	10.5	16.7
	1992-1998	4.1	7.0	7.0	5.9	5.2	7.5	7.2	15.3	8.0	5.6	23.7
	Post-1998	5.1	8.1	8.0	7.5	6.6	9.9	10.1	21.9	10.8	7.1	33.9

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	329.3	1441.3	2729.9	1170.2	519.5	1069.0	1638.4	1960.5	1054.7	1203.5	5569.5
	1978-1992	209.8	1399.3	2815.1	895.7	322.7	886.6	1481.1	1723.6	776.6	907.7	4724.9
	1992-1998	181.8	1179.0	2733.1	978.6	481.1	982.6	1328.8	1421.1	1158.6	1010.7	2865.7
	Post-1998	133.1	1048.4	2475.1	940.5	429.7	960.3	1368.4	1732.1	1130.8	966.7	3435.2
Peak1 kW/unit	Pre-1978	0.0	2.0	2.7	2.0	1.4	1.7	2.4	2.3	1.9	2.0	3.6
	1978-1992	0.0	1.8	2.7	1.6	1.2	1.7	2.1	2.0	1.6	1.7	3.0
	1992-1998	0.0	1.5	2.6	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.4	2.2	1.4	1.2	1.6	1.9	1.9	2.0	1.6	2.0
Gas therms	Pre-1978	365.8	308.5	244.9	251.6	318.0	194.1	203.3	210.5	147.6	293.2	103.7
	1978-1992	217.7	192.2	172.0	142.9	162.7	86.4	102.5	93.6	69.8	141.3	39.0
	1992-1998	126.3	146.3	115.7	84.8	99.4	40.8	36.9	44.8	36.7	86.0	12.7
	Post-1998	114.1	120.0	95.1	71.3	83.1	29.2	25.7	35.3	24.7	76.3	8.0

Single-Family Measure Savings

Ceiling R-19 to R-38 batts

Measure base: R-19 Ceiling insulation (between attic and house)

Measure description: R-38 Ceiling insulation

Measure units: Ceiling Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
	1978-1992	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
	1992-1998	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	Post-1998	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1071.8	1216.4	1216.4	1071.8	1071.8	986.2	1233.9	1438.3	986.2	1071.8	1438.3	
	1978-1992	1456.7	1385.8	1385.8	1456.7	1456.7	1272.6	1272.6	1556.2	1272.6	1456.7	1556.2	
	1992-1998	1300.3	1500.1	1500.1	1300.3	1300.3	1288.2	1202.0	1398.6	1288.2	1300.3	1398.6	
	Post-1998	1379.4	1421.9	1421.9	1379.4	1379.4	1358.0	1375.0	1839.5	1358.0	1379.4	1839.5	

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	3.3	3.8	3.7	2.4	2.5	2.7	3.5	4.1	3.1	3.0	3.4
	1978-1992	9.1	3.5	4.1	5.4	6.4	3.0	2.6	4.9	3.3	5.7	3.8
	1992-1998	5.6	3.3	3.4	2.2	2.7	1.9	1.6	4.0	2.1	2.1	3.4
	Post-1998	7.1	3.8	3.8	2.6	2.0	2.2	1.7	5.0	2.7	2.5	3.7
Peak1 kW/unit	Pre-1978	na	2.5	2.5	1.2	1.6	1.7	1.7	2.2	1.0	1.4	2.4
	1978-1992	na	2.6	2.5	1.4	1.0	1.9	1.6	3.8	1.4	3.2	3.2
	1992-1998	na	2.7	2.8	1.1	1.3	1.0	1.1	2.6	1.0	1.3	3.2
	Post-1998	na	3.0	2.9	1.2	1.6	1.3	1.5	3.0	1.2	1.4	3.4
Gas therms	Pre-1978	3.7	5.6	5.6	4.3	3.7	4.5	6.0	8.6	4.8	4.6	11.6
	1978-1992	9.8	8.3	8.4	13.3	11.2	9.0	9.4	15.7	10.0	14.6	22.7
	1992-1998	5.7	9.8	9.8	8.3	7.3	10.5	10.0	21.1	11.3	7.9	32.7
	Post-1998	7.2	11.3	11.3	10.5	9.2	13.8	14.1	30.2	15.0	9.9	46.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	329.3	1441.3	2729.9	1170.2	519.5	1069.0	1638.4	1960.5	1054.7	1203.5	5569.5
	1978-1992	209.8	1399.3	2815.1	895.7	322.7	886.6	1481.1	1723.6	776.6	907.7	4724.9
	1992-1998	181.8	1179.0	2733.1	978.6	481.1	982.6	1328.8	1421.1	1158.6	1010.7	2865.7
	Post-1998	133.1	1048.4	2475.1	940.5	429.7	960.3	1368.4	1732.1	1130.8	966.7	3435.2
Peak1 kW/unit	Pre-1978	0.0	2.0	2.7	2.0	1.4	1.7	2.4	2.3	1.9	2.0	3.6
	1978-1992	0.0	1.8	2.7	1.6	1.2	1.7	2.1	2.0	1.6	1.7	3.0
	1992-1998	0.0	1.5	2.6	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.4	2.2	1.4	1.2	1.6	1.9	1.9	2.0	1.6	2.0
Gas therms	Pre-1978	365.8	308.5	244.9	251.6	318.0	194.1	203.3	210.5	147.6	293.2	103.7
	1978-1992	217.7	192.2	172.0	142.9	162.7	86.4	102.5	93.6	69.8	141.3	39.0
	1992-1998	126.3	146.3	115.7	84.8	99.4	40.8	36.9	44.8	36.7	86.0	12.7
	Post-1998	114.1	120.0	95.1	71.3	83.1	29.2	25.7	35.3	24.7	76.3	8.0

Single-Family Measure Savings

Ceiling R-30 to R-38 batts

Measure base: R-30 Ceiling insulation (between attic and house)

Measure description: R-38 Ceiling insulation

Measure units: Ceiling Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1071.8	1216.4	1216.4	1071.8	1071.8	986.2	1233.9	1438.3	986.2	1071.8	1438.3	
	1978-1992	1456.7	1385.8	1385.8	1456.7	1456.7	1272.6	1272.6	1556.2	1272.6	1456.7	1556.2	
	1992-1998	1300.3	1500.1	1500.1	1300.3	1300.3	1288.2	1202.0	1398.6	1288.2	1300.3	1398.6	
	Post-1998	1379.4	1421.9	1421.9	1379.4	1379.4	1358.0	1375.0	1839.5	1358.0	1379.4	1839.5	

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	1.0	1.0	1.0	0.7	0.4	0.5	1.3	1.2	0.8	1.0	0.9
	1978-1992	2.7	1.1	1.3	2.3	1.8	0.9	0.8	1.4	0.8	1.7	1.1
	1992-1998	1.7	1.0	1.1	0.6	0.8	0.5	0.5	1.3	0.3	0.9	0.9
	Post-1998	2.1	1.0	1.2	0.7	1.2	0.1	0.3	1.8	0.8	1.0	1.1
Peak1 kW/unit	Pre-1978	na	0.7	0.7	0.3	0.4	0.5	0.6	0.5	0.3	0.5	0.7
	1978-1992	na	0.8	0.6	0.4	0.3	0.6	0.4	1.0	0.5	0.9	1.0
	1992-1998	na	0.8	0.8	0.3	0.3	0.4	0.3	0.7	0.3	0.6	1.0
	Post-1998	na	0.9	0.9	0.4	-0.5	0.4	0.4	0.8	0.4	0.4	1.0
Gas therms	Pre-1978	1.1	1.7	1.7	1.3	1.1	1.3	1.8	2.6	1.4	1.4	3.6
	1978-1992	3.0	2.5	2.5	4.2	3.4	2.8	2.8	5.0	3.0	4.6	7.2
	1992-1998	1.7	3.1	3.0	2.5	2.2	3.2	3.0	6.9	3.5	2.4	11.7
	Post-1998	2.2	3.5	3.5	3.3	2.8	4.4	4.4	10.6	4.7	3.0	18.2

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	321.5	1401.5	2654.9	1150.7	508.8	1045.0	1602.0	1903.1	1029.9	1179.5	5428.1
	1978-1992	196.2	1364.9	2737.2	867.2	307.6	868.0	1454.3	1661.3	756.6	870.5	4596.4
	1992-1998	174.6	1151.7	2667.8	962.5	472.1	968.5	1313.9	1382.4	1137.3	998.0	2794.6
	Post-1998	126.3	1018.8	2409.9	922.4	426.4	939.7	1350.2	1675.9	1109.4	951.4	3343.2
Peak1 kW/unit	Pre-1978	0.0	2.0	2.7	2.0	1.4	1.7	2.4	2.2	1.8	2.0	3.6
	1978-1992	0.0	1.8	2.6	1.6	1.2	1.7	2.1	1.9	1.6	1.6	2.9
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	2.0
Gas therms	Pre-1978	356.1	296.0	235.1	243.9	309.7	187.9	194.7	197.6	142.6	283.6	95.1
	1978-1992	202.5	180.7	161.7	129.2	149.6	80.8	95.5	83.0	64.8	126.5	32.5
	1992-1998	121.1	136.1	107.6	79.8	94.3	37.8	34.3	38.0	33.7	81.1	9.7
	Post-1998	108.3	110.3	87.4	66.0	77.6	26.3	23.1	27.6	22.0	70.9	5.3

Single-Family Measure Savings

Wall 2x4 R-13 to 2x4 R-15

Measure base: 2x4 wall with R-13 cavity insulation

Measure description: 2x4 wall, R-13 cavity insulation, R-2 sheathing

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	1517.5	1268.8	1268.8	1517.5	1517.5	1594.2	1604.2	1236.9	1594.2	1517.5	1236.9

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	8.1	4.0	1.9	2.4	5.3	1.9	2.0	2.1	2.1	2.7	1.3
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	3.1	2.8	2.0	1.9	1.7	2.1	3.3	1.4	2.2	2.3
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	7.7	9.7	10.0	12.3	11.1	18.6	19.8	21.7	20.9	10.1	32.1

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	138.4	1107.8	2509.7	948.8	443.6	960.7	1382.6	1769.8	1139.2	979.0	3449.4
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.4	2.4	1.4	1.2	1.6	1.9	2.1	2.0	1.6	2.1
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	118.2	140.7	112.7	76.0	88.1	32.9	29.3	60.1	28.4	79.6	19.1

Single-Family Measure Savings

Wall 2x4 R-13 to 2x6 R-19

Measure base: 2x4 wall with R-13 cavity insulation

Measure description: 2x6 wall with R-19 cavity insulation

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	1517.5	1268.8	1268.8	1517.5	1517.5	1594.2	1604.2	1236.9	1594.2	1517.5	1236.9

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	15.8	6.4	4.0	4.7	6.5	3.0	2.6	4.5	3.4	4.4	3.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	5.6	5.3	3.4	1.9	2.9	3.6	6.2	2.2	3.7	5.0
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	15.4	19.6	20.1	23.8	21.4	34.7	36.5	42.4	38.1	20.0	59.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	138.4	1107.8	2509.7	948.8	443.6	960.7	1382.6	1769.8	1139.2	979.0	3449.4
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.4	2.4	1.4	1.2	1.6	1.9	2.1	2.0	1.6	2.1
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	118.2	140.7	112.7	76.0	88.1	32.9	29.3	60.1	28.4	79.6	19.1

Single-Family Measure Savings

Wall 2x4 R-13 to 2x6 R-21

Measure base: 2x4 wall with R-13 cavity insulation

Measure description: 2x6 wall with R-19 cavity ins., R-2 sheathing

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	1517.5	1268.8	1268.8	1517.5	1517.5	1594.2	1604.2	1236.9	1594.2	1517.5	1236.9

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	20.0	8.9	5.2	5.9	8.0	4.6	3.6	5.7	4.7	5.8	3.8
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	7.5	7.2	4.7	4.0	4.6	4.9	8.4	3.2	5.3	6.5
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	19.4	24.3	25.1	29.9	26.8	42.9	44.9	52.0	46.8	25.1	70.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	138.4	1107.8	2509.7	948.8	443.6	960.7	1382.6	1769.8	1139.2	979.0	3449.4
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.4	2.4	1.4	1.2	1.6	1.9	2.1	2.0	1.6	2.1
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	118.2	140.7	112.7	76.0	88.1	32.9	29.3	60.1	28.4	79.6	19.1

Single-Family Measure Savings

Wall 2x4 R-15 to 2x6 R-19

Measure base: 2x4 wall, R-13 cavity insulation, R-2 sheathing

Measure description: 2x6 wall with R-19 cavity insulation

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	1517.5	1268.8	1268.8	1517.5	1517.5	1594.2	1604.2	1236.9	1594.2	1517.5	1236.9

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	8.4	2.5	2.1	2.3	1.3	1.1	0.5	2.5	1.4	1.8	1.8
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	2.6	2.6	1.4	0.1	1.3	1.5	3.0	0.8	1.6	2.8
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	8.3	10.9	11.3	13.2	11.6	19.7	20.9	26.5	21.8	11.0	40.3

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	127.2	1063.4	2461.6	925.8	420.1	942.8	1354.3	1733.3	1115.2	952.6	3404.3
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.4	2.3	1.4	1.2	1.6	1.8	2.0	2.0	1.5	2.1
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	109.0	127.1	101.4	66.7	78.3	26.7	23.5	47.1	22.5	71.6	13.0

Single-Family Measure Savings

Wall 2x4 R-15 to 2x6 R-21

Measure base: 2x4 wall, R-13 cavity insulation, R-2 sheathing

Measure description: 2x6 wall with R-19 cavity ins., R-2 sheathing

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	1517.5	1268.8	1268.8	1517.5	1517.5	1594.2	1604.2	1236.9	1594.2	1517.5	1236.9

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	12.9	5.1	3.3	3.6	2.8	2.8	1.5	3.8	2.6	3.2	2.5
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	4.6	4.6	2.7	2.1	3.0	2.9	5.3	1.8	3.1	4.3
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	12.6	16.2	16.8	20.0	17.6	29.9	31.3	38.8	32.7	16.7	55.8

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	127.2	1063.4	2461.6	925.8	420.1	942.8	1354.3	1733.3	1115.2	952.6	3404.3
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.4	2.3	1.4	1.2	1.6	1.8	2.0	2.0	1.5	2.1
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	109.0	127.1	101.4	66.7	78.3	26.7	23.5	47.1	22.5	71.6	13.0

Single-Family Measure Savings

Wall 2x6 R-19 to 2x6 R-21

Measure base: 2x6 wall with R-19 cavity insulation

Measure description: 2x6 wall with R-19 cavity ins., R-2 sheathing

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	1517.5	1268.8	1268.8	1517.5	1517.5	1594.2	1604.2	1236.9	1594.2	1517.5	1236.9

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	4.9	2.6	1.2	1.3	1.6	1.6	1.0	1.2	1.3	1.4	0.8
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	2.1	2.0	1.3	2.1	1.7	1.4	2.4	1.0	1.6	1.6
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	4.7	5.9	6.3	7.9	6.8	12.7	13.2	16.7	14.0	6.4	26.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	116.5	1036.5	2409.1	904.3	414.7	932.0	1346.9	1689.3	1100.0	935.8	3344.7
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.4	2.2	1.4	1.2	1.5	1.8	2.0	2.0	1.5	2.0
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	100.0	113.2	90.0	57.9	69.3	21.5	18.6	34.6	17.6	63.7	7.7

Single-Family Measure Savings

Wall 2x4 Ext. Rigid Foam R-14 to R-21

Measure base: 2x4 wall, R-13 cavity insulation, R-1 sheathing

Measure description: 2x4 wall, R-13 cavity insulation, R-8 sheathing

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	1517.5	1268.8	1268.8	1517.5	1517.5	1594.2	1604.2	1236.9	1594.2	1517.5	1236.9

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	16.4	7.0	3.9	5.4	5.7	3.7	2.5	4.3	3.3	4.4	2.5
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	6.1	5.7	3.9	3.1	3.6	3.8	6.3	2.5	4.0	5.1
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	15.8	19.6	20.3	24.8	22.1	36.8	38.4	43.8	40.1	20.7	61.1

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	132.3	1082.3	2486.3	941.5	429.8	951.4	1366.9	1750.2	1121.9	963.7	3421.4
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.4	2.3	1.4	1.2	1.6	1.9	2.1	2.0	1.6	2.1
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	113.2	133.2	106.6	70.9	82.8	29.5	26.1	52.8	25.1	75.2	15.5

Single-Family Measure Savings

Low-Income Attic Access Weatherstripping

Measure base: 2 F thermostat setback/setup, 0.42 ACH infiltration

Measure description: Infiltration reduced by 3%

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	1.1	1.7	2.6	2.4	-0.5	-0.5	2.8	1.8	2.7	0.0	7.0
	1978-1992	1.4	2.4	2.6	-0.3	1.9	1.0	1.8	0.9	-3.7	0.3	6.3
	1992-1998	1.1	-1.3	2.8	1.0	2.9	-1.6	0.1	3.1	-4.5	1.1	4.1
	Post-1998	1.0	0.8	5.4	0.1	1.1	-0.8	2.4	1.1	5.3	0.3	5.7
Peak1 kW/unit	Pre-1978	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01
	1978-1992	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01
	1992-1998	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Post-1998	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01
Gas therms	Pre-1978	1	1	1	1	1	1	1	1	1	0	1
	1978-1992	1	1	1	1	1	1	1	0	1	0	0
	1992-1998	1	1	1	1	1	0	0	0	0	0	0
	Post-1998	1	1	1	1	1	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.4	0.1	0.1	0.3	-0.1	-0.1	0.2	0.1	0.4	0.0	0.1
	1978-1992	0.9	0.2	0.1	-0.1	1.1	0.2	0.2	0.1	-0.9	0.0	0.1
	1992-1998	0.8	-0.1	0.1	0.1	1.0	-0.2	0.0	0.3	-0.6	0.1	0.2
	Post-1998	1.0	0.1	0.3	0.0	0.4	-0.1	0.2	0.1	0.7	0.0	0.2
Peak1 kW/unit	Pre-1978	na	0.3	0.2	0.3	0.2	0.2	0.3	0.0	0.1	0.2	0.3
	1978-1992	na	0.3	0.3	0.5	-0.2	0.7	0.4	0.2	0.2	0.2	0.3
	1992-1998	na	0.5	0.3	0.3	0.4	0.2	0.2	-0.2	0.2	0.1	0.5
	Post-1998	na	0.0	0.2	0.4	0.2	0.3	0.3	0.2	0.3	0.2	0.5
Gas therms	Pre-1978	0.3	0.4	0.4	0.3	0.5	0.4	0.5	0.3	0.6	0.1	0.6
	1978-1992	0.8	0.8	0.6	1.0	1.2	1.1	1.0	0.7	1.6	0.3	1.7
	1992-1998	0.7	1.0	0.8	0.9	1.2	1.5	1.6	1.2	2.0	0.2	3.2
	Post-1998	0.9	1.1	0.9	1.1	1.4	1.8	2.3	1.8	2.5	0.3	4.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	303.4	1293.0	2618.6	920.1	380.5	831.7	1409.6	1840.1	757.2	1022.0	5671.2
	1978-1992	155.9	1115.0	2415.1	524.7	177.7	567.5	1151.4	1374.1	429.5	611.4	4347.3
	1992-1998	145.9	893.8	2286.7	700.8	288.7	703.3	1068.3	1092.1	768.4	770.1	2599.0
	Post-1998	106.1	780.7	2067.1	658.8	249.1	672.7	1098.3	1318.3	739.4	724.9	3124.7
Peak1 kW/unit	Pre-1978	0.0	2.1	2.9	2.0	1.3	1.7	2.4	2.3	1.8	2.0	3.8
	1978-1992	0.0	1.7	2.6	1.5	1.0	1.6	2.0	1.9	1.5	1.5	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.5	2.0	1.5	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.1	1.5	1.8	1.8	1.9	1.5	2.0
Gas therms	Pre-1978	344.1	304.8	240.8	224.6	285.2	162.0	177.9	200.6	113.6	276.0	99.6
	1978-1992	162.7	155.3	138.7	95.3	112.0	54.1	66.4	61.6	38.2	96.7	21.9
	1992-1998	101.6	118.4	91.3	60.4	75.2	24.5	22.5	22.5	20.9	61.1	5.4
	Post-1998	91.2	96.0	74.3	49.6	62.8	16.9	14.9	14.4	13.6	52.5	3.2

Single-Family Measure Savings

Low-Income Caulking

Measure base: 2 F thermostat setback/setup, 0.42 ACH infiltration

Measure description: Infiltration reduced by 3%

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	1.1	1.7	2.6	2.4	-0.5	-0.5	2.8	1.8	2.7	0.0	7.0
	1978-1992	1.4	2.4	2.6	-0.3	1.9	1.0	1.8	0.9	-3.7	0.3	6.3
	1992-1998	1.1	-1.3	2.8	1.0	2.9	-1.6	0.1	3.1	-4.5	1.1	4.1
	Post-1998	1.0	0.8	5.4	0.1	1.1	-0.8	2.4	1.1	5.3	0.3	5.7
Peak1 kW/unit	Pre-1978	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01
	1978-1992	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01
	1992-1998	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Post-1998	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01
Gas therms	Pre-1978	1	1	1	1	1	1	1	1	1	0	1
	1978-1992	1	1	1	1	1	1	1	0	1	0	0
	1992-1998	1	1	1	1	1	0	0	0	0	0	0
	Post-1998	1	1	1	1	1	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.4	0.1	0.1	0.3	-0.1	-0.1	0.2	0.1	0.4	0.0	0.1
	1978-1992	0.9	0.2	0.1	-0.1	1.1	0.2	0.2	0.1	-0.9	0.0	0.1
	1992-1998	0.8	-0.1	0.1	0.1	1.0	-0.2	0.0	0.3	-0.6	0.1	0.2
	Post-1998	1.0	0.1	0.3	0.0	0.4	-0.1	0.2	0.1	0.7	0.0	0.2
Peak1 kW/unit	Pre-1978	na	0.3	0.2	0.3	0.2	0.2	0.3	0.0	0.1	0.2	0.3
	1978-1992	na	0.3	0.3	0.5	-0.2	0.7	0.4	0.2	0.2	0.2	0.3
	1992-1998	na	0.5	0.3	0.3	0.4	0.2	0.2	-0.2	0.2	0.1	0.5
	Post-1998	na	0.0	0.2	0.4	0.2	0.3	0.3	0.2	0.3	0.2	0.5
Gas therms	Pre-1978	0.3	0.4	0.4	0.3	0.5	0.4	0.5	0.3	0.6	0.1	0.6
	1978-1992	0.8	0.8	0.6	1.0	1.2	1.1	1.0	0.7	1.6	0.3	1.7
	1992-1998	0.7	1.0	0.8	0.9	1.2	1.5	1.6	1.2	2.0	0.2	3.2
	Post-1998	0.9	1.1	0.9	1.1	1.4	1.8	2.3	1.8	2.5	0.3	4.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	303.4	1293.0	2618.6	920.1	380.5	831.7	1409.6	1840.1	757.2	1022.0	5671.2
	1978-1992	155.9	1115.0	2415.1	524.7	177.7	567.5	1151.4	1374.1	429.5	611.4	4347.3
	1992-1998	145.9	893.8	2286.7	700.8	288.7	703.3	1068.3	1092.1	768.4	770.1	2599.0
	Post-1998	106.1	780.7	2067.1	658.8	249.1	672.7	1098.3	1318.3	739.4	724.9	3124.7
Peak1 kW/unit	Pre-1978	0.0	2.1	2.9	2.0	1.3	1.7	2.4	2.3	1.8	2.0	3.8
	1978-1992	0.0	1.7	2.6	1.5	1.0	1.6	2.0	1.9	1.5	1.5	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.5	2.0	1.5	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.1	1.5	1.8	1.8	1.9	1.5	2.0
Gas therms	Pre-1978	344.1	304.8	240.8	224.6	285.2	162.0	177.9	200.6	113.6	276.0	99.6
	1978-1992	162.7	155.3	138.7	95.3	112.0	54.1	66.4	61.6	38.2	96.7	21.9
	1992-1998	101.6	118.4	91.3	60.4	75.2	24.5	22.5	22.5	20.9	61.1	5.4
	Post-1998	91.2	96.0	74.3	49.6	62.8	16.9	14.9	14.4	13.6	52.5	3.2

Single-Family Measure Savings

Low-Income Door Weatherstripping

Measure base: 2 F thermostat setback/setup, 0.42 ACH infiltration

Measure description: Infiltration reduced by 9%

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	3.2	4.9	10.2	5.4	2.7	1.1	4.9	6.7	4.9	1.8	19.8
	1978-1992	4.2	3.9	5.9	2.7	1.9	0.8	2.6	3.1	-9.1	-0.3	19.8
	1992-1998	3.4	3.2	7.1	1.0	4.5	0.0	3.6	5.2	-0.2	5.5	13.0
	Post-1998	3.0	3.1	13.4	0.7	1.7	0.0	4.8	4.3	4.1	1.5	17.2
Peak1 kW/unit	Pre-1978	0.00	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.03
	1978-1992	0.00	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.03
	1992-1998	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.02
	Post-1998	0.00	0.01	0.02	0.01	0.00	0.02	0.02	0.01	0.01	0.01	0.03
Gas therms	Pre-1978	3	4	3	2	4	2	2	2	2	1	2
	1978-1992	4	3	3	3	4	2	2	1	2	1	1
	1992-1998	2	4	2	2	3	1	1	1	1	0	0
	Post-1998	2	3	2	2	3	1	1	1	1	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	1.1	0.4	0.4	0.6	0.7	0.1	0.3	0.4	0.6	0.2	0.3
	1978-1992	2.7	0.4	0.2	0.5	1.1	0.1	0.2	0.2	-2.1	0.0	0.5
	1992-1998	2.4	0.4	0.3	0.1	1.6	0.0	0.3	0.5	0.0	0.7	0.5
	Post-1998	2.9	0.4	0.6	0.1	0.7	0.0	0.4	0.3	0.5	0.2	0.6
Peak1 kW/unit	Pre-1978	na	1.0	0.7	0.7	0.7	0.8	0.8	0.4	0.4	0.5	0.8
	1978-1992	na	0.8	0.7	1.4	0.6	1.3	1.1	0.8	0.6	0.7	1.0
	1992-1998	na	0.9	0.9	1.0	1.0	0.8	0.8	0.2	0.5	0.4	1.4
	Post-1998	na	0.8	0.9	1.1	0.1	1.0	0.9	0.7	0.6	0.4	1.4
Gas therms	Pre-1978	1.0	1.4	1.2	1.0	1.4	1.3	1.4	0.9	1.9	0.3	1.9
	1978-1992	2.4	2.2	1.8	3.0	3.7	3.1	3.0	2.0	4.7	0.8	4.9
	1992-1998	2.2	3.2	2.4	2.7	3.6	4.2	5.1	3.4	5.9	0.8	8.8
	Post-1998	2.7	3.4	2.8	3.4	4.3	5.4	6.5	5.1	7.3	0.9	14.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	303.4	1293.0	2618.6	920.1	380.5	831.7	1409.6	1840.1	757.2	1022.0	5671.2
	1978-1992	155.9	1115.0	2415.1	524.7	177.7	567.5	1151.4	1374.1	429.5	611.4	4347.3
	1992-1998	145.9	893.8	2286.7	700.8	288.7	703.3	1068.3	1092.1	768.4	770.1	2599.0
	Post-1998	106.1	780.7	2067.1	658.8	249.1	672.7	1098.3	1318.3	739.4	724.9	3124.7
Peak1 kW/unit	Pre-1978	0.0	2.1	2.9	2.0	1.3	1.7	2.4	2.3	1.8	2.0	3.8
	1978-1992	0.0	1.7	2.6	1.5	1.0	1.6	2.0	1.9	1.5	1.5	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.5	2.0	1.5	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.1	1.5	1.8	1.8	1.9	1.5	2.0
Gas therms	Pre-1978	344.1	304.8	240.8	224.6	285.2	162.0	177.9	200.6	113.6	276.0	99.6
	1978-1992	162.7	155.3	138.7	95.3	112.0	54.1	66.4	61.6	38.2	96.7	21.9
	1992-1998	101.6	118.4	91.3	60.4	75.2	24.5	22.5	22.5	20.9	61.1	5.4
	Post-1998	91.2	96.0	74.3	49.6	62.8	16.9	14.9	14.4	13.6	52.5	3.2

Single-Family Measure Savings

Low-Income Evaporative Cooler Cover

Measure base: 2 F thermostat setback/setup, 0.42 ACH infiltration

Measure description: Infiltration reduced by 2%

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.7	1.0	0.2	0.0	-0.3	0.4	1.1	1.2	1.1	-0.2	4.8
	1978-1992	0.9	1.5	2.0	-0.5	0.8	0.6	0.8	0.3	-6.5	0.2	4.2
	1992-1998	0.8	-0.9	2.1	0.1	-1.0	-1.4	0.9	2.5	0.9	0.2	2.7
	Post-1998	0.7	-3.1	5.1	-0.4	1.5	-1.0	2.6	0.4	5.5	0.4	3.6
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	1978-1992	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01
	1992-1998	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Gas therms	Pre-1978	1	1	1	1	1	0	1	0	0	0	0
	1978-1992	1	1	1	1	1	0	0	0	0	0	0
	1992-1998	0	1	1	0	1	0	0	0	0	0	0
	Post-1998	1	1	0	0	1	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.2	0.1	0.0	0.0	-0.1	0.0	0.1	0.1	0.1	0.0	0.1
	1978-1992	0.6	0.1	0.1	-0.1	0.4	0.1	0.1	0.0	-1.5	0.0	0.1
	1992-1998	0.5	-0.1	0.1	0.0	-0.3	-0.2	0.1	0.2	0.1	0.0	0.1
	Post-1998	0.6	-0.4	0.2	-0.1	0.6	-0.2	0.2	0.0	0.7	0.1	0.1
Peak1 kW/unit	Pre-1978	na	0.2	0.1	0.2	0.3	0.1	0.1	0.0	0.1	0.2	0.2
	1978-1992	na	0.2	0.2	0.4	0.8	0.3	0.3	0.2	0.1	0.1	0.2
	1992-1998	na	0.3	0.3	0.2	0.5	0.2	0.2	-0.3	0.2	0.0	0.3
	Post-1998	na	-0.2	0.0	0.3	0.2	0.2	0.2	0.2	0.3	0.0	0.3
Gas therms	Pre-1978	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.4	0.1	0.4
	1978-1992	0.5	0.5	0.4	0.7	0.8	0.7	0.7	0.5	1.1	0.2	1.2
	1992-1998	0.5	0.7	0.6	0.6	0.8	0.9	1.1	0.8	1.3	0.2	1.9
	Post-1998	0.6	0.7	0.6	0.8	1.0	1.2	1.6	1.3	1.7	0.2	3.1

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	303.4	1293.0	2618.6	920.1	380.5	831.7	1409.6	1840.1	757.2	1022.0	5671.2
	1978-1992	155.9	1115.0	2415.1	524.7	177.7	567.5	1151.4	1374.1	429.5	611.4	4347.3
	1992-1998	145.9	893.8	2286.7	700.8	288.7	703.3	1068.3	1092.1	768.4	770.1	2599.0
	Post-1998	106.1	780.7	2067.1	658.8	249.1	672.7	1098.3	1318.3	739.4	724.9	3124.7
Peak1 kW/unit	Pre-1978	0.0	2.1	2.9	2.0	1.3	1.7	2.4	2.3	1.8	2.0	3.8
	1978-1992	0.0	1.7	2.6	1.5	1.0	1.6	2.0	1.9	1.5	1.5	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.5	2.0	1.5	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.1	1.5	1.8	1.8	1.9	1.5	2.0
Gas therms	Pre-1978	344.1	304.8	240.8	224.6	285.2	162.0	177.9	200.6	113.6	276.0	99.6
	1978-1992	162.7	155.3	138.7	95.3	112.0	54.1	66.4	61.6	38.2	96.7	21.9
	1992-1998	101.6	118.4	91.3	60.4	75.2	24.5	22.5	22.5	20.9	61.1	5.4
	Post-1998	91.2	96.0	74.3	49.6	62.8	16.9	14.9	14.4	13.6	52.5	3.2

Single-Family Measure Savings

Low-Income Outlet Gasket

Measure base: 2 F thermostat setback/setup, 0.42 ACH infiltration

Measure description: Infiltration reduced by 1%

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.4	0.6	-0.2	0.2	-0.4	0.0	0.7	0.2	0.4	0.2	2.4
	1978-1992	0.5	-2.6	0.7	1.5	0.1	0.3	1.0	-0.3	-0.8	0.3	2.8
	1992-1998	0.4	-1.3	1.0	0.1	-1.8	-1.3	0.3	0.9	0.1	0.1	1.4
	Post-1998	0.3	0.1	4.4	-0.3	2.5	0.0	0.4	0.6	5.2	0.3	1.7
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.3	-0.2	0.0	0.3	0.1	0.1	0.1	0.0	-0.2	0.1	0.1
	1992-1998	0.3	-0.1	0.0	0.0	-0.6	-0.2	0.0	0.1	0.0	0.0	0.1
	Post-1998	0.3	0.0	0.2	0.0	1.0	0.0	0.0	0.0	0.7	0.0	0.1
Peak1 kW/unit	Pre-1978	na	0.2	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1
	1978-1992	na	0.0	0.0	0.2	0.0	0.3	0.2	0.1	0.2	-0.1	0.0
	1992-1998	na	0.2	0.0	0.2	0.5	0.1	0.1	-0.3	0.1	0.0	0.2
	Post-1998	na	0.1	-0.1	0.0	0.0	0.2	0.2	0.0	0.1	0.0	0.2
Gas therms	Pre-1978	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.0	0.2
	1978-1992	0.3	0.2	0.2	0.3	0.4	0.3	0.3	0.3	0.5	0.1	0.6
	1992-1998	0.2	0.3	0.3	0.3	0.4	0.5	0.5	0.4	0.7	0.1	1.1
	Post-1998	0.3	0.4	0.3	0.4	0.5	0.6	0.7	0.7	0.9	0.1	1.6

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	303.4	1293.0	2618.6	920.1	380.5	831.7	1409.6	1840.1	757.2	1022.0	5671.2
	1978-1992	155.9	1115.0	2415.1	524.7	177.7	567.5	1151.4	1374.1	429.5	611.4	4347.3
	1992-1998	145.9	893.8	2286.7	700.8	288.7	703.3	1068.3	1092.1	768.4	770.1	2599.0
	Post-1998	106.1	780.7	2067.1	658.8	249.1	672.7	1098.3	1318.3	739.4	724.9	3124.7
Peak1 kW/unit	Pre-1978	0.0	2.1	2.9	2.0	1.3	1.7	2.4	2.3	1.8	2.0	3.8
	1978-1992	0.0	1.7	2.6	1.5	1.0	1.6	2.0	1.9	1.5	1.5	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.5	2.0	1.5	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.1	1.5	1.8	1.8	1.9	1.5	2.0
Gas therms	Pre-1978	344.1	304.8	240.8	224.6	285.2	162.0	177.9	200.6	113.6	276.0	99.6
	1978-1992	162.7	155.3	138.7	95.3	112.0	54.1	66.4	61.6	38.2	96.7	21.9
	1992-1998	101.6	118.4	91.3	60.4	75.2	24.5	22.5	22.5	20.9	61.1	5.4
	Post-1998	91.2	96.0	74.3	49.6	62.8	16.9	14.9	14.4	13.6	52.5	3.2

Single-Family Measure Savings

Whole House Fans

Measure base: Natural Ventilation only

Measure description: Night-time forced ventilation

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	150.1	215.1	217.9	100.4	191.3	187.0	197.3	246.6	138.8	154.0
	1978-1992	0.0	182.7	256.0	237.7	63.9	203.9	183.7	221.3	222.7	146.9	162.3
	1992-1998	0.0	194.6	317.6	229.8	171.7	229.4	174.7	227.0	322.1	167.0	125.8
	Post-1998	0.0	179.6	305.1	247.8	174.8	241.7	191.0	291.7	338.5	176.1	162.2
Peak1 kW/unit	Pre-1978	0.00	0.01	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.00
	1978-1992	0.00	0.02	0.02	0.02	0.04	0.04	0.02	0.06	0.02	0.03	0.00
	1992-1998	0.00	0.03	0.04	0.02	0.03	0.02	0.01	0.06	0.02	0.03	0.00
	Post-1998	0.00	0.03	0.03	0.02	0.02	0.04	0.02	0.07	0.02	0.01	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	9.3	7.0	16.9	17.7	16.6	10.3	8.9	21.9	10.5	2.5
	1978-1992	0.0	13.1	9.1	27.0	20.5	22.9	12.4	12.8	28.6	16.6	3.4
	1992-1998	0.0	17.1	12.0	23.9	36.4	23.7	13.3	16.6	28.3	16.7	4.5
	Post-1998	0.0	17.8	12.8	26.9	41.0	25.7	14.1	17.7	30.5	18.5	4.9
Peak1 kW/unit	Pre-1978	na	0.6	0.6	0.6	1.2	0.8	0.5	0.6	0.3	0.7	0.0
	1978-1992	na	1.0	0.7	1.0	3.3	2.1	0.8	2.8	1.3	2.1	0.0
	1992-1998	na	1.9	1.4	1.3	2.1	1.4	0.8	3.7	1.0	1.7	0.0
	Post-1998	na	2.4	1.5	1.5	1.9	2.3	0.9	3.6	1.1	0.9	0.0
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1610.5	3064.3	1291.4	568.2	1149.4	1814.6	2209.9	1127.0	1317.5	6194.1
	1978-1992	202.3	1397.5	2808.7	879.9	311.2	889.7	1481.1	1723.6	778.6	885.8	4724.9
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	2.2	3.0	2.1	1.4	1.8	2.5	2.5	1.9	2.2	3.9
	1978-1992	0.0	1.8	2.7	1.6	1.2	1.7	2.1	2.0	1.6	1.6	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	413.7	366.9	290.8	288.6	359.1	219.6	243.4	269.8	168.3	338.6	143.7
	1978-1992	209.3	191.3	171.2	135.3	155.5	86.9	102.5	93.6	70.2	133.1	39.0
	1992-1998	121.1	131.9	104.3	79.8	94.3	37.8	34.3	35.4	33.7	81.1	8.5
	Post-1998	108.3	106.5	84.4	66.0	77.6	26.3	23.1	24.7	22.0	70.9	4.3

Single-Family Measure Savings

default window with Sunscreen

Measure base: Default window type by vintage, location

Measure description: Overall shading coefficient multiplied by 0.32

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-0.2	1.5	1.9	1.6	0.5	1.2	1.7	1.4	1.5	1.3	1.9
	1978-1992	-0.2	1.3	1.7	1.4	0.3	1.0	1.3	1.4	1.1	1.2	1.9
	1992-1998	-0.1	1.0	1.5	0.8	0.4	0.8	0.9	1.2	1.1	0.8	1.1
	Post-1998	-0.1	1.0	1.5	0.8	0.4	0.8	0.9	1.2	1.1	0.8	1.2
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-15.1	18.8	12.6	27.3	20.6	24.9	19.5	16.5	32.1	22.0	8.2
	1978-1992	-20.5	24.8	16.5	35.4	21.7	30.6	25.9	20.2	37.8	29.3	9.8
	1992-1998	-21.9	28.8	19.1	36.0	36.9	35.3	28.4	23.5	42.3	32.9	10.5
	Post-1998	-28.5	30.2	19.8	41.0	47.4	39.8	32.5	25.9	46.9	38.1	12.7
Peak1 kW/unit	Pre-1978	na	11.5	7.7	14.9	18.4	15.2	13.2	8.9	20.5	12.5	3.0
	1978-1992	na	11.4	8.2	19.4	25.7	16.9	16.2	12.4	19.4	15.5	4.3
	1992-1998	na	16.1	12.4	21.1	27.3	18.5	16.8	14.0	20.4	17.9	8.9
	Post-1998	na	17.0	12.3	23.9	21.2	20.1	19.9	12.5	23.7	19.8	8.9
Gas therms	Pre-1978	-14.2	-10.3	-10.8	-13.4	-11.3	-21.0	-18.6	-21.8	-26.6	-10.9	-26.8
	1978-1992	-18.2	-19.3	-20.6	-34.5	-29.4	-50.7	-49.8	-48.9	-68.1	-25.1	-73.2
	1992-1998	-21.1	-25.3	-26.4	-50.5	-44.9	-97.8	-99.9	-88.5	-123.6	-33.5	-165.3
	Post-1998	-27.0	-28.7	-29.5	-63.1	-52.9	-128.7	-137.8	-138.5	-169.1	-40.7	-284.8

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	368.2	1610.5	3064.3	1291.4	568.2	1149.4	1814.6	2209.9	1127.0	1317.5	6194.1
	1978-1992	202.3	1397.5	2808.7	879.9	311.2	889.7	1481.1	1723.6	778.6	885.8	4724.9
	1992-1998	174.6	1140.7	2639.0	962.5	472.1	968.5	1313.9	1364.8	1137.3	998.0	2768.7
	Post-1998	126.3	1009.0	2379.9	922.4	426.4	939.7	1350.2	1645.7	1109.4	951.4	3306.7
Peak1 kW/unit	Pre-1978	0.0	2.2	3.0	2.1	1.4	1.8	2.5	2.5	1.9	2.2	3.9
	1978-1992	0.0	1.8	2.7	1.6	1.2	1.7	2.1	2.0	1.6	1.6	3.0
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.6	1.8	1.6	2.1	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.6	1.8	1.9	2.0	1.5	1.9
Gas therms	Pre-1978	413.7	366.9	290.8	288.6	359.1	219.6	243.4	269.8	168.3	338.6	143.7
	1978-1992	209.3	191.3	171.2	135.3	155.5	86.9	102.5	93.6	70.2	133.1	39.0
	1992-1998	121.1	131.9	104.3	79.8	94.3	37.8	34.3	35.4	33.7	81.1	8.5
	Post-1998	108.3	106.5	84.4	66.0	77.6	26.3	23.1	24.7	22.0	70.9	4.3

Single-Family Measure Savings

Dbl clear windows to Double Pane, Argon Gas

Measure base: Double pane clear windows

Measure description: Double pane clear windows (SC = 0.88)

Argon gas added, U=0.46

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	1978-1992	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	1992-1998	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.1
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.1
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0	
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0	
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9	
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7	

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	3.9	-0.2	0.0	-0.8	1.1	-0.4	0.0	-0.1	-0.8	0.0	0.5
	1978-1992	7.5	-0.3	0.3	-0.3	2.5	0.0	-0.3	-0.2	-1.3	0.7	0.6
	1992-1998	12.2	-0.4	-0.3	-1.1	-0.9	-1.4	-0.9	-0.4	-2.6	-1.2	0.5
	Post-1998	14.9	0.0	0.1	-1.0	-3.2	-2.1	-1.7	-0.4	-3.6	-1.3	0.7
Peak1 kW/unit	Pre-1978	na	0.9	0.9	0.3	-0.2	0.7	0.8	0.9	-0.4	0.5	1.2
	1978-1992	na	1.0	1.3	-0.1	0.5	0.5	0.7	1.0	-0.4	1.2	1.8
	1992-1998	na	0.7	1.2	0.3	-0.8	0.6	0.7	0.7	-1.2	0.5	1.9
	Post-1998	na	1.4	1.3	0.2	-1.4	0.8	0.8	0.6	-0.7	0.4	2.0
Gas therms	Pre-1978	3.5	4.1	4.3	4.5	4.3	6.9	6.0	7.6	8.5	3.7	10.5
	1978-1992	6.8	8.7	9.2	9.7	9.0	13.3	16.0	15.3	16.2	8.1	23.0
	1992-1998	11.4	11.1	11.2	16.7	16.0	25.1	25.4	20.1	28.1	12.7	30.8
	Post-1998	13.8	12.4	12.7	20.3	19.3	30.7	33.2	28.3	34.3	15.3	43.6

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	343.0	1459.5	2865.0	1126.4	484.0	1009.7	1647.9	2039.0	967.5	1176.3	5856.5
	1978-1992	204.8	1235.2	2585.9	729.3	262.0	763.5	1315.2	1576.9	642.1	765.2	4432.2
	1992-1998	178.3	1095.0	2580.9	911.3	433.9	921.4	1264.5	1330.6	1068.5	954.7	2755.6
	Post-1998	128.9	968.0	2336.1	870.1	385.2	885.6	1294.2	1596.3	1031.7	906.1	3292.4
Peak1 kW/unit	Pre-1978	0.0	2.0	2.8	1.9	1.3	1.6	2.3	2.3	1.7	2.0	3.7
	1978-1992	0.0	1.7	2.5	1.5	1.1	1.5	1.9	1.8	1.5	1.5	2.8
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.5	1.7	1.6	2.0	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.5	1.8	1.9	1.9	1.5	2.0
Gas therms	Pre-1978	388.8	340.2	268.6	267.0	332.9	196.1	220.2	233.9	146.7	316.9	117.1
	1978-1992	211.8	173.5	154.9	141.1	160.5	74.7	80.7	73.5	59.0	136.4	26.0
	1992-1998	123.6	145.7	115.7	82.1	96.6	39.7	35.9	44.0	36.0	82.5	11.9
	Post-1998	110.4	119.1	95.0	67.9	79.4	27.6	24.1	32.8	23.6	71.8	6.9

Single-Family Measure Savings

Dbl clear windows to Heat Mirror

Measure base: Double pane clear windows

Measure description: Heat Mirror 88 between clear glass (SC = .66)

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.1	1.0	1.3	0.9	0.4	0.8	1.1	0.9	0.9	0.8	1.7
	1978-1992	0.1	0.8	1.2	0.9	0.3	0.6	0.8	0.9	0.7	0.8	1.6
	1992-1998	0.1	0.7	1.1	0.5	0.3	0.5	0.6	0.8	0.6	0.5	1.1
	Post-1998	0.1	0.7	1.2	0.5	0.3	0.4	0.5	0.8	0.6	0.5	1.1
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	6.1	13.1	9.2	17.8	19.7	17.8	14.0	11.5	21.2	15.1	7.8
	1978-1992	12.7	18.0	12.8	26.4	25.9	22.1	17.9	13.7	26.5	22.0	9.1
	1992-1998	23.6	21.4	14.5	25.0	31.7	22.6	18.9	16.1	26.1	22.1	10.8
	Post-1998	29.3	23.2	15.4	27.5	37.8	23.8	20.3	17.8	27.0	24.6	11.9
Peak1 kW/unit	Pre-1978	na	10.7	10.3	13.2	14.3	13.0	11.5	12.3	14.2	11.7	9.8
	1978-1992	na	14.4	14.0	13.3	18.5	13.0	14.2	13.3	14.7	15.1	11.3
	1992-1998	na	16.1	15.7	18.1	17.8	15.6	16.0	15.4	16.6	17.4	14.4
	Post-1998	na	17.1	16.8	18.9	19.5	18.0	18.0	16.5	17.7	18.7	14.7
Gas therms	Pre-1978	5.2	6.2	6.9	5.9	5.6	8.8	7.3	11.4	10.1	5.2	16.6
	1978-1992	11.4	15.7	17.1	12.5	12.0	14.4	21.8	20.3	15.2	12.1	31.9
	1992-1998	21.6	20.7	21.9	27.8	26.6	37.9	39.7	26.9	40.2	23.0	42.2
	Post-1998	26.8	23.7	24.9	34.7	33.3	47.5	53.3	40.5	50.5	28.3	60.6

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	343.0	1459.5	2865.0	1126.4	484.0	1009.7	1647.9	2039.0	967.5	1176.3	5856.5
	1978-1992	204.8	1235.2	2585.9	729.3	262.0	763.5	1315.2	1576.9	642.1	765.2	4432.2
	1992-1998	178.3	1095.0	2580.9	911.3	433.9	921.4	1264.5	1330.6	1068.5	954.7	2755.6
	Post-1998	128.9	968.0	2336.1	870.1	385.2	885.6	1294.2	1596.3	1031.7	906.1	3292.4
Peak1 kW/unit	Pre-1978	0.0	2.0	2.8	1.9	1.3	1.6	2.3	2.3	1.7	2.0	3.7
	1978-1992	0.0	1.7	2.5	1.5	1.1	1.5	1.9	1.8	1.5	1.5	2.8
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.5	1.7	1.6	2.0	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.5	1.8	1.9	1.9	1.5	2.0
Gas therms	Pre-1978	388.8	340.2	268.6	267.0	332.9	196.1	220.2	233.9	146.7	316.9	117.1
	1978-1992	211.8	173.5	154.9	141.1	160.5	74.7	80.7	73.5	59.0	136.4	26.0
	1992-1998	123.6	145.7	115.7	82.1	96.6	39.7	35.9	44.0	36.0	82.5	11.9
	Post-1998	110.4	119.1	95.0	67.9	79.4	27.6	24.1	32.8	23.6	71.8	6.9

Single-Family Measure Savings

Dbl clear windows to Double, High Performance Tint

Measure base: Double pane clear windows

Measure description: "Blue" Tint, SC = 0.57

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-0.1	1.3	1.5	1.2	0.4	1.0	1.4	1.1	1.2	0.9	1.6
	1978-1992	-0.2	1.0	1.4	1.1	0.2	0.8	1.0	1.1	0.9	0.8	1.5
	1992-1998	-0.1	0.9	1.4	0.7	0.3	0.7	0.8	1.1	0.9	0.6	1.1
	Post-1998	-0.1	0.9	1.4	0.7	0.3	0.7	0.8	1.1	1.0	0.6	1.1
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-9.6	17.2	10.8	24.5	16.5	22.7	17.6	14.0	30.1	17.2	7.3
	1978-1992	-16.1	22.6	14.6	32.5	13.2	28.9	23.1	16.9	35.5	23.7	8.2
	1992-1998	-24.9	26.2	17.4	33.1	32.7	33.4	25.8	20.9	40.0	26.8	10.1
	Post-1998	-30.5	28.5	19.2	38.7	41.3	37.7	29.7	23.4	44.7	31.5	11.3
Peak1 kW/unit	Pre-1978	na	11.0	9.1	15.4	20.3	14.8	11.7	11.9	19.7	11.8	6.9
	1978-1992	na	13.6	10.7	19.0	25.7	14.8	14.9	11.5	22.0	13.3	6.9
	1992-1998	na	16.2	13.8	21.6	25.6	18.3	17.0	14.0	25.6	18.3	9.0
	Post-1998	na	17.7	14.7	24.1	27.4	20.5	19.0	15.4	27.0	19.9	8.5
Gas therms	Pre-1978	-8.9	-9.8	-9.8	-12.6	-12.4	-20.2	-17.5	-18.7	-26.9	-9.2	-25.9
	1978-1992	-14.5	-19.7	-19.7	-28.4	-26.4	-46.2	-51.5	-46.1	-66.5	-20.0	-78.5
	1992-1998	-23.7	-24.9	-23.9	-46.9	-45.4	-88.5	-91.4	-66.1	-118.1	-28.6	-124.6
	Post-1998	-28.6	-27.7	-26.1	-57.4	-56.6	-117.0	-125.0	-97.2	-160.3	-34.4	-199.9

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	343.0	1459.5	2865.0	1126.4	484.0	1009.7	1647.9	2039.0	967.5	1176.3	5856.5
	1978-1992	204.8	1235.2	2585.9	729.3	262.0	763.5	1315.2	1576.9	642.1	765.2	4432.2
	1992-1998	178.3	1095.0	2580.9	911.3	433.9	921.4	1264.5	1330.6	1068.5	954.7	2755.6
	Post-1998	128.9	968.0	2336.1	870.1	385.2	885.6	1294.2	1596.3	1031.7	906.1	3292.4
Peak1 kW/unit	Pre-1978	0.0	2.0	2.8	1.9	1.3	1.6	2.3	2.3	1.7	2.0	3.7
	1978-1992	0.0	1.7	2.5	1.5	1.1	1.5	1.9	1.8	1.5	1.5	2.8
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.5	1.7	1.6	2.0	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.5	1.8	1.9	1.9	1.5	2.0
Gas therms	Pre-1978	388.8	340.2	268.6	267.0	332.9	196.1	220.2	233.9	146.7	316.9	117.1
	1978-1992	211.8	173.5	154.9	141.1	160.5	74.7	80.7	73.5	59.0	136.4	26.0
	1992-1998	123.6	145.7	115.7	82.1	96.6	39.7	35.9	44.0	36.0	82.5	11.9
	Post-1998	110.4	119.1	95.0	67.9	79.4	27.6	24.1	32.8	23.6	71.8	6.9

Single-Family Measure Savings

Dbl clear windows to Insol-8

Measure base: Double pane clear windows

Measure description: Two Heat Mirror 88 layers between clear glass

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.1	1.2	1.6	1.1	0.5	1.0	1.4	1.1	1.1	1.0	2.0
	1978-1992	0.1	1.0	1.5	1.1	0.3	0.8	1.0	1.1	0.8	0.9	2.0
	1992-1998	0.1	0.9	1.4	0.7	0.4	0.6	0.7	1.1	0.8	0.6	1.3
	Post-1998	0.1	0.9	1.5	0.7	0.4	0.6	0.7	1.0	0.8	0.6	1.4
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	3.6	16.8	11.4	22.7	21.7	22.7	17.5	14.4	26.8	18.8	9.2
	1978-1992	8.6	21.9	16.0	32.8	28.2	27.5	22.8	16.8	34.0	27.2	10.8
	1992-1998	17.8	26.8	18.3	31.4	39.3	29.8	23.8	21.1	33.5	28.3	12.7
	Post-1998	22.4	28.9	19.7	36.1	45.6	32.4	26.2	22.6	36.1	31.6	14.3
Peak1 kW/unit	Pre-1978	na	12.7	11.9	15.9	17.9	15.6	13.8	14.5	17.6	14.0	11.0
	1978-1992	na	16.4	15.8	17.2	22.4	15.5	16.5	15.0	18.4	17.5	12.4
	1992-1998	na	18.7	18.2	21.6	21.5	18.7	18.9	18.1	21.0	21.2	15.7
	Post-1998	na	20.4	19.4	23.0	24.4	21.7	21.2	19.1	22.2	22.8	16.4
Gas therms	Pre-1978	2.9	3.6	4.4	2.6	2.5	3.9	3.0	6.2	3.9	2.3	10.3
	1978-1992	7.6	11.1	12.4	5.7	5.9	4.2	10.6	9.1	2.1	6.4	17.0
	1992-1998	16.0	15.2	16.6	17.9	17.5	23.2	25.2	12.6	23.3	15.4	23.5
	Post-1998	20.0	17.9	19.2	23.6	23.0	31.2	37.7	22.3	32.4	19.5	37.8

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	343.0	1459.5	2865.0	1126.4	484.0	1009.7	1647.9	2039.0	967.5	1176.3	5856.5
	1978-1992	204.8	1235.2	2585.9	729.3	262.0	763.5	1315.2	1576.9	642.1	765.2	4432.2
	1992-1998	178.3	1095.0	2580.9	911.3	433.9	921.4	1264.5	1330.6	1068.5	954.7	2755.6
	Post-1998	128.9	968.0	2336.1	870.1	385.2	885.6	1294.2	1596.3	1031.7	906.1	3292.4
Peak1 kW/unit	Pre-1978	0.0	2.0	2.8	1.9	1.3	1.6	2.3	2.3	1.7	2.0	3.7
	1978-1992	0.0	1.7	2.5	1.5	1.1	1.5	1.9	1.8	1.5	1.5	2.8
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.5	1.7	1.6	2.0	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.5	1.8	1.9	1.9	1.5	2.0
Gas therms	Pre-1978	388.8	340.2	268.6	267.0	332.9	196.1	220.2	233.9	146.7	316.9	117.1
	1978-1992	211.8	173.5	154.9	141.1	160.5	74.7	80.7	73.5	59.0	136.4	26.0
	1992-1998	123.6	145.7	115.7	82.1	96.6	39.7	35.9	44.0	36.0	82.5	11.9
	Post-1998	110.4	119.1	95.0	67.9	79.4	27.6	24.1	32.8	23.6	71.8	6.9

Single-Family Measure Savings

Dbl clear windows to Double Pane, Med Low-E Coating

Measure base: Double pane clear windows

Measure description: "Low-E Squared", U=0.30, SC = 0.51

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	1.6	2.2	1.6	0.5	1.2	1.8	1.5	1.5	1.3	2.6
	1978-1992	0.0	1.4	1.9	1.4	0.3	1.1	1.4	1.5	1.1	1.2	2.4
	1992-1998	0.0	1.2	1.9	0.9	0.5	0.9	1.0	1.4	1.1	0.8	1.7
	Post-1998	0.0	1.2	2.0	0.9	0.5	0.9	1.0	1.4	1.1	0.9	1.7
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-1.0	22.2	15.2	30.7	24.6	29.2	22.8	19.4	36.7	24.7	11.6
	1978-1992	0.1	29.9	20.4	42.8	27.9	36.5	31.1	23.8	44.3	34.7	13.4
	1992-1998	4.1	35.4	24.0	42.9	47.4	42.1	34.3	28.4	48.2	38.4	15.9
	Post-1998	5.8	39.0	26.1	49.2	56.3	46.2	38.1	31.2	53.0	43.4	18.0
Peak1 kW/unit	Pre-1978	na	16.4	14.9	21.0	25.6	20.5	17.6	18.2	24.3	17.7	13.1
	1978-1992	na	21.3	19.2	25.8	33.4	20.9	22.1	19.5	26.9	21.8	14.8
	1992-1998	na	24.7	22.9	30.0	32.5	26.1	25.6	22.9	31.1	29.0	18.3
	Post-1998	na	26.6	24.1	32.3	35.3	28.7	28.3	24.5	32.8	31.5	19.4
Gas therms	Pre-1978	-1.4	-1.1	-0.5	-3.7	-3.3	-5.9	-5.9	-4.7	-9.1	-2.8	-3.9
	1978-1992	0.0	0.8	1.6	-8.2	-6.4	-17.2	-14.5	-15.1	-27.8	-4.9	-18.6
	1992-1998	3.0	2.4	3.8	-5.5	-4.2	-15.9	-14.2	-20.8	-24.8	-1.2	-28.3
	Post-1998	4.4	3.7	5.2	-4.4	-3.3	-16.8	-11.5	-23.7	-27.5	-0.5	-32.8

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	343.0	1459.5	2865.0	1126.4	484.0	1009.7	1647.9	2039.0	967.5	1176.3	5856.5
	1978-1992	204.8	1235.2	2585.9	729.3	262.0	763.5	1315.2	1576.9	642.1	765.2	4432.2
	1992-1998	178.3	1095.0	2580.9	911.3	433.9	921.4	1264.5	1330.6	1068.5	954.7	2755.6
	Post-1998	128.9	968.0	2336.1	870.1	385.2	885.6	1294.2	1596.3	1031.7	906.1	3292.4
Peak1 kW/unit	Pre-1978	0.0	2.0	2.8	1.9	1.3	1.6	2.3	2.3	1.7	2.0	3.7
	1978-1992	0.0	1.7	2.5	1.5	1.1	1.5	1.9	1.8	1.5	1.5	2.8
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.5	1.7	1.6	2.0	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.5	1.8	1.9	1.9	1.5	2.0
Gas therms	Pre-1978	388.8	340.2	268.6	267.0	332.9	196.1	220.2	233.9	146.7	316.9	117.1
	1978-1992	211.8	173.5	154.9	141.1	160.5	74.7	80.7	73.5	59.0	136.4	26.0
	1992-1998	123.6	145.7	115.7	82.1	96.6	39.7	35.9	44.0	36.0	82.5	11.9
	Post-1998	110.4	119.1	95.0	67.9	79.4	27.6	24.1	32.8	23.6	71.8	6.9

Single-Family Measure Savings

Dbl clear windows to Double, Standard Tint

Measure base: Double pane clear windows

Measure description: "Bronze" Tint, SC = 0.72

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	0.7	0.9	0.7	0.3	0.5	0.8	0.6	0.6	0.5	0.9
	1978-1992	0.0	0.5	0.7	0.6	0.2	0.5	0.6	0.6	0.5	0.5	0.9
	1992-1998	0.0	0.5	0.7	0.4	0.2	0.4	0.4	0.6	0.5	0.3	0.6
	Post-1998	0.0	0.5	0.8	0.4	0.2	0.4	0.4	0.6	0.5	0.3	0.6
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-2.5	9.1	6.1	13.2	11.8	12.7	9.8	7.8	16.0	9.8	4.3
	1978-1992	-3.8	12.1	7.8	18.6	12.8	16.7	12.8	8.8	20.6	13.5	4.9
	1992-1998	-4.8	14.7	9.5	17.9	22.8	18.2	14.0	11.3	22.6	14.5	6.0
	Post-1998	-5.5	16.2	10.4	21.2	29.2	20.4	15.6	12.0	24.9	17.1	6.6
Peak1 kW/unit	Pre-1978	na	6.2	5.4	8.5	10.6	8.4	6.9	6.9	10.8	6.9	4.5
	1978-1992	na	7.7	6.9	9.8	13.1	8.3	8.6	6.5	11.5	8.5	4.9
	1992-1998	na	9.3	8.6	11.4	13.6	9.7	9.6	8.1	13.5	10.5	6.1
	Post-1998	na	10.3	9.2	13.4	14.9	11.6	10.7	9.5	14.0	10.8	6.1
Gas therms	Pre-1978	-2.4	-2.6	-2.4	-3.6	-3.6	-5.9	-5.1	-4.5	-8.1	-2.3	-6.3
	1978-1992	-3.4	-4.5	-4.0	-8.0	-7.4	-14.0	-14.0	-12.3	-20.3	-4.9	-19.1
	1992-1998	-4.9	-5.1	-4.2	-11.1	-11.0	-21.3	-20.7	-17.2	-28.4	-6.1	-28.5
	Post-1998	-5.5	-5.2	-4.3	-12.8	-12.9	-25.8	-24.6	-21.9	-34.7	-7.0	-39.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	343.0	1459.5	2865.0	1126.4	484.0	1009.7	1647.9	2039.0	967.5	1176.3	5856.5
	1978-1992	204.8	1235.2	2585.9	729.3	262.0	763.5	1315.2	1576.9	642.1	765.2	4432.2
	1992-1998	178.3	1095.0	2580.9	911.3	433.9	921.4	1264.5	1330.6	1068.5	954.7	2755.6
	Post-1998	128.9	968.0	2336.1	870.1	385.2	885.6	1294.2	1596.3	1031.7	906.1	3292.4
Peak1 kW/unit	Pre-1978	0.0	2.0	2.8	1.9	1.3	1.6	2.3	2.3	1.7	2.0	3.7
	1978-1992	0.0	1.7	2.5	1.5	1.1	1.5	1.9	1.8	1.5	1.5	2.8
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.5	1.7	1.6	2.0	1.6	1.7
	Post-1998	0.0	1.3	2.2	1.4	1.2	1.5	1.8	1.9	1.9	1.5	2.0
Gas therms	Pre-1978	388.8	340.2	268.6	267.0	332.9	196.1	220.2	233.9	146.7	316.9	117.1
	1978-1992	211.8	173.5	154.9	141.1	160.5	74.7	80.7	73.5	59.0	136.4	26.0
	1992-1998	123.6	145.7	115.7	82.1	96.6	39.7	35.9	44.0	36.0	82.5	11.9
	Post-1998	110.4	119.1	95.0	67.9	79.4	27.6	24.1	32.8	23.6	71.8	6.9

Single-Family Measure Savings

Dbl clear windows to Double Pane, Vinyl Frame

Measure base: Double pane clear windows, aluminum frame

Measure description: Double pane clear windows
Vinyl window frames

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.1	0.4	0.6	0.4	0.2	0.3	0.5	0.3	0.4	0.4	0.7
	1978-1992	0.1	0.3	0.5	0.4	0.2	0.3	0.3	0.3	0.3	0.3	0.7
	1992-1998	0.1	0.2	0.4	0.2	0.1	0.1	0.2	0.3	0.2	0.2	0.5
	Post-1998	0.1	0.2	0.4	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.4
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	7.4	5.2	4.2	7.5	10.4	7.3	5.8	4.1	8.8	7.0	3.3
	1978-1992	12.5	6.4	5.1	11.2	14.8	9.8	7.0	4.9	10.7	10.0	4.0
	1992-1998	16.4	7.0	5.1	8.1	10.5	6.8	6.3	6.0	7.3	7.0	4.5
	Post-1998	16.4	7.4	5.5	7.0	9.6	6.9	6.3	4.6	6.7	7.3	4.1
Peak1 kW/unit	Pre-1978	na	5.8	5.6	6.6	6.2	6.9	6.0	5.2	6.3	6.4	4.2
	1978-1992	na	6.3	6.6	6.1	7.8	7.0	6.6	6.0	6.5	8.0	5.7
	1992-1998	na	6.5	6.6	6.7	6.0	5.6	6.9	6.6	5.4	6.8	6.9
	Post-1998	na	6.6	7.0	6.5	6.0	6.0	6.6	6.7	5.9	6.5	5.4
Gas therms	Pre-1978	6.5	7.1	7.4	7.8	7.7	11.2	9.3	9.2	13.4	6.7	12.9
	1978-1992	11.3	12.4	12.6	14.5	14.0	19.1	21.1	18.8	22.4	12.9	28.4
	1992-1998	15.1	15.4	15.3	20.5	20.4	29.2	32.1	24.9	32.9	16.4	38.5
	Post-1998	15.1	15.5	15.4	20.6	20.6	29.5	32.3	25.5	33.2	16.4	38.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	343.0	1459.5	2865.0	1126.4	484.0	1009.7	1647.9	2039.0	967.5	1176.3	5856.5
	1978-1992	204.8	1235.2	2585.9	729.3	262.0	763.5	1315.2	1576.9	642.1	765.2	4432.2
	1992-1998	178.3	1095.0	2580.9	911.3	433.9	921.4	1264.5	1330.6	1068.5	954.7	2755.6
	Post-1998	154.1	1044.9	2470.8	935.5	425.9	951.0	1381.0	1672.5	1105.2	977.3	3431.4
Peak1 kW/unit	Pre-1978	0.0	2.0	2.8	1.9	1.3	1.6	2.3	2.3	1.7	2.0	3.7
	1978-1992	0.0	1.7	2.5	1.5	1.1	1.5	1.9	1.8	1.5	1.5	2.8
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.5	1.7	1.6	2.0	1.6	1.7
	Post-1998	0.0	1.4	2.3	1.5	1.3	1.6	1.9	2.0	2.0	1.6	2.1
Gas therms	Pre-1978	388.8	340.2	268.6	267.0	332.9	196.1	220.2	233.9	146.7	316.9	117.1
	1978-1992	211.8	173.5	154.9	141.1	160.5	74.7	80.7	73.5	59.0	136.4	26.0
	1992-1998	123.6	145.7	115.7	82.1	96.6	39.7	35.9	44.0	36.0	82.5	11.9
	Post-1998	130.0	141.1	112.2	85.5	100.0	39.2	35.6	44.1	35.3	85.8	11.2

Single-Family Measure Savings

Dbl tint to Double Pane, Argon Gas

Measure base: Double pane standard tint

Measure description: Double pane clear windows

Argon gas added, U=0.46

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.1	-0.7	-0.9	-0.7	-0.2	-0.6	-0.8	-0.6	-0.7	-0.5	-0.8
	1978-1992	0.1	-0.6	-0.7	-0.6	-0.1	-0.5	-0.6	-0.6	-0.5	-0.4	-0.8
	1992-1998	0.1	-0.5	-0.8	-0.4	-0.2	-0.4	-0.4	-0.6	-0.6	-0.3	-0.6
	Post-1998	0.1	-0.5	-0.8	-0.4	-0.3	-0.4	-0.5	-0.6	-0.6	-0.4	-0.6
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	6.2	-10.3	-6.5	-16.1	-12.2	-14.9	-10.8	-8.6	-19.9	-10.9	-4.0
	1978-1992	10.8	-14.2	-8.1	-23.2	-11.9	-20.1	-15.0	-10.0	-27.5	-14.9	-4.6
	1992-1998	16.3	-17.7	-10.8	-23.1	-30.7	-24.0	-17.3	-13.2	-32.4	-18.3	-5.8
	Post-1998	19.3	-19.3	-11.4	-28.3	-45.8	-28.3	-20.5	-14.1	-37.9	-22.2	-6.4
Peak1 kW/unit	Pre-1978	na	-5.6	-4.7	-9.0	-12.1	-8.4	-6.5	-6.5	-12.6	-6.9	-3.4
	1978-1992	na	-7.3	-6.1	-11.0	-14.6	-8.4	-8.7	-5.8	-13.5	-8.0	-3.3
	1992-1998	na	-9.4	-8.1	-12.6	-16.6	-10.1	-9.9	-8.0	-16.9	-11.2	-4.5
	Post-1998	na	-10.0	-8.7	-15.2	-19.2	-12.3	-11.0	-9.9	-17.1	-11.6	-4.3
Gas therms	Pre-1978	5.7	6.6	6.6	7.9	7.7	12.1	10.6	11.6	15.3	5.8	15.8
	1978-1992	9.9	12.6	12.6	16.5	15.3	24.0	26.3	24.6	30.3	12.4	35.3
	1992-1998	15.5	15.4	14.8	25.0	24.4	38.2	38.2	31.9	44.0	17.8	46.2
	Post-1998	18.3	16.7	16.4	29.4	28.5	44.9	46.4	41.2	51.2	20.9	59.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	351.8	1326.1	2690.1	977.7	426.8	881.7	1486.8	1879.1	812.9	1060.5	5605.1
	1978-1992	212.5	1085.4	2384.7	593.5	228.4	635.7	1146.9	1437.4	509.7	661.6	4213.0
	1992-1998	186.9	934.1	2335.7	748.3	334.9	753.3	1088.0	1180.3	827.4	816.6	2591.2
	Post-1998	136.0	811.5	2093.9	685.4	272.6	704.6	1092.2	1405.4	775.1	751.1	3074.0
Peak1 kW/unit	Pre-1978	0.0	1.9	2.6	1.8	1.2	1.5	2.2	2.1	1.5	1.8	3.5
	1978-1992	0.0	1.5	2.3	1.3	0.9	1.4	1.7	1.7	1.3	1.4	2.6
	1992-1998	0.0	1.4	2.3	1.2	1.0	1.4	1.6	1.4	1.7	1.4	1.6
	Post-1998	0.0	1.2	2.0	1.2	1.0	1.3	1.6	1.7	1.7	1.4	1.8
Gas therms	Pre-1978	398.2	349.2	275.0	276.8	345.0	207.7	231.4	244.4	158.6	324.1	124.4
	1978-1992	219.0	181.4	161.0	152.5	172.4	85.2	92.0	82.6	70.9	143.1	31.0
	1992-1998	129.6	153.0	120.6	91.2	107.3	48.2	43.4	51.6	46.2	87.6	15.2
	Post-1998	116.6	125.3	99.1	76.6	89.7	34.7	30.0	40.0	31.8	76.8	9.6

Single-Family Measure Savings

Dbl tint to Heat Mirror

Measure base: Double pane standard tint

Measure description: Heat Mirror 88 between clear glass (SC = .66)

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.1	0.3	0.5	0.3	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.7
	1978-1992	0.1	0.3	0.5	0.3	0.1	0.2	0.3	0.3	0.2	0.3	0.3	0.7
	1992-1998	0.1	0.2	0.4	0.2	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.4
	Post-1998	0.1	0.2	0.4	0.2	0.1	0.1	0.2	0.3	0.1	0.2	0.2	0.5
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0	
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0	
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9	
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7	

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	4.4	4.7	3.4	6.7	7.3	6.6	4.7	4.3	7.6	6.2	3.3
	1978-1992	8.3	7.0	5.4	10.2	10.7	8.2	7.1	5.9	9.8	9.6	3.8
	1992-1998	14.5	8.4	5.7	10.0	13.2	8.4	7.2	6.9	8.4	10.3	4.4
	Post-1998	17.8	9.4	6.1	10.8	13.8	9.2	7.6	7.7	8.0	10.9	5.1
Peak1 kW/unit	Pre-1978	na	4.1	4.3	4.9	4.6	4.9	4.7	5.1	4.4	4.6	4.3
	1978-1992	na	5.9	6.2	5.1	6.3	4.9	5.7	6.6	4.8	6.5	5.0
	1992-1998	na	6.7	6.8	7.7	6.2	6.4	6.5	7.2	4.8	7.8	6.6
	Post-1998	na	7.2	7.0	7.3	6.8	7.4	7.5	6.9	5.7	8.7	6.8
Gas therms	Pre-1978	3.8	4.4	4.7	4.3	4.5	6.7	5.6	6.8	8.2	3.1	10.7
	1978-1992	7.5	10.4	10.7	9.0	9.1	11.7	15.4	13.3	14.0	7.3	22.2
	1992-1998	13.4	13.3	13.6	18.1	18.3	26.1	27.4	17.9	29.5	13.4	29.8
	Post-1998	16.4	15.2	15.3	22.5	22.7	32.6	36.0	25.4	36.6	16.3	40.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	351.8	1326.1	2690.1	977.7	426.8	881.7	1486.8	1879.1	812.9	1060.5	5605.1
	1978-1992	212.5	1085.4	2384.7	593.5	228.4	635.7	1146.9	1437.4	509.7	661.6	4213.0
	1992-1998	186.9	934.1	2335.7	748.3	334.9	753.3	1088.0	1180.3	827.4	816.6	2591.2
	Post-1998	136.0	811.5	2093.9	685.4	272.6	704.6	1092.2	1405.4	775.1	751.1	3074.0
Peak1 kW/unit	Pre-1978	0.0	1.9	2.6	1.8	1.2	1.5	2.2	2.1	1.5	1.8	3.5
	1978-1992	0.0	1.5	2.3	1.3	0.9	1.4	1.7	1.7	1.3	1.4	2.6
	1992-1998	0.0	1.4	2.3	1.2	1.0	1.4	1.6	1.4	1.7	1.4	1.6
	Post-1998	0.0	1.2	2.0	1.2	1.0	1.3	1.6	1.7	1.7	1.4	1.8
Gas therms	Pre-1978	398.2	349.2	275.0	276.8	345.0	207.7	231.4	244.4	158.6	324.1	124.4
	1978-1992	219.0	181.4	161.0	152.5	172.4	85.2	92.0	82.6	70.9	143.1	31.0
	1992-1998	129.6	153.0	120.6	91.2	107.3	48.2	43.4	51.6	46.2	87.6	15.2
	Post-1998	116.6	125.3	99.1	76.6	89.7	34.7	30.0	40.0	31.8	76.8	9.6

Single-Family Measure Savings

Dbl tint to Double, High Performance Tint

Measure base: Double pane standard tint

Measure description: Double pane, "Blue" Tint, SC = 0.57

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-0.1	0.6	0.8	0.6	0.1	0.5	0.7	0.5	0.6	0.5	0.8
	1978-1992	-0.1	0.5	0.7	0.5	0.0	0.4	0.5	0.6	0.4	0.4	0.7
	1992-1998	-0.1	0.4	0.7	0.3	0.1	0.3	0.4	0.5	0.4	0.3	0.5
	Post-1998	0.0	0.4	0.7	0.4	0.1	0.3	0.4	0.6	0.5	0.3	0.5
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-4.7	9.6	5.9	14.0	7.2	12.3	9.4	7.8	18.0	9.7	3.9
	1978-1992	-7.8	13.2	8.2	18.9	4.7	16.2	13.3	9.8	20.4	13.4	4.3
	1992-1998	-12.1	15.2	9.8	19.8	17.1	19.6	15.0	11.3	23.5	16.0	5.4
	Post-1998	-14.9	16.5	10.7	24.6	22.1	22.9	17.8	14.3	27.8	19.7	6.1
Peak1 kW/unit	Pre-1978	na	6.1	4.9	8.5	11.6	8.0	6.3	6.5	10.6	6.3	3.8
	1978-1992	na	7.7	5.6	11.6	16.2	8.1	8.1	7.0	12.3	6.8	3.5
	1992-1998	na	8.9	7.6	12.7	15.4	10.7	9.5	8.0	14.7	10.5	4.9
	Post-1998	na	10.1	7.8	13.9	16.6	11.5	10.5	8.2	15.7	11.8	4.8
Gas therms	Pre-1978	-4.4	-4.7	-4.8	-6.2	-6.0	-9.8	-8.6	-9.5	-12.9	-4.9	-12.7
	1978-1992	-7.0	-9.4	-9.7	-13.5	-12.6	-21.0	-23.6	-21.6	-29.1	-9.9	-34.3
	1992-1998	-11.5	-12.0	-11.8	-22.0	-21.1	-38.6	-40.2	-29.9	-49.4	-14.0	-50.4
	Post-1998	-13.9	-13.4	-12.8	-26.6	-26.0	-49.2	-53.3	-42.4	-64.4	-16.7	-75.8

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	351.8	1326.1	2690.1	977.7	426.8	881.7	1486.8	1879.1	812.9	1060.5	5605.1
	1978-1992	212.5	1085.4	2384.7	593.5	228.4	635.7	1146.9	1437.4	509.7	661.6	4213.0
	1992-1998	186.9	934.1	2335.7	748.3	334.9	753.3	1088.0	1180.3	827.4	816.6	2591.2
	Post-1998	136.0	811.5	2093.9	685.4	272.6	704.6	1092.2	1405.4	775.1	751.1	3074.0
Peak1 kW/unit	Pre-1978	0.0	1.9	2.6	1.8	1.2	1.5	2.2	2.1	1.5	1.8	3.5
	1978-1992	0.0	1.5	2.3	1.3	0.9	1.4	1.7	1.7	1.3	1.4	2.6
	1992-1998	0.0	1.4	2.3	1.2	1.0	1.4	1.6	1.4	1.7	1.4	1.6
	Post-1998	0.0	1.2	2.0	1.2	1.0	1.3	1.6	1.7	1.7	1.4	1.8
Gas therms	Pre-1978	398.2	349.2	275.0	276.8	345.0	207.7	231.4	244.4	158.6	324.1	124.4
	1978-1992	219.0	181.4	161.0	152.5	172.4	85.2	92.0	82.6	70.9	143.1	31.0
	1992-1998	129.6	153.0	120.6	91.2	107.3	48.2	43.4	51.6	46.2	87.6	15.2
	Post-1998	116.6	125.3	99.1	76.6	89.7	34.7	30.0	40.0	31.8	76.8	9.6

Single-Family Measure Savings

Dbl tint to Insol-8

Measure base: Double pane standard tint

Measure description: "Insol-8" Two Heat Mirror 88 layers between clear glass, argon filled

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.1	0.6	0.8	0.5	0.2	0.4	0.6	0.5	0.4	0.5	1.1
	1978-1992	0.1	0.4	0.8	0.5	0.2	0.3	0.5	0.5	0.3	0.5	1.1
	1992-1998	0.1	0.4	0.7	0.3	0.2	0.2	0.3	0.5	0.3	0.3	0.7
	Post-1998	0.1	0.4	0.7	0.3	0.1	0.2	0.3	0.5	0.2	0.3	0.7
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	6.0	8.4	5.7	10.9	11.1	11.5	8.6	7.2	12.9	9.9	5.1
	1978-1992	11.9	11.2	8.9	17.5	17.6	12.9	11.4	8.8	16.9	15.8	6.2
	1992-1998	21.5	14.2	9.7	16.4	21.3	14.1	11.5	11.0	14.2	16.2	7.2
	Post-1998	26.4	15.2	10.4	18.9	23.1	15.1	12.5	12.1	15.0	17.5	8.2
Peak1 kW/unit	Pre-1978	na	7.0	6.8	8.1	8.1	7.8	7.4	8.1	7.6	7.6	6.9
	1978-1992	na	9.4	9.6	8.2	10.7	7.9	8.6	9.1	7.7	9.8	7.8
	1992-1998	na	10.4	10.5	11.5	9.1	9.9	10.2	10.9	8.7	12.0	10.2
	Post-1998	na	11.2	11.3	11.1	11.1	11.3	11.8	10.6	9.5	13.4	11.0
Gas therms	Pre-1978	5.2	6.1	6.7	6.0	5.9	9.3	7.7	10.2	11.1	4.5	15.6
	1978-1992	10.7	14.9	15.8	12.7	12.4	16.0	21.5	19.0	18.6	10.8	30.3
	1992-1998	19.8	19.3	20.0	26.1	25.7	36.7	38.0	25.4	40.3	20.3	40.4
	Post-1998	24.2	21.9	22.6	32.3	31.8	45.3	50.0	36.3	49.8	24.7	55.3

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	351.8	1326.1	2690.1	977.7	426.8	881.7	1486.8	1879.1	812.9	1060.5	5605.1
	1978-1992	212.5	1085.4	2384.7	593.5	228.4	635.7	1146.9	1437.4	509.7	661.6	4213.0
	1992-1998	186.9	934.1	2335.7	748.3	334.9	753.3	1088.0	1180.3	827.4	816.6	2591.2
	Post-1998	136.0	811.5	2093.9	685.4	272.6	704.6	1092.2	1405.4	775.1	751.1	3074.0
Peak1 kW/unit	Pre-1978	0.0	1.9	2.6	1.8	1.2	1.5	2.2	2.1	1.5	1.8	3.5
	1978-1992	0.0	1.5	2.3	1.3	0.9	1.4	1.7	1.7	1.3	1.4	2.6
	1992-1998	0.0	1.4	2.3	1.2	1.0	1.4	1.6	1.4	1.7	1.4	1.6
	Post-1998	0.0	1.2	2.0	1.2	1.0	1.3	1.6	1.7	1.7	1.4	1.8
Gas therms	Pre-1978	398.2	349.2	275.0	276.8	345.0	207.7	231.4	244.4	158.6	324.1	124.4
	1978-1992	219.0	181.4	161.0	152.5	172.4	85.2	92.0	82.6	70.9	143.1	31.0
	1992-1998	129.6	153.0	120.6	91.2	107.3	48.2	43.4	51.6	46.2	87.6	15.2
	Post-1998	116.6	125.3	99.1	76.6	89.7	34.7	30.0	40.0	31.8	76.8	9.6

Single-Family Measure Savings

Dbl tint to Double Pane, Med Low-E Coating

Measure base: Double pane standard tint

Measure description: "Low-E Squared", U=0.30, SC = 0.51

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	1.0	1.3	0.9	0.3	0.7	1.0	0.9	0.8	0.8	1.6
	1978-1992	0.0	0.8	1.2	0.8	0.2	0.6	0.8	1.0	0.6	0.7	1.5
	1992-1998	0.0	0.7	1.1	0.5	0.2	0.5	0.6	0.9	0.6	0.5	1.0
	Post-1998	0.0	0.7	1.2	0.5	0.2	0.5	0.6	0.9	0.6	0.5	1.1
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	1.5	14.4	9.7	20.2	14.5	18.9	14.5	12.5	24.7	16.4	7.7
	1978-1992	3.7	20.3	13.7	29.7	17.3	23.7	21.0	16.4	29.9	24.4	8.9
	1992-1998	8.5	24.3	16.0	30.5	31.9	29.1	23.6	19.2	33.2	28.0	10.6
	Post-1998	10.7	27.2	17.6	35.5	38.3	32.4	26.6	21.9	37.4	31.7	12.1
Peak1 kW/unit	Pre-1978	na	10.9	10.0	13.7	16.8	13.2	11.5	12.1	15.1	11.6	9.1
	1978-1992	na	14.7	13.2	17.7	23.3	13.7	14.8	13.9	17.4	14.6	10.4
	1992-1998	na	17.0	15.6	21.0	21.9	18.1	17.6	16.1	20.4	20.6	13.0
	Post-1998	na	18.1	16.5	21.9	23.9	19.3	19.8	16.5	21.9	23.2	14.2
Gas therms	Pre-1978	1.0	1.5	1.8	0.0	0.3	0.0	-0.8	-0.2	-1.0	-0.6	2.3
	1978-1992	3.3	5.1	5.3	-0.2	1.0	-2.7	-0.5	-2.4	-6.2	0.0	0.4
	1992-1998	7.5	7.1	7.7	5.0	6.2	4.5	5.4	-3.1	2.8	4.6	0.1
	Post-1998	9.4	8.5	9.2	7.5	8.5	7.1	10.6	-1.5	5.3	6.1	4.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	351.8	1326.1	2690.1	977.7	426.8	881.7	1486.8	1879.1	812.9	1060.5	5605.1
	1978-1992	212.5	1085.4	2384.7	593.5	228.4	635.7	1146.9	1437.4	509.7	661.6	4213.0
	1992-1998	186.9	934.1	2335.7	748.3	334.9	753.3	1088.0	1180.3	827.4	816.6	2591.2
	Post-1998	136.0	811.5	2093.9	685.4	272.6	704.6	1092.2	1405.4	775.1	751.1	3074.0
Peak1 kW/unit	Pre-1978	0.0	1.9	2.6	1.8	1.2	1.5	2.2	2.1	1.5	1.8	3.5
	1978-1992	0.0	1.5	2.3	1.3	0.9	1.4	1.7	1.7	1.3	1.4	2.6
	1992-1998	0.0	1.4	2.3	1.2	1.0	1.4	1.6	1.4	1.7	1.4	1.6
	Post-1998	0.0	1.2	2.0	1.2	1.0	1.3	1.6	1.7	1.7	1.4	1.8
Gas therms	Pre-1978	398.2	349.2	275.0	276.8	345.0	207.7	231.4	244.4	158.6	324.1	124.4
	1978-1992	219.0	181.4	161.0	152.5	172.4	85.2	92.0	82.6	70.9	143.1	31.0
	1992-1998	129.6	153.0	120.6	91.2	107.3	48.2	43.4	51.6	46.2	87.6	15.2
	Post-1998	116.6	125.3	99.1	76.6	89.7	34.7	30.0	40.0	31.8	76.8	9.6

Single-Family Measure Savings

Dbl tint, Aluminum frame to Vinyl Frame

Measure base: Double pane standard tint, Aluminum Frame

Measure description: Double pane standard tint, Vinyl Frame

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.1	0.4	0.6	0.4	0.2	0.3	0.5	0.3	0.3	0.4	0.7
	1978-1992	0.1	0.3	0.5	0.4	0.2	0.3	0.3	0.3	0.3	0.3	0.7
	1992-1998	0.1	0.2	0.4	0.2	0.1	0.1	0.2	0.3	0.2	0.2	0.5
	Post-1998	0.1	0.3	0.4	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.4
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	223.0	200.0	200.0	223.0	223.0	238.0	214.0	267.0	238.0	223.0	267.0
	1978-1992	219.0	273.0	273.0	219.0	219.0	260.0	290.0	244.0	260.0	219.0	244.0
	1992-1998	432.8	329.0	329.0	432.8	432.8	454.0	423.6	262.9	454.0	432.8	262.9
	Post-1998	459.1	311.8	311.8	459.1	459.1	478.6	484.6	345.7	478.6	459.1	345.7

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	7.6	5.9	4.4	7.4	10.1	7.6	6.0	3.8	8.4	7.1	3.4
	1978-1992	13.3	6.4	5.1	11.2	15.5	9.5	6.8	5.3	11.4	9.8	4.0
	1992-1998	17.9	7.1	5.3	8.2	9.7	6.5	6.2	5.1	6.7	7.8	4.6
	Post-1998	17.8	7.6	5.3	7.9	10.6	6.4	5.4	4.4	7.0	7.1	4.1
Peak1 kW/unit	Pre-1978	na	5.7	5.8	6.8	6.5	6.7	5.9	4.9	6.2	6.5	4.4
	1978-1992	na	6.3	6.6	6.0	6.3	6.9	6.7	6.1	6.3	7.4	5.9
	1992-1998	na	6.7	6.8	6.7	4.9	5.7	6.6	6.8	5.4	6.5	7.2
	Post-1998	na	6.8	6.9	6.4	5.8	6.3	6.6	6.1	5.3	6.8	5.5
Gas therms	Pre-1978	6.7	7.4	7.6	8.1	7.9	11.7	9.8	9.8	14.1	6.8	13.6
	1978-1992	12.0	13.1	13.3	15.5	14.8	20.6	23.0	20.4	24.1	13.6	31.2
	1992-1998	16.5	16.5	16.5	22.5	22.2	32.3	35.6	27.3	36.1	17.7	42.6
	Post-1998	16.4	16.6	16.5	22.5	22.3	32.5	36.1	28.4	36.6	17.8	43.6

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	333.6	1464.2	2862.5	1133.5	480.1	1015.0	1647.9	2038.2	977.3	1172.6	5834.0
	1978-1992	194.0	1239.3	2580.2	732.2	258.2	764.1	1314.8	1581.7	648.2	762.7	4414.1
	1992-1998	162.8	1097.2	2588.7	915.9	437.0	931.4	1271.3	1328.2	1092.3	965.7	2745.0
	Post-1998	140.3	1047.6	2464.9	948.7	435.3	958.7	1385.6	1683.9	1129.5	985.4	3418.2
Peak1 kW/unit	Pre-1978	0.0	2.0	2.7	1.9	1.3	1.6	2.3	2.2	1.7	2.0	3.7
	1978-1992	0.0	1.7	2.4	1.5	1.1	1.5	1.9	1.8	1.5	1.5	2.8
	1992-1998	0.0	1.5	2.5	1.4	1.2	1.5	1.7	1.6	2.0	1.6	1.7
	Post-1998	0.0	1.4	2.3	1.5	1.3	1.6	1.9	2.0	2.0	1.6	2.0
Gas therms	Pre-1978	379.3	330.3	260.3	258.5	322.7	186.5	210.8	221.3	137.8	308.7	108.3
	1978-1992	201.7	162.7	144.8	131.4	150.1	67.6	71.5	65.5	52.1	128.5	21.8
	1992-1998	113.7	134.2	106.5	72.3	85.6	32.5	29.4	37.6	28.6	75.1	9.1
	Post-1998	119.2	130.2	103.4	74.9	88.1	31.8	28.5	36.5	27.8	77.8	8.3

6.1.2 Multi-Family Energy Savings Results

Multi-Family Measure Savings

Programmable Thermostat

Measure base: No heating or cooling thermostat setback

Measure description: Heating: 5 F setback from 10 p.m. to 6 a.m., weekdays from 9 a.m. to 4 p.m.

Cooling: setup weekdays from 9 a.m. to 4 p.m. to 85 F.

Measure units: house

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	435.8	437.5	399.8	538.5	529.8	345.9	528.2	668.3	354.2	557.0	700.4
	1978-1992	50.0	155.2	170.1	86.4	35.8	93.5	218.7	163.4	79.6	80.1	276.7
	1992-1998	45.8	97.5	109.7	82.9	38.4	78.8	126.5	95.5	70.0	78.6	168.4
	Post-1998	25.9	91.2	102.8	77.9	23.6	71.7	116.0	89.1	62.8	65.9	154.9
Peak1 kW/unit	Pre-1978	0.00	-0.97	-0.83	-0.48	-0.57	-0.15	-0.54	-0.92	-0.51	-0.77	-0.87
	1978-1992	0.00	-1.00	-1.03	-0.88	-0.66	-0.68	-1.07	-1.27	-0.83	-1.06	-1.61
	1992-1998	0.00	-0.89	-0.94	-0.71	-0.58	-0.67	-0.80	-0.99	-0.75	-0.80	-1.29
	Post-1998	0.00	-1.00	-1.06	-0.71	-0.60	-0.71	-0.89	-0.99	-0.78	-0.83	-1.32
Gas therms	Pre-1978	69	64	58	57	63	40	48	58	42	56	45
	1978-1992	26	26	23	15	19	7	13	12	7	15	8
	1992-1998	22	15	13	13	16	5	5	3	4	14	1
	Post-1998	19	13	10	10	13	3	3	2	2	11	1
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	48.3	18.8	11.7	31.4	48.4	22.5	22.9	18.6	28.5	26.9	9.2
	1978-1992	57.1	12.1	9.0	12.1	13.6	11.4	14.6	10.3	12.8	10.3	7.5
	1992-1998	57.2	10.0	7.8	12.6	13.6	10.1	12.6	8.2	11.5	11.0	6.6
	Post-1998	51.4	9.2	7.3	11.7	8.3	9.0	11.5	7.8	9.9	9.4	6.3
Peak1 kW/unit	Pre-1978	na	-28.0	-21.8	-19.3	-29.7	-5.8	-15.8	-21.2	-25.6	-25.5	-13.9
	1978-1992	na	-57.1	-55.8	-85.2	-78.4	-53.3	-54.7	-71.1	-83.7	-80.9	-57.0
	1992-1998	na	-71.7	-73.2	-80.2	-78.1	-61.4	-66.3	-88.0	-87.0	-70.8	-73.2
	Post-1998	na	-80.9	-84.1	-83.2	-81.9	-67.5	-76.4	-92.9	-91.2	-78.5	-79.4
Gas therms	Pre-1978	21.0	22.8	22.4	24.0	25.9	32.2	32.0	28.9	35.9	21.2	31.1
	1978-1992	31.2	28.3	27.8	36.7	36.8	44.7	48.5	45.8	52.5	34.0	48.3
	1992-1998	31.3	31.9	31.5	37.9	37.7	49.1	54.4	59.6	59.1	34.0	55.9
	Post-1998	33.6	33.5	33.2	39.7	39.5	50.5	55.6	65.0	60.6	36.2	54.3

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	902.5	2324.0	3413.9	1716.4	1093.6	1534.1	2310.3	3594.8	1244.8	2067.5	7582.2
	1978-1992	87.6	1281.5	1897.4	711.9	264.2	820.0	1502.1	1592.1	621.2	776.0	3703.9
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.5	3.8	2.5	1.9	2.6	3.4	4.3	2.0	3.0	6.3
	1978-1992	0.0	1.7	1.8	1.0	0.8	1.3	2.0	1.8	1.0	1.3	2.8
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	326.0	282.8	259.0	236.7	243.7	124.2	149.3	201.3	116.5	265.1	144.5
	1978-1992	81.8	93.4	81.2	40.2	50.3	16.3	25.8	27.3	12.9	44.7	16.3
	1992-1998	71.8	47.8	40.0	35.0	43.5	9.3	10.0	5.2	6.9	41.1	2.2
	Post-1998	56.6	37.5	30.9	25.3	32.0	5.4	5.7	2.6	3.6	30.8	1.0

Multi-Family Measure Savings

10 to 11 SEER Split A/C

Measure base: SEER 10

Measure description: SEER 11

Measure units: Cooling Tons

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	41.1	66.3	25.5	9.6	40.2	42.3	45.8	30.8	29.6	108.2
	1978-1992	0.0	40.9	62.0	21.9	7.0	35.8	42.5	31.9	27.1	23.3	76.3
	1992-1998	0.0	39.0	57.1	26.3	9.9	38.7	40.5	30.9	30.4	27.6	68.7
	Post-1998	0.0	38.7	55.7	26.9	10.6	36.4	39.2	30.4	28.9	27.7	66.4
Peak1 kW/unit	Pre-1978	0.00	0.07	0.08	0.05	0.04	0.08	0.07	0.06	0.06	0.06	0.09
	1978-1992	0.00	0.06	0.06	0.03	0.03	0.06	0.06	0.04	0.04	0.04	0.06
	1992-1998	0.00	0.05	0.05	0.04	0.03	0.06	0.05	0.03	0.04	0.05	0.05
	Post-1998	0.00	0.05	0.05	0.04	0.03	0.05	0.05	0.03	0.04	0.04	0.05
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	3.7	3.7	3.7	3.7	3.7	2.5	3.6	5.3	2.5	3.7	5.3
	1978-1992	2.6	2.6	2.6	2.6	2.6	1.9	2.8	4.2	1.9	2.6	4.2
	1992-1998	2.2	2.2	2.2	2.2	2.2	1.8	2.2	3.3	1.8	2.2	3.3
	Post-1998	2.2	2.3	2.3	2.2	2.2	2.0	2.3	3.3	2.0	2.2	3.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	8.1	8.6	7.3	4.9	8.2	8.3	8.3	8.0	6.8	9.0
	1978-1992	0.0	8.6	8.8	8.7	7.4	8.8	8.8	8.8	8.8	8.5	9.0
	1992-1998	0.0	8.8	8.9	8.8	7.7	8.9	8.8	8.8	8.9	8.5	9.0
	Post-1998	0.0	8.8	8.9	8.8	8.2	8.9	8.9	8.8	8.9	8.6	9.0
Peak1 kW/unit	Pre-1978	na	9.0	9.1	8.9	8.4	9.1	9.2	8.9	9.0	8.8	9.3
	1978-1992	na	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.3
	1992-1998	na	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.3
	Post-1998	na	9.2	9.2	9.1	9.1	9.1	9.2	9.1	9.1	9.1	9.3
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	627.4	1887.8	2879.7	1303.8	725.2	1240.1	1847.9	2906.5	979.6	1608.8	6405.1
	1978-1992	87.6	1220.8	1805.3	643.2	242.2	780.2	1356.2	1515.0	591.0	702.8	3519.6
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.0	3.3	2.1	1.6	2.2	2.9	3.8	1.7	2.5	5.3
	1978-1992	0.0	1.7	1.8	0.9	0.8	1.2	1.8	1.7	0.9	1.2	2.7
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	283.4	242.4	222.3	200.5	203.4	97.7	117.6	163.5	88.4	229.7	115.0
	1978-1992	81.8	93.4	81.2	40.2	50.3	16.3	25.8	27.3	12.9	44.7	16.3
	1992-1998	71.8	47.8	40.0	35.0	43.5	9.3	10.0	5.2	6.9	41.1	2.2
	Post-1998	56.6	37.5	30.9	25.3	32.0	5.4	5.7	2.6	3.6	30.8	1.0

Multi-Family Measure Savings

10 to 12 SEER Split A/C

Measure base: SEER 10

Measure description: SEER 12

Measure units: Cooling Tons

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	75.4	121.5	46.8	17.7	73.7	77.5	83.9	56.5	54.2	198.4
	1978-1992	0.0	74.9	113.7	40.1	12.8	65.6	78.0	58.5	49.7	42.8	139.9
	1992-1998	0.0	71.5	104.6	48.3	18.2	70.9	74.2	56.6	55.7	50.7	125.9
	Post-1998	0.0	70.9	102.1	49.3	19.5	66.7	71.9	55.7	53.0	50.7	121.7
Peak1 kW/unit	Pre-1978	0.00	0.13	0.15	0.09	0.07	0.14	0.13	0.12	0.11	0.11	0.17
	1978-1992	0.00	0.11	0.12	0.06	0.05	0.11	0.10	0.07	0.08	0.08	0.11
	1992-1998	0.00	0.10	0.10	0.07	0.06	0.10	0.09	0.06	0.08	0.09	0.09
	Post-1998	0.00	0.09	0.09	0.06	0.06	0.09	0.09	0.05	0.07	0.08	0.08
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	3.7	3.7	3.7	3.7	3.7	2.5	3.6	5.3	2.5	3.7	5.3
	1978-1992	2.6	2.6	2.6	2.6	2.6	1.9	2.8	4.2	1.9	2.6	4.2
	1992-1998	2.2	2.2	2.2	2.2	2.2	1.8	2.2	3.3	1.8	2.2	3.3
	Post-1998	2.2	2.3	2.3	2.2	2.2	2.0	2.3	3.3	2.0	2.2	3.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	14.9	15.7	13.4	9.1	15.0	15.3	15.3	14.6	12.5	16.4
	1978-1992	0.0	15.8	16.2	16.0	13.6	16.2	16.1	16.1	16.2	15.6	16.6
	1992-1998	0.0	16.1	16.3	16.1	14.2	16.3	16.2	16.1	16.3	15.6	16.5
	Post-1998	0.0	16.2	16.4	16.2	15.1	16.3	16.3	16.1	16.4	15.8	16.5
Peak1 kW/unit	Pre-1978	na	16.5	16.6	16.4	15.5	16.7	16.8	16.4	16.5	16.1	17.0
	1978-1992	na	16.8	16.9	16.7	16.6	16.8	16.7	16.7	16.6	16.7	17.0
	1992-1998	na	16.8	16.9	16.7	16.6	16.8	16.8	16.7	16.6	16.7	17.0
	Post-1998	na	16.8	16.9	16.7	16.7	16.8	16.8	16.7	16.6	16.7	17.0
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	627.4	1887.8	2879.7	1303.8	725.2	1240.1	1847.9	2906.5	979.6	1608.8	6405.1
	1978-1992	87.6	1220.8	1805.3	643.2	242.2	780.2	1356.2	1515.0	591.0	702.8	3519.6
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.0	3.3	2.1	1.6	2.2	2.9	3.8	1.7	2.5	5.3
	1978-1992	0.0	1.7	1.8	0.9	0.8	1.2	1.8	1.7	0.9	1.2	2.7
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	283.4	242.4	222.3	200.5	203.4	97.7	117.6	163.5	88.4	229.7	115.0
	1978-1992	81.8	93.4	81.2	40.2	50.3	16.3	25.8	27.3	12.9	44.7	16.3
	1992-1998	71.8	47.8	40.0	35.0	43.5	9.3	10.0	5.2	6.9	41.1	2.2
	Post-1998	56.6	37.5	30.9	25.3	32.0	5.4	5.7	2.6	3.6	30.8	1.0

Multi-Family Measure Savings

10 to 13 SEER Split A/C

Measure base: SEER 10

Measure description: SEER 13

Measure units: Cooling Tons

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	104.4	168.2	64.8	24.4	102.0	107.3	116.1	78.2	75.1	274.7
	1978-1992	0.0	103.7	157.4	55.6	17.8	90.9	108.0	81.0	68.8	59.2	193.8
	1992-1998	0.0	98.9	144.9	66.9	25.2	98.2	102.8	78.4	77.1	70.2	174.3
	Post-1998	0.0	98.2	141.4	68.2	27.0	92.4	99.5	77.2	73.4	70.2	168.5
Peak1 kW/unit	Pre-1978	0.00	0.18	0.20	0.13	0.09	0.20	0.19	0.16	0.15	0.15	0.23
	1978-1992	0.00	0.15	0.16	0.08	0.07	0.15	0.15	0.09	0.11	0.11	0.15
	1992-1998	0.00	0.13	0.14	0.09	0.08	0.14	0.13	0.08	0.11	0.12	0.12
	Post-1998	0.00	0.13	0.13	0.09	0.08	0.13	0.12	0.07	0.10	0.11	0.12
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	3.7	3.7	3.7	3.7	3.7	2.5	3.6	5.3	2.5	3.7	5.3
	1978-1992	2.6	2.6	2.6	2.6	2.6	1.9	2.8	4.2	1.9	2.6	4.2
	1992-1998	2.2	2.2	2.2	2.2	2.2	1.8	2.2	3.3	1.8	2.2	3.3
	Post-1998	2.2	2.3	2.3	2.2	2.2	2.0	2.3	3.3	2.0	2.2	3.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	20.6	21.7	18.5	12.5	20.8	21.1	21.2	20.2	17.4	22.7
	1978-1992	0.0	21.8	22.4	22.2	18.8	22.4	22.3	22.3	22.4	21.6	23.0
	1992-1998	0.0	22.3	22.6	22.2	19.6	22.6	22.5	22.3	22.6	21.6	22.9
	Post-1998	0.0	22.4	22.7	22.5	20.9	22.6	22.5	22.4	22.7	21.9	22.9
Peak1 kW/unit	Pre-1978	na	22.9	23.1	22.7	21.5	23.2	23.2	22.7	22.9	22.3	23.5
	1978-1992	na	23.3	23.4	23.1	23.0	23.3	23.2	23.1	23.0	23.1	23.5
	1992-1998	na	23.3	23.4	23.1	23.0	23.2	23.2	23.1	23.0	23.1	23.5
	Post-1998	na	23.3	23.4	23.1	23.0	23.2	23.2	23.1	22.9	23.1	23.5
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	627.4	1887.8	2879.7	1303.8	725.2	1240.1	1847.9	2906.5	979.6	1608.8	6405.1
	1978-1992	87.6	1220.8	1805.3	643.2	242.2	780.2	1356.2	1515.0	591.0	702.8	3519.6
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.0	3.3	2.1	1.6	2.2	2.9	3.8	1.7	2.5	5.3
	1978-1992	0.0	1.7	1.8	0.9	0.8	1.2	1.8	1.7	0.9	1.2	2.7
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	283.4	242.4	222.3	200.5	203.4	97.7	117.6	163.5	88.4	229.7	115.0
	1978-1992	81.8	93.4	81.2	40.2	50.3	16.3	25.8	27.3	12.9	44.7	16.3
	1992-1998	71.8	47.8	40.0	35.0	43.5	9.3	10.0	5.2	6.9	41.1	2.2
	Post-1998	56.6	37.5	30.9	25.3	32.0	5.4	5.7	2.6	3.6	30.8	1.0

Multi-Family Measure Savings

10 to 14 SEER Split A/C

Measure base: SEER 10

Measure description: SEER 14

Measure units: Cooling Tons

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	129.3	208.3	80.3	30.3	126.3	132.9	143.8	96.9	93.0	340.1
	1978-1992	0.0	128.4	194.8	68.8	22.0	112.5	133.7	100.3	85.1	73.3	239.9
	1992-1998	0.0	122.5	179.4	82.8	31.2	121.6	127.2	97.0	95.4	86.9	215.9
	Post-1998	0.0	121.5	175.1	84.5	33.4	114.4	123.2	95.5	90.9	86.9	208.7
Peak1 kW/unit	Pre-1978	0.00	0.23	0.25	0.16	0.11	0.25	0.23	0.20	0.19	0.19	0.29
	1978-1992	0.00	0.19	0.20	0.10	0.08	0.18	0.18	0.12	0.14	0.13	0.19
	1992-1998	0.00	0.16	0.17	0.11	0.10	0.17	0.16	0.10	0.14	0.15	0.15
	Post-1998	0.00	0.16	0.16	0.11	0.09	0.16	0.15	0.09	0.12	0.14	0.14
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	3.7	3.7	3.7	3.7	3.7	2.5	3.6	5.3	2.5	3.7	5.3
	1978-1992	2.6	2.6	2.6	2.6	2.6	1.9	2.8	4.2	1.9	2.6	4.2
	1992-1998	2.2	2.2	2.2	2.2	2.2	1.8	2.2	3.3	1.8	2.2	3.3
	Post-1998	2.2	2.3	2.3	2.2	2.2	2.0	2.3	3.3	2.0	2.2	3.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	25.5	26.9	22.9	15.5	25.8	26.2	26.2	25.1	21.5	28.2
	1978-1992	0.0	27.0	27.7	27.5	23.3	27.8	27.7	27.6	27.7	26.8	28.4
	1992-1998	0.0	27.6	28.0	27.5	24.3	27.9	27.8	27.6	27.9	26.7	28.4
	Post-1998	0.0	27.8	28.1	27.8	25.9	28.0	27.9	27.7	28.1	27.1	28.3
Peak1 kW/unit	Pre-1978	na	28.3	28.5	28.0	26.6	28.7	28.7	28.1	28.3	27.6	29.1
	1978-1992	na	28.8	28.9	28.6	28.5	28.8	28.7	28.6	28.5	28.6	29.1
	1992-1998	na	28.8	28.9	28.5	28.5	28.7	28.7	28.6	28.4	28.6	29.1
	Post-1998	na	28.8	28.9	28.6	28.5	28.7	28.7	28.6	28.4	28.6	29.1
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	627.4	1887.8	2879.7	1303.8	725.2	1240.1	1847.9	2906.5	979.6	1608.8	6405.1
	1978-1992	87.6	1220.8	1805.3	643.2	242.2	780.2	1356.2	1515.0	591.0	702.8	3519.6
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.0	3.3	2.1	1.6	2.2	2.9	3.8	1.7	2.5	5.3
	1978-1992	0.0	1.7	1.8	0.9	0.8	1.2	1.8	1.7	0.9	1.2	2.7
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	283.4	242.4	222.3	200.5	203.4	97.7	117.6	163.5	88.4	229.7	115.0
	1978-1992	81.8	93.4	81.2	40.2	50.3	16.3	25.8	27.3	12.9	44.7	16.3
	1992-1998	71.8	47.8	40.0	35.0	43.5	9.3	10.0	5.2	6.9	41.1	2.2
	Post-1998	56.6	37.5	30.9	25.3	32.0	5.4	5.7	2.6	3.6	30.8	1.0

Multi-Family Measure Savings

10 to 16 SEER Split A/C

Measure base: SEER 10

Measure description: SEER 16

Measure units: Cooling Tons

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	169.7	273.4	105.4	39.7	165.7	174.4	188.7	127.1	122.0	446.4
	1978-1992	0.0	168.6	255.7	90.3	28.9	147.6	175.4	131.6	111.7	96.2	314.9
	1992-1998	0.0	160.8	235.4	108.7	40.9	159.6	167.0	127.3	125.2	114.0	283.3
	Post-1998	0.0	159.5	229.8	110.9	43.8	150.2	161.7	125.4	119.3	114.1	273.9
Peak1 kW/unit	Pre-1978	0.00	0.30	0.33	0.21	0.15	0.32	0.30	0.26	0.25	0.25	0.38
	1978-1992	0.00	0.24	0.26	0.14	0.11	0.24	0.24	0.15	0.18	0.17	0.25
	1992-1998	0.00	0.21	0.22	0.15	0.13	0.23	0.21	0.13	0.18	0.19	0.20
	Post-1998	0.00	0.21	0.21	0.15	0.12	0.20	0.19	0.12	0.16	0.18	0.19
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	3.7	3.7	3.7	3.7	3.7	2.5	3.6	5.3	2.5	3.7	5.3
	1978-1992	2.6	2.6	2.6	2.6	2.6	1.9	2.8	4.2	1.9	2.6	4.2
	1992-1998	2.2	2.2	2.2	2.2	2.2	1.8	2.2	3.3	1.8	2.2	3.3
	Post-1998	2.2	2.3	2.3	2.2	2.2	2.0	2.3	3.3	2.0	2.2	3.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	33.4	35.3	30.1	20.4	33.9	34.4	34.4	32.9	28.2	37.0
	1978-1992	0.0	35.4	36.4	36.0	30.6	36.4	36.3	36.2	36.4	35.1	37.3
	1992-1998	0.0	36.2	36.8	36.1	31.8	36.6	36.5	36.3	36.7	35.1	37.2
	Post-1998	0.0	36.5	36.9	36.5	33.9	36.8	36.6	36.3	36.8	35.6	37.2
Peak1 kW/unit	Pre-1978	na	37.2	37.5	36.8	34.9	37.6	37.7	36.9	37.2	36.2	38.2
	1978-1992	na	37.8	38.0	37.6	37.5	37.8	37.6	37.6	37.4	37.6	38.3
	1992-1998	na	37.9	37.9	37.5	37.4	37.7	37.7	37.5	37.3	37.5	38.2
	Post-1998	na	37.9	38.0	37.5	37.4	37.6	37.7	37.5	37.3	37.6	38.2
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	627.4	1887.8	2879.7	1303.8	725.2	1240.1	1847.9	2906.5	979.6	1608.8	6405.1
	1978-1992	87.6	1220.8	1805.3	643.2	242.2	780.2	1356.2	1515.0	591.0	702.8	3519.6
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.0	3.3	2.1	1.6	2.2	2.9	3.8	1.7	2.5	5.3
	1978-1992	0.0	1.7	1.8	0.9	0.8	1.2	1.8	1.7	0.9	1.2	2.7
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	283.4	242.4	222.3	200.5	203.4	97.7	117.6	163.5	88.4	229.7	115.0
	1978-1992	81.8	93.4	81.2	40.2	50.3	16.3	25.8	27.3	12.9	44.7	16.3
	1992-1998	71.8	47.8	40.0	35.0	43.5	9.3	10.0	5.2	6.9	41.1	2.2
	Post-1998	56.6	37.5	30.9	25.3	32.0	5.4	5.7	2.6	3.6	30.8	1.0

Multi-Family Measure Savings

Basic HVAC diagnostic testing and repair

Measure base: Degraded DX cooling, Leaky ducts (20% duct leakage)

Measure description: Standard SEER (by location and vintage)

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	313.1	504.4	194.7	73.1	208.0	315.0	496.6	159.6	224.9	1173.6
	1978-1992	0.0	217.6	330.0	116.6	37.3	143.1	247.6	276.2	108.1	124.1	660.4
	1992-1998	0.0	179.6	263.0	121.6	46.0	145.5	186.6	216.5	114.0	127.4	480.9
	Post-1998	0.0	184.7	266.4	123.7	48.8	149.1	187.6	213.0	118.5	127.6	464.9
Peak1 kW/unit	Pre-1978	0.00	0.54	0.60	0.39	0.27	0.40	0.54	0.69	0.31	0.45	0.99
	1978-1992	0.00	0.31	0.33	0.18	0.14	0.23	0.33	0.32	0.18	0.22	0.51
	1992-1998	0.00	0.24	0.25	0.17	0.14	0.21	0.23	0.22	0.16	0.22	0.34
	Post-1998	0.00	0.24	0.24	0.16	0.14	0.20	0.22	0.20	0.16	0.20	0.32
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	12.0	12.5	11.1	8.1	12.1	12.2	12.3	11.9	10.6	12.9
	1978-1992	0.0	12.5	12.8	12.7	11.2	12.8	12.7	12.7	12.8	12.4	13.0
	1992-1998	0.0	12.7	12.9	12.7	11.6	12.8	12.8	12.7	12.8	12.4	13.0
	Post-1998	0.0	12.8	12.9	12.8	12.1	12.9	12.8	12.8	12.9	12.6	13.0
Peak1 kW/unit	Pre-1978	na	13.0	13.1	12.9	12.4	13.1	13.1	12.9	13.0	12.8	13.2
	1978-1992	na	13.1	13.2	13.1	13.0	13.1	13.1	13.1	13.0	13.0	13.2
	1992-1998	na	13.1	13.2	13.0	13.0	13.1	13.1	13.0	13.0	13.0	13.2
	Post-1998	na	13.1	13.2	13.0	13.0	13.1	13.1	13.1	13.0	13.0	13.2
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	639.6	2607.9	4036.7	1754.4	898.3	1717.6	2572.7	4049.2	1346.5	2128.5	9090.2
	1978-1992	90.6	1738.1	2587.3	919.7	332.1	1120.0	1942.3	2170.3	847.0	997.6	5080.6
	1992-1998	83.6	1411.8	2046.1	956.9	397.2	1133.9	1458.4	1699.5	888.2	1025.2	3706.8
	Post-1998	52.7	1445.7	2067.4	967.3	402.5	1159.7	1464.2	1669.7	920.8	1015.8	3583.5
Peak1 kW/unit	Pre-1978	0.0	4.2	4.6	3.0	2.2	3.1	4.1	5.3	2.4	3.6	7.5
	1978-1992	0.0	2.4	2.5	1.3	1.1	1.8	2.5	2.5	1.4	1.7	3.9
	1992-1998	0.0	1.8	1.9	1.3	1.1	1.6	1.8	1.7	1.3	1.7	2.6
	Post-1998	0.0	1.8	1.8	1.2	1.1	1.5	1.7	1.6	1.2	1.5	2.4
Gas therms	Pre-1978	283.9	242.7	222.6	200.9	203.8	97.9	117.8	163.7	88.6	230.1	115.1
	1978-1992	86.5	98.8	85.9	42.5	53.3	17.2	27.3	28.8	13.7	47.3	17.2
	1992-1998	75.0	49.8	41.7	36.6	45.4	9.8	10.4	5.4	7.2	42.9	2.3
	Post-1998	59.1	39.1	32.2	26.4	33.4	5.7	6.0	2.7	3.7	32.1	1.0

Multi-Family Measure Savings

Advanced HVAC diagnostic testing and repair

Measure base: Degraded DX cooling, Leaky ducts (20% duct leakage)

Measure description: Standard SEER (by location and vintage)

6% Duct leakage

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	17.0	464.2	743.5	291.1	115.1	306.7	467.4	737.5	236.2	336.4	1719.5
	1978-1992	3.4	324.2	488.4	173.6	56.9	212.7	368.8	409.6	160.2	185.4	974.9
	1992-1998	3.3	268.2	389.9	180.7	69.4	216.4	276.9	323.5	168.1	189.9	710.4
	Post-1998	2.1	273.5	394.7	183.9	72.3	221.6	279.9	315.5	175.5	190.7	686.8
Peak1 kW/unit	Pre-1978	0.00	0.76	0.82	0.54	0.41	0.53	0.77	0.97	0.42	0.63	1.31
	1978-1992	0.00	0.44	0.49	0.26	0.21	0.34	0.47	0.47	0.26	0.33	0.75
	1992-1998	0.00	0.35	0.36	0.25	0.21	0.31	0.34	0.32	0.23	0.31	0.50
	Post-1998	0.00	0.35	0.36	0.24	0.20	0.30	0.33	0.30	0.23	0.30	0.47
Gas therms	Pre-1978	1	0	0	1	1	0	0	0	0	1	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	2.7	17.8	18.4	16.6	12.8	17.9	18.2	18.2	17.5	15.8	18.9
	1978-1992	3.8	18.7	18.9	18.9	17.1	19.0	19.0	18.9	18.9	18.6	19.2
	1992-1998	3.9	19.0	19.1	18.9	17.5	19.1	19.0	19.0	18.9	18.5	19.2
	Post-1998	4.0	18.9	19.1	19.0	18.0	19.1	19.1	18.9	19.1	18.8	19.2
Peak1 kW/unit	Pre-1978	na	18.2	17.9	18.2	18.4	17.3	18.6	18.2	17.7	17.9	17.5
	1978-1992	na	18.6	19.1	19.2	19.3	19.1	18.7	19.3	19.0	19.2	19.3
	1992-1998	na	19.2	19.1	19.1	18.9	19.2	19.2	19.3	18.6	19.0	19.4
	Post-1998	na	19.3	19.2	19.3	19.2	19.1	19.2	19.2	18.7	19.4	19.4
Gas therms	Pre-1978	0.3	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.2
	1978-1992	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1
	1992-1998	0.1	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2
	Post-1998	0.1	0.1	0.0	0.1	0.1	0.3	0.1	0.1	0.3	0.1	0.2

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	639.6	2607.9	4036.7	1754.4	898.3	1717.6	2572.7	4049.2	1346.5	2128.5	9090.2
	1978-1992	90.6	1738.1	2587.3	919.7	332.1	1120.0	1942.3	2170.3	847.0	997.6	5080.6
	1992-1998	83.6	1411.8	2046.1	956.9	397.2	1133.9	1458.4	1699.5	888.2	1025.2	3706.8
	Post-1998	52.7	1445.7	2067.4	967.3	402.5	1159.7	1464.2	1669.7	920.8	1015.8	3583.5
Peak1 kW/unit	Pre-1978	0.0	4.2	4.6	3.0	2.2	3.1	4.1	5.3	2.4	3.6	7.5
	1978-1992	0.0	2.4	2.5	1.3	1.1	1.8	2.5	2.5	1.4	1.7	3.9
	1992-1998	0.0	1.8	1.9	1.3	1.1	1.6	1.8	1.7	1.3	1.7	2.6
	Post-1998	0.0	1.8	1.8	1.2	1.1	1.5	1.7	1.6	1.2	1.5	2.4
Gas therms	Pre-1978	283.9	242.7	222.6	200.9	203.8	97.9	117.8	163.7	88.6	230.1	115.1
	1978-1992	86.5	98.8	85.9	42.5	53.3	17.2	27.3	28.8	13.7	47.3	17.2
	1992-1998	75.0	49.8	41.7	36.6	45.4	9.8	10.4	5.4	7.2	42.9	2.3
	Post-1998	59.1	39.1	32.2	26.4	33.4	5.7	6.0	2.7	3.7	32.1	1.0

Multi-Family Measure Savings

80 AFUE to Condensing 90 AFUE Furnace

Measure base: 80 AFUE furnace

Measure description: 90 AFUE Furnace

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	28	24	22	19	20	9	11	16	9	22	11	
	1978-1992	8	10	8	4	5	2	3	3	1	5	2	
	1992-1998	7	5	4	4	4	1	1	1	1	4	0	
	Post-1998	6	4	3	3	3	1	1	0	0	3	0	
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas therms	Pre-1978	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
	1978-1992	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
	1992-1998	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
	Post-1998	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1

Base Values	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	627.4	2184.9	3358.4	1488.3	794.7	1437.7	2146.7	3377.5	1131.1	1822.4	7519.2	
	1978-1992	87.6	1281.5	1897.4	711.9	264.2	820.0	1502.1	1592.1	621.2	776.0	3703.9	
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3	
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8	
Peak1 kW/unit	Pre-1978	0.0	3.5	3.8	2.5	1.8	2.6	3.4	4.4	2.0	3.0	6.3	
	1978-1992	0.0	1.7	1.8	1.0	0.8	1.3	2.0	1.8	1.0	1.3	2.8	
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8	
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7	
Gas therms	Pre-1978	247.9	212.1	194.5	175.4	177.9	85.4	102.9	143.1	77.3	201.0	100.6	
	1978-1992	75.6	86.4	75.1	37.2	46.5	15.0	23.9	25.2	11.9	41.3	15.1	
	1992-1998	65.5	43.6	36.5	31.9	39.7	8.5	9.1	4.7	6.3	37.5	2.0	
	Post-1998	51.7	34.2	28.2	23.1	29.2	5.0	5.2	2.4	3.3	28.1	0.9	

Multi-Family Measure Savings

80 AFUE to Condensing 92 AFUE Furnace

Measure base: 80 AFUE furnace

Measure description: 92 AFUE Furnace

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	32	28	25	23	23	11	13	19	10	26	13	
	1978-1992	10	11	10	5	6	2	3	3	2	5	2	
	1992-1998	9	6	5	4	5	1	1	1	1	5	0	
	Post-1998	7	4	4	3	4	1	1	0	0	4	0	
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas therms	Pre-1978	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
	1978-1992	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
	1992-1998	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
	Post-1998	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	627.4	2184.9	3358.4	1488.3	794.7	1437.7	2146.7	3377.5	1131.1	1822.4	7519.2
	1978-1992	87.6	1281.5	1897.4	711.9	264.2	820.0	1502.1	1592.1	621.2	776.0	3703.9
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.5	3.8	2.5	1.8	2.6	3.4	4.4	2.0	3.0	6.3
	1978-1992	0.0	1.7	1.8	1.0	0.8	1.3	2.0	1.8	1.0	1.3	2.8
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	247.9	212.1	194.5	175.4	177.9	85.4	102.9	143.1	77.3	201.0	100.6
	1978-1992	75.6	86.4	75.1	37.2	46.5	15.0	23.9	25.2	11.9	41.3	15.1
	1992-1998	65.5	43.6	36.5	31.9	39.7	8.5	9.1	4.7	6.3	37.5	2.0
	Post-1998	51.7	34.2	28.2	23.1	29.2	5.0	5.2	2.4	3.3	28.1	0.9

Multi-Family Measure Savings

80 AFUE to Condensing 94 AFUE Furnace

Measure base: 80 AFUE furnace

Measure description: 94 AFUE Furnace

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	37	32	29	26	27	13	15	21	12	30	15	
	1978-1992	11	13	11	6	7	2	4	4	2	6	2	
	1992-1998	10	6	5	5	6	1	1	1	1	6	0	
	Post-1998	8	5	4	3	4	1	1	0	0	4	0	
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas therms	Pre-1978	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
	1978-1992	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
	1992-1998	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
	Post-1998	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	627.4	2184.9	3358.4	1488.3	794.7	1437.7	2146.7	3377.5	1131.1	1822.4	7519.2
	1978-1992	87.6	1281.5	1897.4	711.9	264.2	820.0	1502.1	1592.1	621.2	776.0	3703.9
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.5	3.8	2.5	1.8	2.6	3.4	4.4	2.0	3.0	6.3
	1978-1992	0.0	1.7	1.8	1.0	0.8	1.3	2.0	1.8	1.0	1.3	2.8
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	247.9	212.1	194.5	175.4	177.9	85.4	102.9	143.1	77.3	201.0	100.6
	1978-1992	75.6	86.4	75.1	37.2	46.5	15.0	23.9	25.2	11.9	41.3	15.1
	1992-1998	65.5	43.6	36.5	31.9	39.7	8.5	9.1	4.7	6.3	37.5	2.0
	Post-1998	51.7	34.2	28.2	23.1	29.2	5.0	5.2	2.4	3.3	28.1	0.9

Multi-Family Measure Savings

80 AFUE to Condensing 96 AFUE Furnace

Measure base: 80 AFUE furnace

Measure description: 96 AFUE Furnace

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	41	35	32	29	30	14	17	24	13	33	17	
	1978-1992	13	14	13	6	8	3	4	4	2	7	3	
	1992-1998	11	7	6	5	7	1	2	1	1	6	0	
	Post-1998	9	6	5	4	5	1	1	0	1	5	0	
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	na	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gas therms	Pre-1978	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
	1978-1992	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
	1992-1998	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
	Post-1998	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	627.4	2184.9	3358.4	1488.3	794.7	1437.7	2146.7	3377.5	1131.1	1822.4	7519.2
	1978-1992	87.6	1281.5	1897.4	711.9	264.2	820.0	1502.1	1592.1	621.2	776.0	3703.9
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.5	3.8	2.5	1.8	2.6	3.4	4.4	2.0	3.0	6.3
	1978-1992	0.0	1.7	1.8	1.0	0.8	1.3	2.0	1.8	1.0	1.3	2.8
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	247.9	212.1	194.5	175.4	177.9	85.4	102.9	143.1	77.3	201.0	100.6
	1978-1992	75.6	86.4	75.1	37.2	46.5	15.0	23.9	25.2	11.9	41.3	15.1
	1992-1998	65.5	43.6	36.5	31.9	39.7	8.5	9.1	4.7	6.3	37.5	2.0
	Post-1998	51.7	34.2	28.2	23.1	29.2	5.0	5.2	2.4	3.3	28.1	0.9

Multi-Family Measure Savings

Duct Repair

Measure base: 20% duct leakage

Measure description: 6% duct leakage

50% of duct loss is lost to outside

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	17.0	151.1	239.0	96.5	41.9	98.6	152.3	240.9	76.6	111.5	545.9
	1978-1992	3.4	95.7	142.0	53.8	18.5	62.4	114.6	119.6	46.7	58.0	281.4
	1992-1998	3.3	75.5	108.1	50.4	20.2	60.4	76.9	91.2	46.1	53.5	195.1
	Post-1998	2.1	75.7	109.2	51.3	20.1	61.8	78.6	87.3	48.5	53.9	188.6
Peak1 kW/unit	Pre-1978	0.00	0.22	0.22	0.16	0.13	0.13	0.23	0.28	0.11	0.18	0.32
	1978-1992	0.00	0.12	0.14	0.08	0.06	0.09	0.13	0.14	0.07	0.10	0.21
	1992-1998	0.00	0.09	0.10	0.07	0.05	0.08	0.09	0.09	0.06	0.08	0.14
	Post-1998	0.00	0.09	0.10	0.07	0.06	0.08	0.09	0.08	0.06	0.08	0.13
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	2.7	6.6	6.8	6.2	5.1	6.5	6.7	6.8	6.5	5.9	6.9
	1978-1992	3.8	7.0	7.0	7.1	6.6	7.1	7.1	7.0	7.0	7.0	7.1
	1992-1998	3.9	7.2	7.1	7.1	6.6	7.2	7.1	7.2	7.0	6.9	7.1
	Post-1998	4.0	7.0	7.1	7.1	6.6	7.2	7.2	7.0	7.1	7.1	7.1
Peak1 kW/unit	Pre-1978	na	6.0	5.6	6.0	6.9	4.8	6.3	6.1	5.5	5.8	4.9
	1978-1992	na	6.3	6.9	7.1	7.2	6.9	6.4	7.1	6.9	7.1	7.0
	1992-1998	na	7.0	6.9	7.0	6.7	7.1	7.0	7.2	6.5	6.8	7.1
	Post-1998	na	7.1	7.0	7.1	7.1	6.9	7.1	7.1	6.6	7.2	7.1
Gas therms	Pre-1978	0.3	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.2
	1978-1992	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1
	1992-1998	0.1	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2
	Post-1998	0.1	0.1	0.0	0.1	0.1	0.3	0.1	0.1	0.3	0.1	0.2

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	639.6	2294.8	3532.3	1559.8	825.2	1509.5	2257.6	3552.6	1186.8	1903.6	7916.6
	1978-1992	90.6	1367.8	2025.8	759.8	280.9	876.5	1603.0	1700.4	663.0	827.4	3956.8
	1992-1998	83.6	1052.6	1520.0	713.7	305.2	842.9	1085.3	1266.5	660.2	770.5	2744.9
	Post-1998	52.7	1076.2	1534.5	719.9	304.9	861.5	1089.0	1243.8	683.7	760.6	2653.6
Peak1 kW/unit	Pre-1978	0.0	3.6	4.0	2.6	1.9	2.7	3.6	4.6	2.1	3.1	6.5
	1978-1992	0.0	1.9	2.0	1.1	0.9	1.4	2.1	1.9	1.1	1.4	3.0
	1992-1998	0.0	1.3	1.4	1.0	0.8	1.2	1.3	1.2	0.9	1.2	1.9
	Post-1998	0.0	1.3	1.4	0.9	0.8	1.1	1.3	1.2	0.9	1.1	1.8
Gas therms	Pre-1978	283.9	242.7	222.6	200.9	203.8	97.9	117.8	163.7	88.6	230.1	115.1
	1978-1992	81.8	93.5	81.3	40.2	50.4	16.3	25.8	27.3	12.9	44.7	16.3
	1992-1998	71.9	47.8	40.0	35.1	43.5	9.4	10.0	5.2	6.9	41.1	2.2
	Post-1998	56.6	37.5	30.9	25.3	32.0	5.5	5.7	2.6	3.6	30.8	1.0

Multi-Family Measure Savings

Ceiling R-19 to R-30 batts

Measure base: R-19 Ceiling insulation (between attic and house)

Measure description: R-30 Ceiling insulation

Measure units: Ceiling Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
	1978-1992	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.2
	1992-1998	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.2
	Post-1998	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.2
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	473.5	487.0	487.0	473.5	473.5	463.0	542.5	633.5	463.0	473.5	633.5	
	1978-1992	512.0	511.0	511.0	512.0	512.0	579.5	647.5	632.5	579.5	512.0	632.5	
	1992-1998	430.0	450.0	450.0	430.0	430.0	515.0	480.0	480.0	515.0	430.0	480.0	
	Post-1998	440.0	475.0	475.0	440.0	440.0	537.5	500.0	485.0	537.5	440.0	485.0	

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	8.0	4.0	3.5	4.8	5.4	4.1	3.7	3.3	4.3	4.2	2.5
	1978-1992	15.6	3.2	3.3	4.2	5.3	4.0	2.8	3.5	4.1	4.4	3.1
	1992-1998	12.8	3.1	3.5	3.1	3.9	3.6	2.5	3.0	3.1	3.3	2.9
	Post-1998	14.1	3.3	3.7	3.2	3.1	3.3	2.8	2.9	3.1	3.2	3.0
Peak1 kW/unit	Pre-1978	na	3.5	3.7	4.0	3.2	4.0	3.9	3.7	2.5	2.8	2.8
	1978-1992	na	3.7	4.1	4.9	3.8	5.6	4.2	5.1	4.0	3.9	3.6
	1992-1998	na	4.3	4.2	3.3	3.3	5.2	4.2	4.8	3.3	3.3	3.8
	Post-1998	na	4.5	5.0	3.3	3.1	5.5	4.1	5.8	3.4	3.7	4.1
Gas therms	Pre-1978	5.0	5.1	5.1	6.4	5.5	8.1	8.7	8.2	9.1	5.8	10.6
	1978-1992	11.5	8.5	8.7	15.3	12.7	18.8	14.3	15.9	19.4	15.3	18.8
	1992-1998	9.8	11.9	12.4	12.9	10.9	19.8	18.2	24.1	20.8	12.3	34.1
	Post-1998	12.1	14.7	15.3	16.0	13.4	25.2	24.1	32.2	27.5	15.1	45.8

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	194.3	1173.9	2003.2	673.1	231.8	766.6	1174.5	1941.0	542.9	821.9	4989.5
	1978-1992	87.6	1287.9	1905.6	711.9	264.2	820.0	1493.5	1592.1	621.2	776.0	3703.9
	1992-1998	91.8	1018.0	1476.5	680.8	293.4	807.8	1029.7	1220.6	630.4	737.6	2643.2
	Post-1998	58.7	1043.4	1493.7	688.1	292.3	823.5	1034.5	1198.7	651.8	726.4	2559.8
Peak1 kW/unit	Pre-1978	0.0	2.1	2.3	1.3	1.0	1.5	1.9	2.5	1.1	1.7	4.0
	1978-1992	0.0	1.8	1.9	1.0	0.8	1.3	1.9	1.8	1.0	1.3	2.8
	1992-1998	0.0	1.3	1.4	0.9	0.8	1.1	1.3	1.2	0.9	1.2	1.9
	Post-1998	0.0	1.3	1.4	0.9	0.8	1.1	1.2	1.2	0.9	1.1	1.8
Gas therms	Pre-1978	148.1	120.5	110.8	88.2	96.7	33.5	36.9	54.8	26.5	104.3	30.8
	1978-1992	81.8	94.5	82.2	40.2	50.3	16.3	25.2	27.3	12.9	44.7	16.3
	1992-1998	79.7	57.1	48.2	40.2	48.8	11.6	12.2	7.6	8.7	46.8	4.1
	Post-1998	64.4	47.0	39.1	30.1	36.9	7.3	7.6	4.5	4.9	36.3	2.3

Multi-Family Measure Savings

Ceiling R-19 to R-38 batts

Measure base: R-19 Ceiling insulation (between attic and house)

Measure description: R-38 Ceiling insulation

Measure units: Ceiling Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.3
	1978-1992	0.0	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.3
	1992-1998	0.0	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
	Post-1998	0.0	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	473.5	487.0	487.0	473.5	473.5	463.0	542.5	633.5	463.0	473.5	633.5	
	1978-1992	512.0	511.0	511.0	512.0	512.0	579.5	647.5	632.5	579.5	512.0	632.5	
	1992-1998	430.0	450.0	450.0	430.0	430.0	515.0	480.0	480.0	515.0	430.0	480.0	
	Post-1998	440.0	475.0	475.0	440.0	440.0	537.5	500.0	485.0	537.5	440.0	485.0	

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	10.9	5.4	4.9	6.6	7.5	5.7	5.3	4.6	6.1	5.8	3.5
	1978-1992	19.8	4.6	4.5	6.0	7.2	5.6	4.1	4.7	5.7	6.0	4.3
	1992-1998	17.0	4.4	4.8	4.1	5.0	4.7	3.5	4.2	4.4	4.8	4.0
	Post-1998	18.3	4.6	5.1	4.3	4.4	4.6	3.8	4.1	4.5	4.3	4.2
Peak1 kW/unit	Pre-1978	na	4.8	5.1	5.6	4.8	5.7	5.3	5.0	3.5	4.0	3.8
	1978-1992	na	5.2	5.7	7.1	5.4	7.9	5.7	6.9	5.5	5.7	4.9
	1992-1998	na	6.0	5.9	4.7	4.4	7.2	5.4	6.3	4.5	4.4	5.3
	Post-1998	na	6.4	6.9	4.9	4.1	7.9	5.5	7.9	4.8	5.1	5.5
Gas therms	Pre-1978	6.9	7.1	7.1	8.8	7.7	11.2	11.9	11.4	12.5	8.1	14.6
	1978-1992	15.8	11.8	12.1	20.8	17.4	25.1	19.4	21.4	25.7	20.8	25.3
	1992-1998	13.6	16.4	17.0	17.5	14.9	26.1	24.4	31.8	27.5	16.8	44.8
	Post-1998	16.6	20.2	21.0	21.5	18.0	32.6	31.3	42.2	35.7	20.5	57.3

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	194.3	1173.9	2003.2	673.1	231.8	766.6	1174.5	1941.0	542.9	821.9	4989.5
	1978-1992	87.6	1287.9	1905.6	711.9	264.2	820.0	1493.5	1592.1	621.2	776.0	3703.9
	1992-1998	91.8	1018.0	1476.5	680.8	293.4	807.8	1029.7	1220.6	630.4	737.6	2643.2
	Post-1998	58.7	1043.4	1493.7	688.1	292.3	823.5	1034.5	1198.7	651.8	726.4	2559.8
Peak1 kW/unit	Pre-1978	0.0	2.1	2.3	1.3	1.0	1.5	1.9	2.5	1.1	1.7	4.0
	1978-1992	0.0	1.8	1.9	1.0	0.8	1.3	1.9	1.8	1.0	1.3	2.8
	1992-1998	0.0	1.3	1.4	0.9	0.8	1.1	1.3	1.2	0.9	1.2	1.9
	Post-1998	0.0	1.3	1.4	0.9	0.8	1.1	1.2	1.2	0.9	1.1	1.8
Gas therms	Pre-1978	148.1	120.5	110.8	88.2	96.7	33.5	36.9	54.8	26.5	104.3	30.8
	1978-1992	81.8	94.5	82.2	40.2	50.3	16.3	25.2	27.3	12.9	44.7	16.3
	1992-1998	79.7	57.1	48.2	40.2	48.8	11.6	12.2	7.6	8.7	46.8	4.1
	Post-1998	64.4	47.0	39.1	30.1	36.9	7.3	7.6	4.5	4.9	36.3	2.3

Multi-Family Measure Savings

Ceiling R-30 to R-38 batts

Measure base: R-30 Ceiling insulation (between attic and house)

Measure description: R-38 Ceiling insulation

Measure units: Ceiling Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	473.5	487.0	487.0	473.5	473.5	463.0	542.5	633.5	463.0	473.5	633.5	
	1978-1992	512.0	511.0	511.0	512.0	512.0	579.5	647.5	632.5	579.5	512.0	632.5	
	1992-1998	430.0	450.0	450.0	430.0	430.0	515.0	480.0	480.0	515.0	430.0	480.0	
	Post-1998	440.0	475.0	475.0	440.0	440.0	537.5	500.0	485.0	537.5	440.0	485.0	

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	3.2	1.5	1.4	1.8	2.2	1.6	1.6	1.3	1.9	1.7	1.0
	1978-1992	5.1	1.4	1.3	1.9	2.0	1.7	1.4	1.3	1.7	1.6	1.2
	1992-1998	4.9	1.3	1.4	1.0	1.1	1.2	1.1	1.2	1.3	1.6	1.2
	Post-1998	4.9	1.3	1.5	1.2	1.3	1.4	1.0	1.2	1.4	1.1	1.2
Peak1 kW/unit	Pre-1978	na	1.4	1.5	1.6	1.6	1.8	1.5	1.4	1.0	1.2	1.1
	1978-1992	na	1.6	1.7	2.3	1.7	2.4	1.5	1.9	1.5	1.9	1.4
	1992-1998	na	1.8	1.8	1.5	1.1	2.2	1.2	1.5	1.3	1.1	1.5
	Post-1998	na	2.0	2.0	1.7	1.1	2.5	1.4	2.2	1.4	1.4	1.5
Gas therms	Pre-1978	2.0	2.1	2.1	2.6	2.3	3.3	3.5	3.4	3.7	2.4	4.4
	1978-1992	4.9	3.6	3.7	6.6	5.3	7.7	5.9	6.5	7.9	6.5	7.9
	1992-1998	4.1	5.1	5.3	5.4	4.5	7.9	7.6	10.1	8.4	5.1	16.3
	Post-1998	5.1	6.4	6.7	6.6	5.4	9.9	9.4	14.7	11.3	6.4	21.2

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	178.8	1127.2	1932.8	640.7	219.3	735.2	1130.9	1876.4	519.5	787.3	4863.0
	1978-1992	73.9	1246.5	1843.5	681.8	250.1	786.9	1451.5	1536.8	596.0	741.9	3589.4
	1992-1998	80.1	986.0	1424.5	659.7	282.1	778.6	1003.9	1183.7	610.6	713.6	2566.5
	Post-1998	50.5	1008.4	1438.4	666.5	283.3	796.7	1005.9	1163.5	631.6	703.2	2482.0
Peak1 kW/unit	Pre-1978	0.0	2.0	2.2	1.3	0.9	1.5	1.9	2.4	1.1	1.7	3.9
	1978-1992	0.0	1.7	1.8	1.0	0.8	1.2	1.9	1.7	0.9	1.3	2.7
	1992-1998	0.0	1.3	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.3	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	140.7	114.3	105.1	82.5	91.3	30.8	33.7	50.3	24.1	98.2	27.6
	1978-1992	72.4	86.5	75.0	34.0	43.9	13.2	21.6	22.9	10.4	37.8	13.2
	1992-1998	71.8	50.3	42.2	35.0	43.5	9.3	10.0	5.8	6.9	41.1	2.7
	Post-1998	56.6	40.0	33.1	25.3	32.0	5.4	5.7	3.0	3.6	30.8	1.2

Multi-Family Measure Savings

Wall 2x4 R-13 to 2x4 R-15

Measure base: 2x4 wall with R-13 cavity insulation

Measure description: 2x4 wall, R-13 cavity insulation, R-2 sheathing

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	446.1	463.5	463.5	446.1	446.1	493.0	475.5	468.3	493.0	446.1	468.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	17.9	0.3	0.8	-0.8	-0.4	-0.7	-0.1	0.1	-1.2	-0.1	1.1
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	1.8	2.3	1.4	0.6	1.6	1.7	2.1	0.8	1.6	1.9
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	9.8	10.8	11.8	13.7	11.9	21.2	20.9	24.9	24.6	13.3	29.2

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	62.6	998.1	1445.3	660.7	280.9	790.0	1004.9	1149.8	623.6	702.4	2526.2
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.3	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	63.3	50.7	43.1	29.6	36.7	7.1	7.4	6.8	4.9	35.9	2.9

Multi-Family Measure Savings

Wall 2x4 R-13 to 2x6 R-19

Measure base: 2x4 wall with R-13 cavity insulation

Measure description: 2x6 wall with R-19 cavity insulation

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	446.1	463.5	463.5	446.1	446.1	493.0	475.5	468.3	493.0	446.1	468.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	32.2	0.1	1.4	-2.2	-3.1	-1.9	-0.7	-0.2	-2.8	-1.0	2.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	3.3	4.0	2.3	1.0	2.8	2.8	3.5	1.6	2.9	3.6
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	19.0	20.9	22.7	25.9	22.5	38.6	37.9	44.8	43.9	25.4	50.8

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	62.6	998.1	1445.3	660.7	280.9	790.0	1004.9	1149.8	623.6	702.4	2526.2
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.3	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	63.3	50.7	43.1	29.6	36.7	7.1	7.4	6.8	4.9	35.9	2.9

Multi-Family Measure Savings

Wall 2x4 R-13 to 2x6 R-21

Measure base: 2x4 wall with R-13 cavity insulation

Measure description: 2x6 wall with R-19 cavity ins., R-2 sheathing

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	446.1	463.5	463.5	446.1	446.1	493.0	475.5	468.3	493.0	446.1	468.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	40.1	0.3	1.9	-2.6	-3.8	-2.0	-0.7	0.1	-3.1	-0.6	2.5
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	4.5	5.2	3.3	2.1	3.8	3.9	5.1	2.2	4.1	4.7
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	23.8	26.1	28.4	32.3	28.1	47.2	46.3	54.7	53.5	31.6	60.2

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	62.6	998.1	1445.3	660.7	280.9	790.0	1004.9	1149.8	623.6	702.4	2526.2
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.3	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	63.3	50.7	43.1	29.6	36.7	7.1	7.4	6.8	4.9	35.9	2.9

Multi-Family Measure Savings

Wall 2x4 R-15 to 2x6 R-19

Measure base: 2x4 wall, R-13 cavity insulation, R-2 sheathing

Measure description: 2x6 wall with R-19 cavity insulation

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	446.1	463.5	463.5	446.1	446.1	493.0	475.5	468.3	493.0	446.1	468.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	17.5	-0.2	0.6	-1.4	-2.6	-1.2	-0.6	-0.4	-1.6	-0.9	0.9
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	1.4	1.7	0.9	0.4	1.1	1.1	1.4	0.8	1.3	1.7
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	10.2	11.3	12.4	14.2	12.1	22.1	21.4	26.5	25.6	14.0	30.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	51.4	994.7	1433.4	666.1	282.1	795.8	1006.1	1148.2	631.2	703.2	2499.3
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.3	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	57.1	45.2	38.0	25.6	32.3	5.6	5.8	5.1	3.7	31.2	2.0

Multi-Family Measure Savings

Wall 2x4 R-15 to 2x6 R-21

Measure base: 2x4 wall, R-13 cavity insulation, R-2 sheathing

Measure description: 2x6 wall with R-19 cavity ins., R-2 sheathing

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	446.1	463.5	463.5	446.1	446.1	493.0	475.5	468.3	493.0	446.1	468.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	27.0	0.0	1.1	-1.8	-3.4	-1.2	-0.5	-0.1	-1.9	-0.5	1.5
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	2.7	3.0	1.9	1.5	2.2	2.3	3.0	1.4	2.5	2.9
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	15.6	17.2	18.8	21.5	18.4	33.0	32.1	39.6	38.3	21.2	43.8

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	51.4	994.7	1433.4	666.1	282.1	795.8	1006.1	1148.2	631.2	703.2	2499.3
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.3	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	57.1	45.2	38.0	25.6	32.3	5.6	5.8	5.1	3.7	31.2	2.0

Multi-Family Measure Savings

Wall 2x6 R-19 to 2x6 R-21

Measure base: 2x6 wall with R-19 cavity insulation

Measure description: 2x6 wall with R-19 cavity ins., R-2 sheathing

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	446.1	463.5	463.5	446.1	446.1	493.0	475.5	468.3	493.0	446.1	468.3

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	11.6	0.2	0.5	-0.4	-0.7	0.0	0.0	0.3	-0.3	0.4	0.6
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	1.3	1.3	1.0	1.1	1.0	1.1	1.6	0.5	1.2	1.2
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	6.0	6.6	7.4	8.6	7.2	13.9	13.6	17.8	17.0	8.4	19.1

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	42.4	997.0	1425.1	675.2	289.6	805.2	1012.0	1152.6	641.3	709.5	2476.7
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.2	1.3	0.8	0.7	1.0	1.2	1.1	0.8	1.0	1.7
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	51.3	40.1	33.3	22.0	28.4	4.3	4.6	3.7	2.7	26.8	1.4

Multi-Family Measure Savings

Wall 2x4 Ext. Rigid Foam R-14 to R-21

Measure base: 2x4 wall, R-13 cavity insulation, R-1 sheathing

Measure description: 2x4 wall, R-13 cavity insulation, R-8 sheathing

Measure units: Wall Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	na	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	446.1	463.5	463.5	446.1	446.1	493.0	475.5	468.3	493.0	446.1	468.3	

Percentage Savings	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	34.5	0.0	1.5	-2.0	-3.3	-1.6	-0.7	-0.1	-2.3	-0.8	2.0	
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	na	3.6	4.0	2.8	1.5	2.8	3.0	4.1	2.1	3.3	3.8	
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	20.0	22.0	24.0	27.3	23.7	40.8	39.9	48.2	46.9	26.8	52.9	

Base Values	Vintage	Forecasting Climate Zones											
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15	
Energy kWh/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	56.3	995.7	1438.0	663.4	281.7	792.7	1005.0	1149.2	629.5	702.5	2511.5	
Peak1 kW/unit	Pre-1978	na	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	0.0	1.3	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7	
Gas therms	Pre-1978	na	na	na	na	na	na	na	na	na	na	na	na
	1978-1992	na	na	na	na	na	na	na	na	na	na	na	na
	1992-1998	na	na	na	na	na	na	na	na	na	na	na	na
	Post-1998	59.9	47.7	40.3	27.4	34.3	6.2	6.5	5.8	4.2	33.3	2.4	

Multi-Family Measure Savings

Low-Income Attic Access Weatherstripping

Measure base: 2 F thermostat setback/setup, 0.42 ACH infiltration

Measure description: Infiltration reduced by 3%

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	1.0	-1.0	0.5	0.0	0.2	-0.7	-0.2	1.1	1.0	-0.2	5.7
	1978-1992	0.5	-2.0	0.5	-0.1	-2.9	-1.4	-2.6	0.7	-3.9	-1.7	4.1
	1992-1998	0.0	-1.6	0.8	-1.0	-1.7	-2.8	-0.6	0.2	-2.6	0.0	2.2
	Post-1998	0.0	-0.5	0.4	-2.6	-1.2	-2.7	-0.8	-1.1	-3.1	-0.7	1.4
Peak1 kW/unit	Pre-1978	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	1978-1992	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Gas therms	Pre-1978	1	1	0	0	1	0	0	0	0	0	0
	1978-1992	1	1	1	0	1	0	0	0	0	0	0
	1992-1998	1	1	0	0	0	0	0	0	0	0	0
	Post-1998	1	1	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.2	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	0.0	0.1
	1978-1992	1.3	-0.2	0.0	0.0	-2.0	-0.2	-0.2	0.0	-0.9	-0.3	0.1
	1992-1998	-0.1	-0.2	0.1	-0.2	-1.0	-0.5	-0.1	0.0	-0.6	0.0	0.1
	Post-1998	0.0	-0.1	0.0	-0.5	-0.7	-0.4	-0.1	-0.1	-0.7	-0.1	0.1
Peak1 kW/unit	Pre-1978	na	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1
	1978-1992	na	0.2	0.3	0.5	0.0	0.1	0.2	0.2	0.2	0.3	0.5
	1992-1998	na	0.3	0.3	0.3	-0.1	0.5	0.2	0.2	0.1	0.3	0.6
	Post-1998	na	0.2	0.4	-0.1	0.3	0.3	0.2	0.3	0.3	0.5	0.6
Gas therms	Pre-1978	0.3	0.3	0.2	0.2	0.4	0.3	0.3	0.2	0.3	0.1	0.3
	1978-1992	1.3	1.0	0.9	1.4	1.8	1.7	1.6	1.1	2.5	0.5	1.8
	1992-1998	1.2	1.6	1.4	1.3	1.7	2.1	2.3	2.4	3.0	0.5	3.7
	Post-1998	1.5	2.1	1.7	1.6	2.1	2.5	3.0	3.6	4.2	0.6	4.4

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	450.1	1794.1	2921.1	1083.7	467.9	1108.9	1730.8	2828.8	808.9	1393.1	6789.4
	1978-1992	36.9	1057.8	1662.7	518.0	142.4	614.2	1231.6	1349.1	414.9	611.5	3363.3
	1992-1998	33.6	818.6	1240.9	499.2	165.4	597.9	833.6	1013.9	430.1	572.7	2319.9
	Post-1998	23.4	842.8	1257.6	509.2	175.2	618.8	842.4	998.5	450.7	571.8	2248.8
Peak1 kW/unit	Pre-1978	0.0	3.3	3.6	2.3	1.5	2.5	3.2	4.1	1.8	2.8	6.1
	1978-1992	0.0	1.7	1.8	0.9	0.7	1.2	1.9	1.7	0.9	1.2	2.7
	1992-1998	0.0	1.2	1.2	0.8	0.7	1.0	1.1	1.1	0.8	1.1	1.7
	Post-1998	0.0	1.2	1.2	0.8	0.7	1.0	1.1	1.0	0.8	1.0	1.6
Gas therms	Pre-1978	242.2	206.3	189.4	166.6	166.6	74.6	90.5	131.8	64.9	195.8	91.3
	1978-1992	58.4	71.0	61.4	25.5	33.0	8.3	13.4	15.0	5.5	28.5	8.7
	1992-1998	51.1	35.0	28.9	22.0	28.1	4.3	4.4	2.1	2.5	26.5	1.0
	Post-1998	39.1	27.1	21.9	15.3	20.2	2.4	2.3	0.9	1.2	18.9	0.5

Multi-Family Measure Savings

Low-Income Caulking

Measure base: 2 F thermostat setback/setup, 0.42 ACH infiltration

Measure description: Infiltration reduced by 3%

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	1.0	-1.0	0.5	0.0	0.2	-0.7	-0.2	1.1	1.0	-0.2	5.7
	1978-1992	0.5	-2.0	0.5	-0.1	-2.9	-1.4	-2.6	0.7	-3.9	-1.7	4.1
	1992-1998	0.0	-1.6	0.8	-1.0	-1.7	-2.8	-0.6	0.2	-2.6	0.0	2.2
	Post-1998	0.0	-0.5	0.4	-2.6	-1.2	-2.7	-0.8	-1.1	-3.1	-0.7	1.4
Peak1 kW/unit	Pre-1978	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	1978-1992	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Gas therms	Pre-1978	1	1	0	0	1	0	0	0	0	0	0
	1978-1992	1	1	1	0	1	0	0	0	0	0	0
	1992-1998	1	1	0	0	0	0	0	0	0	0	0
	Post-1998	1	1	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.2	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	0.0	0.1
	1978-1992	1.3	-0.2	0.0	0.0	-2.0	-0.2	-0.2	0.0	-0.9	-0.3	0.1
	1992-1998	-0.1	-0.2	0.1	-0.2	-1.0	-0.5	-0.1	0.0	-0.6	0.0	0.1
	Post-1998	0.0	-0.1	0.0	-0.5	-0.7	-0.4	-0.1	-0.1	-0.7	-0.1	0.1
Peak1 kW/unit	Pre-1978	na	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1
	1978-1992	na	0.2	0.3	0.5	0.0	0.1	0.2	0.2	0.2	0.3	0.5
	1992-1998	na	0.3	0.3	0.3	-0.1	0.5	0.2	0.2	0.1	0.3	0.6
	Post-1998	na	0.2	0.4	-0.1	0.3	0.3	0.2	0.3	0.3	0.5	0.6
Gas therms	Pre-1978	0.3	0.3	0.2	0.2	0.4	0.3	0.3	0.2	0.3	0.1	0.3
	1978-1992	1.3	1.0	0.9	1.4	1.8	1.7	1.6	1.1	2.5	0.5	1.8
	1992-1998	1.2	1.6	1.4	1.3	1.7	2.1	2.3	2.4	3.0	0.5	3.7
	Post-1998	1.5	2.1	1.7	1.6	2.1	2.5	3.0	3.6	4.2	0.6	4.4

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	450.1	1794.1	2921.1	1083.7	467.9	1108.9	1730.8	2828.8	808.9	1393.1	6789.4
	1978-1992	36.9	1057.8	1662.7	518.0	142.4	614.2	1231.6	1349.1	414.9	611.5	3363.3
	1992-1998	33.6	818.6	1240.9	499.2	165.4	597.9	833.6	1013.9	430.1	572.7	2319.9
	Post-1998	23.4	842.8	1257.6	509.2	175.2	618.8	842.4	998.5	450.7	571.8	2248.8
Peak1 kW/unit	Pre-1978	0.0	3.3	3.6	2.3	1.5	2.5	3.2	4.1	1.8	2.8	6.1
	1978-1992	0.0	1.7	1.8	0.9	0.7	1.2	1.9	1.7	0.9	1.2	2.7
	1992-1998	0.0	1.2	1.2	0.8	0.7	1.0	1.1	1.1	0.8	1.1	1.7
	Post-1998	0.0	1.2	1.2	0.8	0.7	1.0	1.1	1.0	0.8	1.0	1.6
Gas therms	Pre-1978	242.2	206.3	189.4	166.6	166.6	74.6	90.5	131.8	64.9	195.8	91.3
	1978-1992	58.4	71.0	61.4	25.5	33.0	8.3	13.4	15.0	5.5	28.5	8.7
	1992-1998	51.1	35.0	28.9	22.0	28.1	4.3	4.4	2.1	2.5	26.5	1.0
	Post-1998	39.1	27.1	21.9	15.3	20.2	2.4	2.3	0.9	1.2	18.9	0.5

Multi-Family Measure Savings

Low-Income Door Weatherstripping

Measure base: 2 F thermostat setback/setup, 0.42 ACH infiltration

Measure description: Infiltration reduced by 9%

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	3.7	-1.0	2.8	-0.1	0.1	-1.2	2.0	2.9	-0.3	0.0	17.4
	1978-1992	1.8	-5.4	1.1	-1.6	-5.0	-5.9	-3.8	0.8	-7.8	-4.0	11.6
	1992-1998	0.7	-2.3	0.4	-4.1	-4.4	-3.9	-0.9	-0.2	-7.6	-1.8	5.7
	Post-1998	0.4	-5.2	-0.1	-3.5	-5.2	-6.1	-2.8	-0.6	-6.8	-2.1	5.5
Peak1 kW/unit	Pre-1978	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.00	0.03
	1978-1992	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.04
	1992-1998	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.03
	Post-1998	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.03
Gas therms	Pre-1978	2	2	1	1	2	1	1	1	1	0	1
	1978-1992	2	2	2	1	2	0	1	0	0	0	0
	1992-1998	2	2	1	1	1	0	0	0	0	0	0
	Post-1998	2	2	1	1	1	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.8	-0.1	0.1	0.0	0.0	-0.1	0.1	0.1	0.0	0.0	0.3
	1978-1992	4.8	-0.5	0.1	-0.3	-3.5	-1.0	-0.3	0.1	-1.9	-0.7	0.3
	1992-1998	2.1	-0.3	0.0	-0.8	-2.7	-0.7	-0.1	0.0	-1.8	-0.3	0.2
	Post-1998	1.7	-0.6	0.0	-0.7	-3.0	-1.0	-0.3	-0.1	-1.5	-0.4	0.2
Peak1 kW/unit	Pre-1978	na	0.3	0.3	0.5	0.5	0.5	0.4	0.4	0.4	0.1	0.4
	1978-1992	na	0.8	0.8	0.8	0.1	0.9	0.6	0.7	0.4	0.9	1.5
	1992-1998	na	1.0	0.8	0.8	-0.3	1.1	0.6	0.5	0.4	0.9	1.7
	Post-1998	na	1.0	1.0	0.4	0.4	0.8	0.6	1.2	0.5	1.0	1.8
Gas therms	Pre-1978	0.8	0.9	0.7	0.7	1.1	0.8	0.9	0.5	1.0	0.2	0.8
	1978-1992	3.8	3.1	2.6	4.2	5.4	5.1	4.8	3.2	7.6	1.5	5.1
	1992-1998	3.5	5.0	4.0	3.9	4.9	6.2	7.0	6.9	9.0	1.4	10.4
	Post-1998	4.4	6.2	5.1	4.9	6.2	7.6	9.1	10.5	12.5	1.7	12.9

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	450.1	1794.1	2921.1	1083.7	467.9	1108.9	1730.8	2828.8	808.9	1393.1	6789.4
	1978-1992	36.9	1057.8	1662.7	518.0	142.4	614.2	1231.6	1349.1	414.9	611.5	3363.3
	1992-1998	33.6	818.6	1240.9	499.2	165.4	597.9	833.6	1013.9	430.1	572.7	2319.9
	Post-1998	23.4	842.8	1257.6	509.2	175.2	618.8	842.4	998.5	450.7	571.8	2248.8
Peak1 kW/unit	Pre-1978	0.0	3.3	3.6	2.3	1.5	2.5	3.2	4.1	1.8	2.8	6.1
	1978-1992	0.0	1.7	1.8	0.9	0.7	1.2	1.9	1.7	0.9	1.2	2.7
	1992-1998	0.0	1.2	1.2	0.8	0.7	1.0	1.1	1.1	0.8	1.1	1.7
	Post-1998	0.0	1.2	1.2	0.8	0.7	1.0	1.1	1.0	0.8	1.0	1.6
Gas therms	Pre-1978	242.2	206.3	189.4	166.6	166.6	74.6	90.5	131.8	64.9	195.8	91.3
	1978-1992	58.4	71.0	61.4	25.5	33.0	8.3	13.4	15.0	5.5	28.5	8.7
	1992-1998	51.1	35.0	28.9	22.0	28.1	4.3	4.4	2.1	2.5	26.5	1.0
	Post-1998	39.1	27.1	21.9	15.3	20.2	2.4	2.3	0.9	1.2	18.9	0.5

Multi-Family Measure Savings

Low-Income Evaporative Cooler Cover

Measure base: 2 F thermostat setback/setup, 0.42 ACH infiltration

Measure description: Infiltration reduced by 2%

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.7	-1.4	0.6	-0.3	0.7	-0.5	0.5	-0.2	0.8	0.3	3.9
	1978-1992	0.4	-0.5	0.6	-0.5	-2.0	-0.4	-1.3	0.9	-1.9	-0.2	2.4
	1992-1998	-0.2	0.1	1.1	-0.6	0.1	-1.9	0.6	1.4	-1.6	0.0	1.8
	Post-1998	-0.1	-1.3	-0.4	-2.2	-0.7	-0.5	-0.7	-0.4	-2.9	-3.5	0.1
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.2	-0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1
	1978-1992	1.0	0.0	0.0	-0.1	-1.4	-0.1	-0.1	0.1	-0.5	0.0	0.1
	1992-1998	-0.5	0.0	0.1	-0.1	0.0	-0.3	0.1	0.1	-0.4	0.0	0.1
	Post-1998	-0.5	-0.2	0.0	-0.4	-0.4	-0.1	-0.1	0.0	-0.7	-0.6	0.0
Peak1 kW/unit	Pre-1978	na	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
	1978-1992	na	0.2	0.2	0.2	-0.1	0.0	0.2	0.2	0.0	0.3	0.3
	1992-1998	na	0.2	0.2	0.3	-0.1	0.2	0.1	0.0	0.2	0.2	0.4
	Post-1998	na	0.3	0.3	0.0	0.4	0.1	0.2	0.2	0.2	0.3	0.4
Gas therms	Pre-1978	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.2	0.0	0.2
	1978-1992	0.8	0.7	0.6	0.9	1.2	1.2	1.1	0.7	1.7	0.3	1.2
	1992-1998	0.8	1.1	0.9	0.8	1.1	1.4	1.6	1.5	2.0	0.3	2.6
	Post-1998	1.0	1.4	1.2	1.1	1.4	1.7	1.9	2.5	2.8	0.4	2.8

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	450.1	1794.1	2921.1	1083.7	467.9	1108.9	1730.8	2828.8	808.9	1393.1	6789.4
	1978-1992	36.9	1057.8	1662.7	518.0	142.4	614.2	1231.6	1349.1	414.9	611.5	3363.3
	1992-1998	33.6	818.6	1240.9	499.2	165.4	597.9	833.6	1013.9	430.1	572.7	2319.9
	Post-1998	23.4	842.8	1257.6	509.2	175.2	618.8	842.4	998.5	450.7	571.8	2248.8
Peak1 kW/unit	Pre-1978	0.0	3.3	3.6	2.3	1.5	2.5	3.2	4.1	1.8	2.8	6.1
	1978-1992	0.0	1.7	1.8	0.9	0.7	1.2	1.9	1.7	0.9	1.2	2.7
	1992-1998	0.0	1.2	1.2	0.8	0.7	1.0	1.1	1.1	0.8	1.1	1.7
	Post-1998	0.0	1.2	1.2	0.8	0.7	1.0	1.1	1.0	0.8	1.0	1.6
Gas therms	Pre-1978	242.2	206.3	189.4	166.6	166.6	74.6	90.5	131.8	64.9	195.8	91.3
	1978-1992	58.4	71.0	61.4	25.5	33.0	8.3	13.4	15.0	5.5	28.5	8.7
	1992-1998	51.1	35.0	28.9	22.0	28.1	4.3	4.4	2.1	2.5	26.5	1.0
	Post-1998	39.1	27.1	21.9	15.3	20.2	2.4	2.3	0.9	1.2	18.9	0.5

Multi-Family Measure Savings

Low-Income Outlet Gasket

Measure base: 2 F thermostat setback/setup, 0.42 ACH infiltration

Measure description: Infiltration reduced by 1%

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.2	-0.8	0.0	-0.1	-0.3	-0.1	0.3	-0.4	-0.1	0.0	1.9
	1978-1992	0.3	-1.2	0.8	-0.4	-2.0	-0.3	-3.6	1.1	-3.9	-1.7	1.3
	1992-1998	-0.3	-0.1	0.3	-0.3	-0.3	-1.5	-0.5	0.3	0.4	0.3	0.8
	Post-1998	-0.2	-1.0	-0.1	-1.7	0.2	-2.4	-0.1	-0.1	-0.5	-1.0	0.9
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.9	-0.1	0.0	-0.1	-1.4	-0.1	-0.3	0.1	-0.9	-0.3	0.0
	1992-1998	-0.9	0.0	0.0	-0.1	-0.2	-0.3	-0.1	0.0	0.1	0.1	0.0
	Post-1998	-0.9	-0.1	0.0	-0.3	0.1	-0.4	0.0	0.0	-0.1	-0.2	0.0
Peak1 kW/unit	Pre-1978	na	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
	1978-1992	na	0.1	0.1	0.3	-0.4	0.0	0.0	0.1	0.1	0.1	0.2
	1992-1998	na	0.0	0.1	0.2	-0.4	0.2	0.0	0.0	0.1	0.2	0.2
	Post-1998	na	0.1	0.1	-0.2	0.4	0.1	0.2	0.1	0.2	0.3	0.2
Gas therms	Pre-1978	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
	1978-1992	0.4	0.3	0.3	0.5	0.6	0.6	0.5	0.4	0.9	0.2	0.6
	1992-1998	0.4	0.5	0.5	0.4	0.5	0.7	0.8	0.8	1.0	0.2	1.3
	Post-1998	0.5	0.7	0.6	0.6	0.7	0.8	1.0	1.2	1.4	0.2	1.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	450.1	1794.1	2921.1	1083.7	467.9	1108.9	1730.8	2828.8	808.9	1393.1	6789.4
	1978-1992	36.9	1057.8	1662.7	518.0	142.4	614.2	1231.6	1349.1	414.9	611.5	3363.3
	1992-1998	33.6	818.6	1240.9	499.2	165.4	597.9	833.6	1013.9	430.1	572.7	2319.9
	Post-1998	23.4	842.8	1257.6	509.2	175.2	618.8	842.4	998.5	450.7	571.8	2248.8
Peak1 kW/unit	Pre-1978	0.0	3.3	3.6	2.3	1.5	2.5	3.2	4.1	1.8	2.8	6.1
	1978-1992	0.0	1.7	1.8	0.9	0.7	1.2	1.9	1.7	0.9	1.2	2.7
	1992-1998	0.0	1.2	1.2	0.8	0.7	1.0	1.1	1.1	0.8	1.1	1.7
	Post-1998	0.0	1.2	1.2	0.8	0.7	1.0	1.1	1.0	0.8	1.0	1.6
Gas therms	Pre-1978	242.2	206.3	189.4	166.6	166.6	74.6	90.5	131.8	64.9	195.8	91.3
	1978-1992	58.4	71.0	61.4	25.5	33.0	8.3	13.4	15.0	5.5	28.5	8.7
	1992-1998	51.1	35.0	28.9	22.0	28.1	4.3	4.4	2.1	2.5	26.5	1.0
	Post-1998	39.1	27.1	21.9	15.3	20.2	2.4	2.3	0.9	1.2	18.9	0.5

Multi-Family Measure Savings

Whole House Fans

Measure base: Natural Ventilation only

Measure description: Night-time forced ventilation

Measure units: House

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-3.5	101.4	81.9	125.3	110.2	144.2	106.3	118.9	145.5	87.4	56.8
	1978-1992	-1.6	192.7	161.6	228.9	113.9	244.6	215.8	194.8	226.8	167.3	95.6
	1992-1998	-2.5	189.4	161.3	195.7	124.1	239.2	165.6	185.0	225.3	148.7	87.1
	Post-1998	-1.1	208.7	175.4	214.6	141.9	259.3	180.5	198.0	244.8	160.6	91.1
Peak1 kW/unit	Pre-1978	0.00	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.00
	1978-1992	0.00	0.02	0.01	0.03	0.03	0.02	0.02	0.03	0.02	0.02	0.00
	1992-1998	0.00	0.01	0.01	0.02	0.02	0.01	0.00	0.02	0.01	0.02	0.00
	Post-1998	0.00	0.02	0.01	0.02	0.03	0.02	0.00	0.02	0.01	0.02	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1978-1992	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1992-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Post-1998	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-0.6	4.6	2.4	8.4	13.9	10.0	4.9	3.5	12.9	4.8	0.8
	1978-1992	-1.8	15.0	8.5	32.1	43.1	29.8	14.4	12.2	36.5	21.6	2.6
	1992-1998	-3.1	19.5	11.5	29.7	44.0	30.7	16.5	15.8	36.9	20.8	3.4
	Post-1998	-2.1	21.0	12.4	32.2	50.1	32.5	17.9	17.2	38.8	22.8	3.7
Peak1 kW/unit	Pre-1978	na	0.2	0.2	0.7	0.8	0.3	0.5	0.3	0.7	0.4	0.0
	1978-1992	na	1.0	0.6	2.9	3.1	1.4	1.0	1.5	1.7	1.5	0.0
	1992-1998	na	1.1	0.9	2.1	2.5	1.3	0.1	1.4	1.4	1.4	0.0
	Post-1998	na	1.2	0.9	2.5	3.8	1.7	0.2	1.8	1.7	1.7	0.0
Gas therms	Pre-1978	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1978-1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1992-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Post-1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	627.4	2184.9	3358.4	1488.3	794.7	1437.7	2146.7	3377.5	1131.1	1822.4	7519.2
	1978-1992	87.6	1281.5	1897.4	711.9	264.2	820.0	1502.1	1592.1	621.2	776.0	3703.9
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.5	3.8	2.5	1.8	2.6	3.4	4.4	2.0	3.0	6.3
	1978-1992	0.0	1.7	1.8	1.0	0.8	1.3	2.0	1.8	1.0	1.3	2.8
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	283.4	242.4	222.3	200.5	203.4	97.7	117.6	163.5	88.4	229.7	115.0
	1978-1992	81.8	93.4	81.2	40.2	50.3	16.3	25.8	27.3	12.9	44.7	16.3
	1992-1998	71.8	47.8	40.0	35.0	43.5	9.3	10.0	5.2	6.9	41.1	2.2
	Post-1998	56.6	37.5	30.9	25.3	32.0	5.4	5.7	2.6	3.6	30.8	1.0

Multi-Family Measure Savings

default window with Sunscreen

Measure base: Default window type by vintage, location

Measure description: Overall shading coefficient multiplied by 0.32

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-1.2	2.8	2.9	2.1	0.9	2.1	2.3	2.4	1.8	2.0	3.4
	1978-1992	-0.6	2.8	2.9	2.5	1.1	2.2	2.4	2.5	2.0	2.4	3.4
	1992-1998	-0.4	2.4	2.5	1.9	1.0	1.9	2.1	2.3	1.7	1.8	3.0
	Post-1998	-0.3	2.4	2.4	2.0	1.1	2.0	2.1	2.3	1.8	1.8	3.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-18.9	12.1	8.3	14.0	11.4	15.5	11.5	10.9	17.2	10.8	6.9
	1978-1992	-62.4	26.6	18.6	31.6	35.6	29.7	25.2	21.2	34.7	27.0	12.1
	1992-1998	-57.8	27.1	19.0	33.9	40.7	31.4	25.3	22.4	36.0	30.0	13.4
	Post-1998	-71.0	27.7	19.5	34.9	45.3	32.2	26.0	23.4	37.0	31.1	14.4
Peak1 kW/unit	Pre-1978	na	4.3	4.5	5.7	10.8	4.5	4.7	5.4	6.9	5.2	4.3
	1978-1992	na	13.1	12.8	14.6	22.5	10.6	12.6	12.9	15.1	12.5	8.1
	1992-1998	na	14.5	14.1	15.8	22.4	12.1	13.6	14.7	18.1	13.3	9.7
	Post-1998	na	15.0	13.4	14.7	22.7	13.4	15.8	15.7	20.3	19.1	11.3
Gas therms	Pre-1978	-10.4	-5.6	-6.0	-7.6	-7.5	-10.8	-10.4	-12.2	-12.7	-6.2	-11.5
	1978-1992	-17.4	-17.4	-19.8	-30.5	-26.3	-47.0	-44.0	-47.9	-59.5	-25.1	-47.6
	1992-1998	-19.6	-21.5	-24.4	-33.5	-29.0	-57.1	-54.2	-72.9	-71.7	-27.3	-81.8
	Post-1998	-23.5	-24.9	-28.7	-41.1	-35.4	-71.2	-68.7	-100.8	-91.2	-32.6	-102.7

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	627.4	2184.9	3358.4	1488.3	794.7	1437.7	2146.7	3377.5	1131.1	1822.4	7519.2
	1978-1992	87.6	1281.5	1897.4	711.9	264.2	820.0	1502.1	1592.1	621.2	776.0	3703.9
	1992-1998	80.1	973.2	1405.0	659.7	282.1	778.6	1003.9	1169.3	610.6	713.6	2536.3
	Post-1998	50.5	995.5	1417.3	666.5	283.3	796.7	1005.9	1149.6	631.6	703.2	2451.8
Peak1 kW/unit	Pre-1978	0.0	3.5	3.8	2.5	1.8	2.6	3.4	4.4	2.0	3.0	6.3
	1978-1992	0.0	1.7	1.8	1.0	0.8	1.3	2.0	1.8	1.0	1.3	2.8
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.7
Gas therms	Pre-1978	283.4	242.4	222.3	200.5	203.4	97.7	117.6	163.5	88.4	229.7	115.0
	1978-1992	81.8	93.4	81.2	40.2	50.3	16.3	25.8	27.3	12.9	44.7	16.3
	1992-1998	71.8	47.8	40.0	35.0	43.5	9.3	10.0	5.2	6.9	41.1	2.2
	Post-1998	56.6	37.5	30.9	25.3	32.0	5.4	5.7	2.6	3.6	30.8	1.0

Multi-Family Measure Savings

Dbl clear windows to Double Pane, Argon Gas

Measure base: Double pane clear windows

Measure description: Double pane clear windows (SC = 0.88)

Argon gas added, U=0.46

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.2	-0.1	0.0	-0.1	0.0	-0.2	-0.1	-0.1	-0.2	0.0	0.2
	1978-1992	0.2	-0.2	-0.1	-0.3	-0.2	-0.3	-0.3	-0.2	-0.3	-0.2	0.1
	1992-1998	0.2	-0.2	-0.1	-0.3	-0.1	-0.2	-0.2	-0.2	-0.3	-0.2	0.1
	Post-1998	0.1	-0.2	-0.1	-0.3	-0.2	-0.3	-0.2	-0.2	-0.3	-0.2	0.1
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	3.9	-0.5	-0.1	-0.8	-0.1	-1.3	-0.6	-0.5	-1.7	-0.3	0.4
	1978-1992	26.3	-2.2	-0.5	-3.7	-6.9	-3.7	-2.9	-1.7	-5.2	-2.4	0.5
	1992-1998	26.2	-2.6	-0.6	-4.6	-6.4	-4.2	-3.0	-2.1	-6.1	-2.9	0.4
	Post-1998	30.1	-2.8	-0.5	-5.2	-9.8	-4.6	-3.2	-2.2	-6.2	-3.9	0.4
Peak1 kW/unit	Pre-1978	na	0.3	0.5	0.2	0.6	0.4	0.4	0.8	-0.3	0.2	0.7
	1978-1992	na	1.2	1.9	0.3	-0.8	1.2	1.1	1.3	0.0	1.1	2.2
	1992-1998	na	1.3	1.8	0.3	-1.1	1.4	1.3	1.5	-0.3	1.1	2.5
	Post-1998	na	1.5	1.9	0.6	-0.8	1.5	1.6	1.7	-0.1	1.5	2.6
Gas therms	Pre-1978	3.2	3.2	3.3	3.5	3.8	4.5	4.1	4.8	5.0	3.1	4.4
	1978-1992	14.0	14.2	15.1	19.0	17.4	29.1	30.0	26.9	33.7	17.3	28.4
	1992-1998	16.5	17.2	18.3	21.7	20.4	31.8	31.5	35.8	36.6	19.3	43.7
	Post-1998	20.5	21.3	22.8	26.9	24.9	39.6	40.0	46.8	48.1	23.7	48.3

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	575.8	2093.3	3240.1	1423.9	741.0	1394.5	2065.9	3232.4	1091.4	1740.1	7167.9
	1978-1992	56.1	1170.6	1754.9	667.6	237.9	788.7	1430.1	1500.6	603.5	721.5	3411.8
	1992-1998	80.9	935.2	1379.2	640.1	272.1	756.4	980.5	1132.7	589.4	697.1	2519.7
	Post-1998	50.7	955.4	1391.1	644.7	270.0	771.9	983.8	1111.2	609.6	685.7	2435.5
Peak1 kW/unit	Pre-1978	0.0	3.4	3.7	2.4	1.7	2.5	3.3	4.2	1.9	2.9	6.0
	1978-1992	0.0	1.6	1.7	1.0	0.8	1.2	1.8	1.6	0.9	1.2	2.5
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.8	0.7	1.0	1.1	1.1	0.8	1.0	1.7
Gas therms	Pre-1978	263.7	225.9	206.7	185.7	187.1	88.5	107.6	147.0	79.5	213.7	103.8
	1978-1992	65.3	77.0	66.5	29.9	38.1	8.7	12.9	14.7	6.2	33.5	8.3
	1992-1998	71.7	54.3	46.1	35.0	43.3	9.3	9.9	7.0	6.8	40.7	3.2
	Post-1998	56.2	43.8	36.8	25.1	31.7	5.4	5.6	3.9	3.5	30.2	1.5

Multi-Family Measure Savings

Dbl clear windows to Heat Mirror

Measure base: Double pane clear windows

Measure description: Heat Mirror 88 between clear glass (SC = .66)

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.4	1.5	1.9	1.0	0.7	0.8	1.2	1.4	0.7	1.2	3.2
	1978-1992	0.3	1.2	1.7	0.8	0.3	0.7	0.9	1.2	0.5	0.9	3.1
	1992-1998	0.4	1.2	1.7	0.6	0.4	0.6	0.8	1.1	0.4	0.8	2.9
	Post-1998	0.3	1.1	1.7	0.6	0.3	0.6	0.9	1.1	0.4	0.7	2.8
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	7.3	6.7	5.5	7.1	9.3	6.2	6.0	6.7	6.5	6.7	6.8
	1978-1992	52.7	12.6	12.1	10.1	12.5	9.4	9.9	10.5	8.5	10.6	11.9
	1992-1998	60.2	13.4	13.0	11.2	16.8	10.4	10.7	11.7	9.5	13.2	13.2
	Post-1998	69.3	13.6	13.7	10.7	13.5	10.3	11.0	12.0	9.0	12.5	13.6
Peak1 kW/unit	Pre-1978	na	5.0	5.7	5.9	6.7	4.4	4.6	6.2	3.5	4.1	5.4
	1978-1992	na	14.2	15.5	10.8	11.0	12.0	14.1	14.3	11.0	13.0	15.1
	1992-1998	na	15.8	16.8	13.6	12.8	14.5	15.0	17.0	12.0	16.1	17.3
	Post-1998	na	17.1	18.1	15.5	14.1	15.6	15.7	17.9	13.2	17.5	18.4
Gas therms	Pre-1978	6.5	6.2	6.7	6.7	7.0	8.1	7.0	8.8	8.2	6.4	7.7
	1978-1992	32.4	33.8	36.4	41.4	37.4	61.1	65.4	58.0	67.8	40.9	58.6
	1992-1998	39.9	41.8	44.8	49.4	45.6	67.3	66.8	76.0	74.3	46.9	79.5
	Post-1998	49.5	52.1	55.8	60.3	56.2	79.8	81.2	90.0	88.7	57.4	85.8

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	575.8	2093.3	3240.1	1423.9	741.0	1394.5	2065.9	3232.4	1091.4	1740.1	7167.9
	1978-1992	56.1	1170.6	1754.9	667.6	237.9	788.7	1430.1	1500.6	603.5	721.5	3411.8
	1992-1998	80.9	935.2	1379.2	640.1	272.1	756.4	980.5	1132.7	589.4	697.1	2519.7
	Post-1998	50.7	955.4	1391.1	644.7	270.0	771.9	983.8	1111.2	609.6	685.7	2435.5
Peak1 kW/unit	Pre-1978	0.0	3.4	3.7	2.4	1.7	2.5	3.3	4.2	1.9	2.9	6.0
	1978-1992	0.0	1.6	1.7	1.0	0.8	1.2	1.8	1.6	0.9	1.2	2.5
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.8	0.7	1.0	1.1	1.1	0.8	1.0	1.7
Gas therms	Pre-1978	263.7	225.9	206.7	185.7	187.1	88.5	107.6	147.0	79.5	213.7	103.8
	1978-1992	65.3	77.0	66.5	29.9	38.1	8.7	12.9	14.7	6.2	33.5	8.3
	1992-1998	71.7	54.3	46.1	35.0	43.3	9.3	9.9	7.0	6.8	40.7	3.2
	Post-1998	56.2	43.8	36.8	25.1	31.7	5.4	5.6	3.9	3.5	30.2	1.5

Multi-Family Measure Savings

Dbl clear windows to Double, High Performance Tint

Measure base: Double pane clear windows

Measure description: "Blue" Tint, SC = 0.57

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-0.6	2.3	2.4	1.8	0.8	1.8	1.9	1.9	1.6	1.5	2.9
	1978-1992	-0.5	2.4	2.4	2.2	1.0	2.0	2.1	2.1	1.8	1.8	3.0
	1992-1998	-0.4	2.3	2.3	1.8	0.9	1.8	2.0	2.1	1.7	1.6	2.9
	Post-1998	-0.3	2.4	2.3	1.9	1.1	1.9	2.0	2.1	1.7	1.6	2.9
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-9.8	10.6	7.1	12.5	10.9	13.7	10.0	9.2	15.5	8.6	6.3
	1978-1992	-74.3	24.9	16.5	28.5	37.4	27.2	23.3	18.3	32.4	22.5	11.6
	1992-1998	-65.0	26.9	17.8	33.6	40.5	30.7	25.0	21.0	36.9	27.3	13.4
	Post-1998	-79.0	28.2	18.8	34.4	46.5	31.6	25.8	21.8	37.5	28.3	14.1
Peak1 kW/unit	Pre-1978	na	4.1	4.5	6.9	7.4	3.7	3.8	4.0	5.4	3.7	3.2
	1978-1992	na	12.7	11.0	13.5	20.9	9.7	11.6	10.9	14.4	11.8	9.6
	1992-1998	na	14.3	13.0	16.8	24.0	11.9	12.9	14.1	17.7	13.4	10.9
	Post-1998	na	15.3	13.6	17.4	25.2	12.6	13.8	13.7	19.2	15.9	11.7
Gas therms	Pre-1978	-6.0	-6.1	-5.9	-7.4	-8.2	-10.6	-9.7	-10.2	-13.0	-5.6	-10.3
	1978-1992	-22.2	-21.6	-22.0	-35.8	-33.9	-62.6	-59.3	-54.2	-86.0	-26.7	-56.1
	1992-1998	-24.4	-24.8	-25.7	-38.7	-36.7	-67.3	-62.4	-70.5	-90.3	-27.9	-83.6
	Post-1998	-29.7	-29.8	-30.7	-48.4	-45.4	-88.2	-84.3	-90.3	-124.1	-33.8	-122.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	575.8	2093.3	3240.1	1423.9	741.0	1394.5	2065.9	3232.4	1091.4	1740.1	7167.9
	1978-1992	56.1	1170.6	1754.9	667.6	237.9	788.7	1430.1	1500.6	603.5	721.5	3411.8
	1992-1998	80.9	935.2	1379.2	640.1	272.1	756.4	980.5	1132.7	589.4	697.1	2519.7
	Post-1998	50.7	955.4	1391.1	644.7	270.0	771.9	983.8	1111.2	609.6	685.7	2435.5
Peak1 kW/unit	Pre-1978	0.0	3.4	3.7	2.4	1.7	2.5	3.3	4.2	1.9	2.9	6.0
	1978-1992	0.0	1.6	1.7	1.0	0.8	1.2	1.8	1.6	0.9	1.2	2.5
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.8	0.7	1.0	1.1	1.1	0.8	1.0	1.7
Gas therms	Pre-1978	263.7	225.9	206.7	185.7	187.1	88.5	107.6	147.0	79.5	213.7	103.8
	1978-1992	65.3	77.0	66.5	29.9	38.1	8.7	12.9	14.7	6.2	33.5	8.3
	1992-1998	71.7	54.3	46.1	35.0	43.3	9.3	9.9	7.0	6.8	40.7	3.2
	Post-1998	56.2	43.8	36.8	25.1	31.7	5.4	5.6	3.9	3.5	30.2	1.5

Multi-Family Measure Savings

Dbl clear windows to Insol-8

Measure base: Double pane clear windows

Measure description: Two Heat Mirror 88 layers between clear glass

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.3	1.9	2.4	1.4	0.9	1.1	1.6	1.8	1.0	1.5	3.7
	1978-1992	0.3	1.7	2.3	1.2	0.6	1.1	1.4	1.7	0.9	1.3	3.7
	1992-1998	0.4	1.7	2.2	1.0	0.6	1.0	1.3	1.6	0.8	1.2	3.5
	Post-1998	0.3	1.7	2.2	1.0	0.6	1.0	1.3	1.7	0.8	1.1	3.5
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	5.1	8.9	7.0	9.6	11.6	8.9	8.2	8.7	9.6	8.6	8.0
	1978-1992	44.4	18.1	15.8	16.2	21.2	15.3	15.2	15.0	15.8	16.2	14.5
	1992-1998	53.0	19.4	17.0	18.8	27.6	17.3	16.6	16.7	17.6	20.0	16.2
	Post-1998	63.5	19.8	17.9	18.6	24.6	17.3	16.7	17.3	17.4	19.4	16.8
Peak1 kW/unit	Pre-1978	na	5.6	6.2	7.1	7.4	5.1	5.4	6.8	4.6	5.2	6.0
	1978-1992	na	16.4	17.5	12.9	13.9	13.8	16.4	16.2	13.5	15.2	16.6
	1992-1998	na	18.2	19.1	16.3	16.8	16.8	17.3	19.5	15.0	18.7	19.1
	Post-1998	na	19.7	20.6	18.4	17.6	17.9	18.1	20.5	16.4	20.0	20.5
Gas therms	Pre-1978	5.0	4.8	5.2	4.9	5.1	5.6	4.7	6.2	5.4	4.8	5.3
	1978-1992	27.3	29.3	31.8	34.5	31.0	53.7	58.1	50.2	59.7	34.9	51.8
	1992-1998	34.5	36.8	39.6	42.5	39.1	59.9	59.4	68.5	66.2	40.9	74.8
	Post-1998	43.8	47.0	50.5	53.6	49.4	74.0	75.7	84.6	83.2	51.2	81.7

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	575.8	2093.3	3240.1	1423.9	741.0	1394.5	2065.9	3232.4	1091.4	1740.1	7167.9
	1978-1992	56.1	1170.6	1754.9	667.6	237.9	788.7	1430.1	1500.6	603.5	721.5	3411.8
	1992-1998	80.9	935.2	1379.2	640.1	272.1	756.4	980.5	1132.7	589.4	697.1	2519.7
	Post-1998	50.7	955.4	1391.1	644.7	270.0	771.9	983.8	1111.2	609.6	685.7	2435.5
Peak1 kW/unit	Pre-1978	0.0	3.4	3.7	2.4	1.7	2.5	3.3	4.2	1.9	2.9	6.0
	1978-1992	0.0	1.6	1.7	1.0	0.8	1.2	1.8	1.6	0.9	1.2	2.5
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.8	0.7	1.0	1.1	1.1	0.8	1.0	1.7
Gas therms	Pre-1978	263.7	225.9	206.7	185.7	187.1	88.5	107.6	147.0	79.5	213.7	103.8
	1978-1992	65.3	77.0	66.5	29.9	38.1	8.7	12.9	14.7	6.2	33.5	8.3
	1992-1998	71.7	54.3	46.1	35.0	43.3	9.3	9.9	7.0	6.8	40.7	3.2
	Post-1998	56.2	43.8	36.8	25.1	31.7	5.4	5.6	3.9	3.5	30.2	1.5

Multi-Family Measure Savings

Dbl clear windows to Double Pane, Med Low-E Coating

Measure base: Double pane clear windows

Measure description: "Low-E Squared", U=0.30, SC = 0.51

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	2.8	3.2	2.0	1.1	1.8	2.3	2.6	1.6	2.1	4.7
	1978-1992	0.1	2.6	3.1	2.0	1.0	1.8	2.2	2.5	1.6	2.0	4.7
	1992-1998	0.2	2.5	2.9	1.7	1.0	1.7	2.1	2.4	1.5	1.8	4.5
	Post-1998	0.2	2.5	3.0	1.7	1.0	1.7	2.1	2.4	1.5	1.8	4.5
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.0	12.6	9.5	14.2	15.0	14.1	11.8	12.2	15.6	11.8	10.1
	1978-1992	17.9	27.2	21.4	27.0	37.1	25.5	24.2	21.8	28.4	24.6	18.1
	1992-1998	28.0	29.2	23.0	31.8	45.1	29.2	26.0	24.5	32.1	30.7	20.5
	Post-1998	39.1	30.0	24.4	32.0	44.7	29.3	26.4	25.2	32.2	30.8	21.3
Peak1 kW/unit	Pre-1978	na	7.5	7.6	9.3	10.7	6.3	6.7	8.0	6.7	6.7	7.1
	1978-1992	na	20.8	20.4	18.0	22.3	16.5	20.6	19.5	18.8	19.6	19.3
	1992-1998	na	23.1	23.5	23.2	26.2	20.1	22.0	23.4	22.1	24.1	22.1
	Post-1998	na	24.8	25.0	24.7	26.9	21.3	23.0	24.3	23.6	25.3	23.7
Gas therms	Pre-1978	1.7	1.4	1.8	0.8	0.8	0.2	-0.4	0.2	-1.0	1.3	-0.1
	1978-1992	14.4	17.0	18.6	16.0	14.4	29.5	34.7	26.4	33.1	18.3	29.7
	1992-1998	19.8	22.6	24.6	22.5	20.9	35.2	35.6	42.2	38.2	23.4	54.8
	Post-1998	26.7	30.2	32.9	31.6	28.6	51.3	51.9	59.6	58.9	31.6	63.0

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	575.8	2093.3	3240.1	1423.9	741.0	1394.5	2065.9	3232.4	1091.4	1740.1	7167.9
	1978-1992	56.1	1170.6	1754.9	667.6	237.9	788.7	1430.1	1500.6	603.5	721.5	3411.8
	1992-1998	80.9	935.2	1379.2	640.1	272.1	756.4	980.5	1132.7	589.4	697.1	2519.7
	Post-1998	50.7	955.4	1391.1	644.7	270.0	771.9	983.8	1111.2	609.6	685.7	2435.5
Peak1 kW/unit	Pre-1978	0.0	3.4	3.7	2.4	1.7	2.5	3.3	4.2	1.9	2.9	6.0
	1978-1992	0.0	1.6	1.7	1.0	0.8	1.2	1.8	1.6	0.9	1.2	2.5
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.8	0.7	1.0	1.1	1.1	0.8	1.0	1.7
Gas therms	Pre-1978	263.7	225.9	206.7	185.7	187.1	88.5	107.6	147.0	79.5	213.7	103.8
	1978-1992	65.3	77.0	66.5	29.9	38.1	8.7	12.9	14.7	6.2	33.5	8.3
	1992-1998	71.7	54.3	46.1	35.0	43.3	9.3	9.9	7.0	6.8	40.7	3.2
	Post-1998	56.2	43.8	36.8	25.1	31.7	5.4	5.6	3.9	3.5	30.2	1.5

Multi-Family Measure Savings

Dbl clear windows to Double, Standard Tint

Measure base: Double pane clear windows

Measure description: "Bronze" Tint, SC = 0.72

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-0.1	1.2	1.3	0.9	0.5	0.9	1.0	1.0	0.8	0.8	1.7
	1978-1992	-0.1	1.2	1.3	1.0	0.5	0.9	1.0	1.0	0.8	0.9	1.8
	1992-1998	0.0	1.2	1.2	0.9	0.5	0.9	1.0	1.0	0.8	0.8	1.7
	Post-1998	0.0	1.2	1.2	0.9	0.6	0.9	1.0	1.0	0.8	0.8	1.7
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-2.1	5.5	3.8	6.4	6.7	6.7	5.1	4.8	7.6	4.7	3.7
	1978-1992	-9.7	12.5	8.9	13.3	19.6	12.5	11.1	9.2	15.1	11.0	6.8
	1992-1998	-4.6	13.5	9.3	15.9	23.7	14.7	12.0	10.5	17.0	13.8	7.8
	Post-1998	-2.3	13.8	10.0	16.0	24.9	14.9	12.5	10.9	17.2	14.0	8.2
Peak1 kW/unit	Pre-1978	na	2.6	2.8	3.7	3.8	2.2	2.3	2.9	2.6	2.3	2.2
	1978-1992	na	7.5	7.2	6.9	10.4	6.1	6.9	6.6	8.0	7.0	6.6
	1992-1998	na	8.5	8.1	9.5	11.5	7.4	7.9	8.8	9.0	9.0	7.5
	Post-1998	na	9.1	8.8	10.0	12.6	7.7	8.7	8.6	10.0	9.3	8.0
Gas therms	Pre-1978	-1.1	-1.1	-1.0	-1.6	-1.8	-2.5	-2.3	-2.1	-3.3	-1.0	-2.3
	1978-1992	-2.0	-1.2	-0.8	-4.4	-4.6	-6.4	-4.3	-4.3	-9.5	-1.5	-4.3
	1992-1998	-1.3	-0.7	-0.3	-3.6	-3.8	-5.7	-4.7	-2.8	-9.0	-0.6	-2.0
	Post-1998	-0.9	0.0	0.7	-3.2	-3.4	-4.2	-3.2	-1.1	-7.9	0.3	1.2

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	575.8	2093.3	3240.1	1423.9	741.0	1394.5	2065.9	3232.4	1091.4	1740.1	7167.9
	1978-1992	56.1	1170.6	1754.9	667.6	237.9	788.7	1430.1	1500.6	603.5	721.5	3411.8
	1992-1998	80.9	935.2	1379.2	640.1	272.1	756.4	980.5	1132.7	589.4	697.1	2519.7
	Post-1998	50.7	955.4	1391.1	644.7	270.0	771.9	983.8	1111.2	609.6	685.7	2435.5
Peak1 kW/unit	Pre-1978	0.0	3.4	3.7	2.4	1.7	2.5	3.3	4.2	1.9	2.9	6.0
	1978-1992	0.0	1.6	1.7	1.0	0.8	1.2	1.8	1.6	0.9	1.2	2.5
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.2	1.3	0.8	0.7	1.0	1.1	1.1	0.8	1.0	1.7
Gas therms	Pre-1978	263.7	225.9	206.7	185.7	187.1	88.5	107.6	147.0	79.5	213.7	103.8
	1978-1992	65.3	77.0	66.5	29.9	38.1	8.7	12.9	14.7	6.2	33.5	8.3
	1992-1998	71.7	54.3	46.1	35.0	43.3	9.3	9.9	7.0	6.8	40.7	3.2
	Post-1998	56.2	43.8	36.8	25.1	31.7	5.4	5.6	3.9	3.5	30.2	1.5

Multi-Family Measure Savings

Dbl clear windows to Double Pane, Vinyl Frame

Measure base: Double pane clear windows, aluminum frame

Measure description: Double pane clear windows
Vinyl window frames

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.3	0.4	0.6	0.2	0.2	0.1	0.3	0.4	0.1	0.3	1.2
	1978-1992	0.2	0.2	0.5	0.0	0.0	0.0	0.1	0.3	-0.1	0.1	1.1
	1992-1998	0.3	0.2	0.4	0.0	0.0	0.0	0.1	0.2	-0.1	0.1	0.9
	Post-1998	0.3	0.2	0.4	0.0	0.0	0.0	0.1	0.2	-0.1	0.1	1.0
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	4.7	1.7	1.7	1.5	2.4	1.1	1.6	1.9	0.8	1.9	2.5
	1978-1992	35.6	2.5	3.6	0.6	-1.0	0.4	1.3	2.6	-1.3	1.7	4.1
	1992-1998	37.3	2.1	3.5	0.4	0.5	0.1	1.4	2.4	-1.7	2.4	4.1
	Post-1998	37.3	2.3	3.5	0.6	0.6	0.4	1.4	2.5	-1.2	2.4	4.5
Peak1 kW/unit	Pre-1978	na	1.6	2.5	1.6	2.6	1.7	1.8	2.6	1.1	1.5	2.2
	1978-1992	na	5.5	6.4	3.7	3.0	4.5	5.0	5.5	3.2	4.7	6.2
	1992-1998	na	5.7	6.4	4.6	3.4	5.6	6.3	6.1	3.7	5.7	6.7
	Post-1998	na	5.7	6.2	5.2	3.3	5.6	6.2	6.5	3.7	6.1	7.1
Gas therms	Pre-1978	4.1	4.0	4.1	4.3	4.6	5.4	4.8	5.6	5.7	3.9	5.1
	1978-1992	19.5	20.6	21.4	25.5	23.9	37.6	39.4	35.5	43.6	24.1	37.7
	1992-1998	22.8	23.5	24.3	29.2	27.8	42.6	43.6	45.8	49.0	26.7	54.9
	Post-1998	22.6	23.1	23.9	29.1	27.6	42.5	43.5	46.8	48.8	26.7	56.1

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	575.8	2093.3	3240.1	1423.9	741.0	1394.5	2065.9	3232.4	1091.4	1740.1	7167.9
	1978-1992	56.1	1170.6	1754.9	667.6	237.9	788.7	1430.1	1500.6	603.5	721.5	3411.8
	1992-1998	80.9	935.2	1379.2	640.1	272.1	756.4	980.5	1132.7	589.4	697.1	2519.7
	Post-1998	80.8	977.5	1440.8	648.6	271.7	774.9	998.0	1139.6	602.4	702.3	2550.0
Peak1 kW/unit	Pre-1978	0.0	3.4	3.7	2.4	1.7	2.5	3.3	4.2	1.9	2.9	6.0
	1978-1992	0.0	1.6	1.7	1.0	0.8	1.2	1.8	1.6	0.9	1.2	2.5
	1992-1998	0.0	1.2	1.3	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
	Post-1998	0.0	1.3	1.4	0.9	0.7	1.1	1.2	1.1	0.9	1.1	1.8
Gas therms	Pre-1978	263.7	225.9	206.7	185.7	187.1	88.5	107.6	147.0	79.5	213.7	103.8
	1978-1992	65.3	77.0	66.5	29.9	38.1	8.7	12.9	14.7	6.2	33.5	8.3
	1992-1998	71.7	54.3	46.1	35.0	43.3	9.3	9.9	7.0	6.8	40.7	3.2
	Post-1998	72.7	56.9	48.3	35.3	43.7	9.3	9.9	7.4	6.8	41.1	3.4

Multi-Family Measure Savings

Dbl tint to Double Pane, Argon Gas
 Measure base: Double pane standard tint
 Measure description: Double pane clear windows
 Argon gas added, U=0.46
 Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.3	-1.3	-1.3	-1.0	-0.5	-1.0	-1.1	-1.1	-0.9	-0.9	-1.5
	1978-1992	0.2	-1.4	-1.3	-1.3	-0.7	-1.2	-1.3	-1.2	-1.1	-1.1	-1.6
	1992-1998	0.2	-1.4	-1.3	-1.1	-0.7	-1.1	-1.2	-1.2	-1.1	-1.0	-1.6
	Post-1998	0.1	-1.4	-1.3	-1.1	-0.8	-1.2	-1.2	-1.2	-1.1	-1.0	-1.6
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	5.9	-6.3	-4.1	-7.7	-7.3	-8.6	-6.0	-5.6	-10.1	-5.2	-3.4
	1978-1992	32.8	-16.9	-10.3	-19.7	-33.0	-18.4	-15.8	-12.0	-23.8	-15.1	-6.8
	1992-1998	29.4	-18.5	-10.8	-24.5	-39.4	-22.1	-17.1	-14.1	-27.9	-19.3	-8.0
	Post-1998	31.7	-19.2	-11.6	-25.2	-46.2	-23.0	-17.9	-14.7	-28.4	-20.8	-8.5
Peak1 kW/unit	Pre-1978	na	-2.4	-2.4	-3.6	-3.3	-1.9	-2.0	-2.1	-3.0	-2.1	-1.5
	1978-1992	na	-6.9	-5.8	-7.1	-12.4	-5.2	-6.3	-5.7	-8.7	-6.4	-4.7
	1992-1998	na	-7.8	-6.9	-10.2	-14.3	-6.5	-7.1	-8.0	-10.3	-8.6	-5.4
	Post-1998	na	-8.3	-7.5	-10.4	-15.2	-6.7	-7.7	-7.6	-11.2	-8.7	-5.9
Gas therms	Pre-1978	4.3	4.3	4.2	5.0	5.5	6.8	6.2	6.8	8.0	4.0	6.6
	1978-1992	15.8	15.2	15.8	22.4	21.0	33.3	32.9	30.0	39.5	18.5	31.3
	1992-1998	17.6	17.8	18.6	24.5	23.3	35.4	34.5	37.6	41.9	19.8	44.8
	Post-1998	21.2	21.3	22.3	29.2	27.3	42.0	41.8	47.4	51.9	23.5	47.6

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	587.7	1978.4	3117.0	1332.6	691.0	1300.6	1960.1	3076.0	1008.7	1658.9	6904.2
	1978-1992	61.5	1023.9	1599.3	578.5	191.2	690.4	1270.8	1362.5	512.4	642.3	3179.0
	1992-1998	84.7	809.4	1251.6	538.1	207.7	645.5	862.4	1014.0	489.1	601.2	2323.8
	Post-1998	51.8	824.0	1252.5	541.7	202.8	656.8	860.9	990.5	504.6	589.4	2236.5
Peak1 kW/unit	Pre-1978	0.0	3.3	3.6	2.3	1.7	2.4	3.2	4.1	1.9	2.8	5.9
	1978-1992	0.0	1.5	1.6	0.9	0.7	1.1	1.7	1.5	0.8	1.1	2.3
	1992-1998	0.0	1.1	1.2	0.8	0.6	1.0	1.1	1.0	0.8	1.0	1.7
	Post-1998	0.0	1.1	1.2	0.8	0.6	1.0	1.0	1.0	0.8	0.9	1.5
Gas therms	Pre-1978	266.6	228.5	208.7	188.7	190.5	90.7	110.1	150.1	82.1	215.7	106.2
	1978-1992	66.7	78.0	67.0	31.2	39.8	9.3	13.5	15.3	6.8	33.9	8.7
	1992-1998	72.6	54.7	46.2	36.2	44.9	9.9	10.3	7.2	7.5	40.9	3.3
	Post-1998	56.8	43.8	36.5	25.9	32.7	5.6	5.8	4.0	3.8	30.1	1.5

Multi-Family Measure Savings

Dbl tint to Heat Mirror

Measure base: Double pane standard tint

Measure description: Heat Mirror 88 between clear glass (SC = .66)

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.3	0.4	0.6	0.3	0.2	0.1	0.3	0.5	0.1	0.4	1.3
	1978-1992	0.3	0.3	0.6	0.1	0.0	0.1	0.2	0.4	0.0	0.2	1.2
	1992-1998	0.3	0.3	0.6	0.0	0.0	0.0	0.2	0.4	0.0	0.2	1.1
	Post-1998	0.2	0.2	0.6	0.0	0.0	0.0	0.2	0.4	-0.1	0.2	1.1
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	4.8	2.0	2.0	2.0	3.2	1.1	1.8	2.5	1.0	2.6	2.9
	1978-1992	36.0	3.3	4.4	1.3	0.8	1.2	2.3	3.8	-0.7	2.9	5.1
	1992-1998	39.7	3.6	4.9	1.0	2.5	0.7	2.5	4.1	-1.0	4.2	5.7
	Post-1998	48.1	3.3	5.1	0.8	-1.8	0.6	2.4	4.2	-1.4	3.4	5.8
Peak1 kW/unit	Pre-1978	na	2.2	2.5	2.7	2.6	1.9	2.1	2.9	1.2	2.0	2.5
	1978-1992	na	6.0	7.0	4.2	2.2	5.2	6.5	6.8	3.7	5.8	7.0
	1992-1998	na	6.7	7.7	4.8	3.7	6.3	6.9	7.5	3.8	6.6	8.2
	Post-1998	na	7.2	8.3	6.4	3.4	7.0	6.7	8.2	4.1	7.5	8.8
Gas therms	Pre-1978	4.1	4.0	4.1	4.3	4.7	5.4	4.7	5.4	5.9	3.7	5.1
	1978-1992	19.4	20.4	21.6	25.4	23.7	40.1	42.3	36.1	46.3	23.6	38.5
	1992-1998	23.7	25.2	26.7	30.4	28.7	44.5	44.0	49.2	50.5	27.3	59.0
	Post-1998	30.0	31.8	33.7	38.5	35.6	56.3	56.8	64.0	66.2	34.2	63.6

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	587.7	1978.4	3117.0	1332.6	691.0	1300.6	1960.1	3076.0	1008.7	1658.9	6904.2
	1978-1992	61.5	1023.9	1599.3	578.5	191.2	690.4	1270.8	1362.5	512.4	642.3	3179.0
	1992-1998	84.7	809.4	1251.6	538.1	207.7	645.5	862.4	1014.0	489.1	601.2	2323.8
	Post-1998	51.8	824.0	1252.5	541.7	202.8	656.8	860.9	990.5	504.6	589.4	2236.5
Peak1 kW/unit	Pre-1978	0.0	3.3	3.6	2.3	1.7	2.4	3.2	4.1	1.9	2.8	5.9
	1978-1992	0.0	1.5	1.6	0.9	0.7	1.1	1.7	1.5	0.8	1.1	2.3
	1992-1998	0.0	1.1	1.2	0.8	0.6	1.0	1.1	1.0	0.8	1.0	1.7
	Post-1998	0.0	1.1	1.2	0.8	0.6	1.0	1.0	1.0	0.8	0.9	1.5
Gas therms	Pre-1978	266.6	228.5	208.7	188.7	190.5	90.7	110.1	150.1	82.1	215.7	106.2
	1978-1992	66.7	78.0	67.0	31.2	39.8	9.3	13.5	15.3	6.8	33.9	8.7
	1992-1998	72.6	54.7	46.2	36.2	44.9	9.9	10.3	7.2	7.5	40.9	3.3
	Post-1998	56.8	43.8	36.5	25.9	32.7	5.6	5.8	4.0	3.8	30.1	1.5

Multi-Family Measure Savings

Dbl tint to Double, High Performance Tint

Measure base: Double pane standard tint

Measure description: Double pane, "Blue" Tint, SC = 0.57

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-0.3	1.2	1.2	0.9	0.4	0.9	1.0	1.0	0.8	0.8	1.5
	1978-1992	-0.2	1.2	1.2	1.1	0.5	1.0	1.1	1.0	0.9	0.9	1.5
	1992-1998	-0.2	1.1	1.1	0.9	0.4	0.9	1.0	1.0	0.8	0.8	1.5
	Post-1998	-0.2	1.2	1.1	0.9	0.5	0.9	1.0	1.0	0.8	0.8	1.5
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	-5.1	5.6	3.7	6.5	5.4	7.2	5.2	4.9	8.2	4.5	3.3
	1978-1992	-34.9	13.9	9.0	16.1	22.3	15.4	13.1	10.1	18.7	12.5	6.2
	1992-1998	-32.5	15.2	9.8	19.7	24.2	17.6	14.0	11.8	21.8	15.6	7.2
	Post-1998	-40.8	16.2	10.4	20.3	28.5	18.3	14.4	12.1	22.1	16.2	7.7
Peak1 kW/unit	Pre-1978	na	2.2	2.2	3.7	4.3	1.9	2.1	2.0	2.9	1.9	1.7
	1978-1992	na	7.1	5.9	7.3	11.9	5.1	6.6	5.9	7.7	6.9	5.2
	1992-1998	na	8.0	7.3	9.2	14.1	6.6	7.3	7.9	10.1	7.4	6.0
	Post-1998	na	8.6	7.6	10.0	14.1	7.1	7.5	7.8	10.8	8.7	6.4
Gas therms	Pre-1978	-2.9	-3.0	-2.9	-3.6	-4.0	-5.2	-4.7	-5.1	-6.3	-2.8	-5.0
	1978-1992	-10.7	-10.5	-10.8	-17.1	-16.1	-28.8	-27.7	-25.8	-38.3	-13.1	-26.0
	1992-1998	-11.9	-11.9	-12.5	-18.6	-17.5	-30.9	-29.0	-33.1	-40.2	-13.8	-38.7
	Post-1998	-14.5	-14.4	-15.0	-23.1	-21.6	-40.1	-38.6	-41.3	-53.6	-16.7	-52.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	587.7	1978.4	3117.0	1332.6	691.0	1300.6	1960.1	3076.0	1008.7	1658.9	6904.2
	1978-1992	61.5	1023.9	1599.3	578.5	191.2	690.4	1270.8	1362.5	512.4	642.3	3179.0
	1992-1998	84.7	809.4	1251.6	538.1	207.7	645.5	862.4	1014.0	489.1	601.2	2323.8
	Post-1998	51.8	824.0	1252.5	541.7	202.8	656.8	860.9	990.5	504.6	589.4	2236.5
Peak1 kW/unit	Pre-1978	0.0	3.3	3.6	2.3	1.7	2.4	3.2	4.1	1.9	2.8	5.9
	1978-1992	0.0	1.5	1.6	0.9	0.7	1.1	1.7	1.5	0.8	1.1	2.3
	1992-1998	0.0	1.1	1.2	0.8	0.6	1.0	1.1	1.0	0.8	1.0	1.7
	Post-1998	0.0	1.1	1.2	0.8	0.6	1.0	1.0	1.0	0.8	0.9	1.5
Gas therms	Pre-1978	266.6	228.5	208.7	188.7	190.5	90.7	110.1	150.1	82.1	215.7	106.2
	1978-1992	66.7	78.0	67.0	31.2	39.8	9.3	13.5	15.3	6.8	33.9	8.7
	1992-1998	72.6	54.7	46.2	36.2	44.9	9.9	10.3	7.2	7.5	40.9	3.3
	Post-1998	56.8	43.8	36.5	25.9	32.7	5.6	5.8	4.0	3.8	30.1	1.5

Multi-Family Measure Savings

Dbl tint to Insol-8

Measure base: Double pane standard tint

Measure description: "Insol-8" Two Heat Mirror 88 layers between clear glass, argon filled

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.4	0.7	1.1	0.5	0.4	0.3	0.6	0.8	0.2	0.7	2.0
	1978-1992	0.3	0.5	1.0	0.2	0.0	0.2	0.4	0.7	0.0	0.4	2.0
	1992-1998	0.4	0.5	1.0	0.2	0.1	0.2	0.4	0.6	0.0	0.4	1.8
	Post-1998	0.3	0.5	1.0	0.1	0.0	0.1	0.3	0.6	0.0	0.3	1.8
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	0	0
	1978-1992	0	0	0	0	0	0	0	0	0	0	0
	1992-1998	0	0	0	0	0	0	0	0	0	0	0
	Post-1998	0	0	0	0	0	0	0	0	0	0	0
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	99.6	153.3
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	109.5	88.3	133.0
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	128.4	117.3	115.2
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	131.1	118.7	116.4

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	7.0	3.6	3.3	3.5	5.2	2.3	3.2	4.0	2.2	4.2	4.5
	1978-1992	49.3	6.3	7.6	3.3	1.9	3.2	4.5	6.3	0.9	5.9	8.2
	1992-1998	55.1	6.8	8.5	3.4	5.1	3.1	5.1	7.0	0.7	7.3	9.2
	Post-1998	64.3	7.0	8.8	3.1	-0.4	2.8	4.9	7.2	0.3	6.3	9.4
Peak1 kW/unit	Pre-1978	na	3.1	3.5	3.6	3.7	2.9	3.2	4.1	2.0	3.0	3.9
	1978-1992	na	9.6	11.1	6.4	4.0	8.3	10.2	10.3	6.0	8.9	10.8
	1992-1998	na	10.7	12.0	7.5	5.9	10.1	10.2	11.7	6.6	10.7	12.6
	Post-1998	na	11.7	12.9	9.4	5.7	11.1	10.3	13.0	7.2	11.8	13.6
Gas therms	Pre-1978	6.0	5.8	6.1	6.3	6.8	7.9	6.9	8.2	8.4	5.7	7.5
	1978-1992	28.8	30.2	32.3	37.3	34.0	56.4	59.8	52.2	63.2	35.8	53.8
	1992-1998	35.4	37.3	39.8	44.5	41.3	62.1	61.2	69.3	69.0	41.3	75.3
	Post-1998	44.3	47.0	50.2	55.1	51.1	75.0	76.5	84.7	84.5	51.1	81.5

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	587.7	1978.4	3117.0	1332.6	691.0	1300.6	1960.1	3076.0	1008.7	1658.9	6904.2
	1978-1992	61.5	1023.9	1599.3	578.5	191.2	690.4	1270.8	1362.5	512.4	642.3	3179.0
	1992-1998	84.7	809.4	1251.6	538.1	207.7	645.5	862.4	1014.0	489.1	601.2	2323.8
	Post-1998	51.8	824.0	1252.5	541.7	202.8	656.8	860.9	990.5	504.6	589.4	2236.5
Peak1 kW/unit	Pre-1978	0.0	3.3	3.6	2.3	1.7	2.4	3.2	4.1	1.9	2.8	5.9
	1978-1992	0.0	1.5	1.6	0.9	0.7	1.1	1.7	1.5	0.8	1.1	2.3
	1992-1998	0.0	1.1	1.2	0.8	0.6	1.0	1.1	1.0	0.8	1.0	1.7
	Post-1998	0.0	1.1	1.2	0.8	0.6	1.0	1.0	1.0	0.8	0.9	1.5
Gas therms	Pre-1978	266.6	228.5	208.7	188.7	190.5	90.7	110.1	150.1	82.1	215.7	106.2
	1978-1992	66.7	78.0	67.0	31.2	39.8	9.3	13.5	15.3	6.8	33.9	8.7
	1992-1998	72.6	54.7	46.2	36.2	44.9	9.9	10.3	7.2	7.5	40.9	3.3
	Post-1998	56.8	43.8	36.5	25.9	32.7	5.6	5.8	4.0	3.8	30.1	1.5

Multi-Family Measure Savings

Dbl tint to Double Pane, Med Low-E Coating

Measure base: Double pane standard tint

Measure description: "Low-E Squared", U=0.30, SC = 0.51

Measure units: Window Area (ft2)

Measure Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	0.1	1.6	1.9	1.1	0.6	1.0	1.3	1.5	0.8	na	na
	1978-1992	0.2	1.4	1.8	1.0	0.5	0.9	1.2	1.4	na	na	na
	1992-1998	0.2	1.4	1.8	0.9	0.5	0.9	1.1	1.4	na	na	na
	Post-1998	0.2	1.4	1.8	0.9	0.5	0.8	1.1	1.4	na	na	na
Peak1 kW/unit	Pre-1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	na
	1978-1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	na	na
	1992-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	na	na
	Post-1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	na	na	na
Gas therms	Pre-1978	0	0	0	0	0	0	0	0	0	na	na
	1978-1992	0	0	0	0	0	0	0	0	na	na	na
	1992-1998	0	0	0	0	0	0	0	0	na	na	na
	Post-1998	0	0	0	0	0	0	0	0	na	na	na
Units	Pre-1978	99.6	95.6	95.6	99.6	99.6	108.2	106.4	153.3	108.2	na	na
	1978-1992	88.3	122.8	122.8	88.3	88.3	109.5	155.5	133.0	na	na	na
	1992-1998	117.3	108.0	108.0	117.3	117.3	128.4	123.9	115.2	na	na	na
	Post-1998	118.7	114.0	114.0	118.7	118.7	131.1	126.5	116.4	na	na	na

Percentage Savings	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	2.1	7.6	5.9	8.3	8.8	7.9	7.1	7.7	8.7	na	na
	1978-1992	25.1	16.8	13.8	15.8	21.8	14.9	14.7	13.9	na	na	na
	1992-1998	31.1	18.2	15.2	18.8	28.1	17.0	15.9	15.7	na	na	na
	Post-1998	40.4	18.9	16.0	19.1	26.4	16.9	15.9	16.1	na	na	na
Peak1 kW/unit	Pre-1978	na	5.0	4.9	5.8	7.2	4.2	4.5	5.3	4.2	na	na
	1978-1992	na	14.3	14.2	11.9	13.3	11.1	14.7	13.8	na	na	na
	1992-1998	na	16.0	16.8	15.1	16.6	13.7	15.3	16.0	na	na	na
	Post-1998	na	17.3	17.7	16.3	16.4	14.8	15.7	17.2	na	na	na
Gas therms	Pre-1978	2.7	2.5	2.8	2.4	2.6	2.6	1.9	2.3	2.2	na	na
	1978-1992	16.1	18.0	19.2	19.6	18.1	33.7	37.4	29.5	na	na	na
	1992-1998	20.9	23.1	24.8	25.2	23.8	38.7	38.5	43.8	na	na	na
	Post-1998	27.4	30.2	32.4	33.8	30.9	53.3	53.4	60.0	na	na	na

Base Values	Vintage	Forecasting Climate Zones										
		1	2,6	3,7	4	5	8,11	9,12,16	10	13	1 (clg)	15
Energy kWh/unit	Pre-1978	587.7	1978.4	3117.0	1332.6	691.0	1300.6	1960.1	3076.0	1008.7	na	na
	1978-1992	61.5	1023.9	1599.3	578.5	191.2	690.4	1270.8	1362.5	na	na	na
	1992-1998	84.7	809.4	1251.6	538.1	207.7	645.5	862.4	1014.0	na	na	na
	Post-1998	51.8	824.0	1252.5	541.7	202.8	656.8	860.9	990.5	na	na	na
Peak1 kW/unit	Pre-1978	0.0	3.3	3.6	2.3	1.7	2.4	3.2	4.1	1.9	na	na
	1978-1992	0.0	1.5	1.6	0.9	0.7	1.1	1.7	1.5	na	na	na
	1992-1998	0.0	1.1	1.2	0.8	0.6	1.0	1.1	1.0	na	na	na
	Post-1998	0.0	1.1	1.2	0.8	0.6	1.0	1.0	1.0	na	na	na
Gas therms	Pre-1978	266.6	228.5	208.7	188.7	190.5	90.7	110.1	150.1	82.1	na	na
	1978-1992	66.7	78.0	67.0	31.2	39.8	9.3	13.5	15.3	na	na	na
	1992-1998	72.6	54.7	46.2	36.2	44.9	9.9	10.3	7.2	na	na	na
	Post-1998	56.8	43.8	36.5	25.9	32.7	5.6	5.8	4.0	na	na	na

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6.2.2 Gas Measures

Utility	Single Family	Multi- Family
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6.2.1 *Electric Measures*

Non-Conditioning, Electric Measures

Measure	Building Type	Energy Savings Fraction	Base kWh/Unit (UEC)	HE kWh/Unit (UEC)	HE kWh/Unit Savings	Base Peak Watts/Unit	HE Peak Watts/Unit	HE Peak Watt Savings
Base Lighting, 30 Watts	PG&E SF	0%	28.1	28.1	-	8.4	8.4	-
CFL, 7-watt, 0.5 Hrs/Day	PG&E SF	77%	6.1	1.4	4.6	1.8	0.4	1.4
CFL, 7-watt, 2.5 Hrs/Day	PG&E SF	77%	30.3	7.1	23.2	9.1	2.1	7.0
CFL, 7-watt, 6.0 Hrs/Day	PG&E SF	77%	72.7	17.0	55.8	21.8	5.1	16.7
Base Lighting, 60 Watts	PG&E SF	0%	56.3	56.3	-	16.9	16.9	-
CFL, 15-watt, 0.5 Hrs/Day	PG&E SF	75%	12.1	3.0	9.1	3.6	0.9	2.7
CFL, 15-watt, 2.5 Hrs/Day	PG&E SF	75%	60.6	15.1	45.4	18.2	4.5	13.6
CFL, 15-watt, 6.0 Hrs/Day	PG&E SF	75%	145.4	36.3	109.0	43.6	10.9	32.7
Base Lighting, 100 Watts	PG&E SF	0%	93.8	93.8	-	28.1	28.1	-
CFL, 25-watt, 0.5 Hrs/Day	PG&E SF	75%	20.2	5.0	15.1	6.1	1.5	4.5
CFL, 25-watt, 2.5 Hrs/Day	PG&E SF	75%	101.0	25.2	75.7	30.3	7.6	22.7
CFL, 25-watt, 6.0 Hrs/Day	PG&E SF	75%	242.3	60.6	181.7	72.6	18.2	54.5
Base Refrigerator	PG&E SF	0%	1,167	1,167	-	199	199	-
HE Refrigerator - Energy Star	PG&E SF	20%	1,198	959	240	204	164	41
HE Refrigerator - 2001 Compliant	PG&E SF	30%	1,171	820	351	200	140	60
HE Refrigerator - >2001 Compliant	PG&E SF	37%	1,172	738	434	200	126	74
Base 40 gal. Water Heating (EF=0.88)	PG&E SF	0%	2,301	2,301	-	506	506	-
Heat Pump Water Heater (EF=2.9)	PG&E SF	70%	2,301	690	1,610	506	152	354
HE Water Heater (EF=0.93)	PG&E SF	5%	2,308	2,184	124	508	481	27
Low Flow Showerhead	PG&E SF	8%	2,390	2,211	179	526	487	39
Pipe Wrap	PG&E SF	4%	2,305	2,213	92	507	487	20
Faucet Aerators	PG&E SF	3%	2,336	2,266	70	514	499	15
Water Heater Blanket	PG&E SF	10%	2,422	2,180	242	533	480	53
Base Clotheswasher (EF=1.18)	PG&E SF	0%	1,288	1,288	-	536	536	-
Energy Star CW (EF=2.5)	PG&E SF	53%	1,302	614	687	542	256	286
SEHA CW Tier 2 (EF=3.25)	PG&E SF	64%	1,304	474	831	543	197	346
Base Dishwasher (EF=0.46)	PG&E SF	0%	1,368	1,368	-	433	433	-
Energy Star DW (EF=0.52)	PG&E SF	13%	1,385	1,205	180	439	382	57
SEHA DW Tier 1 (0.58)	PG&E SF	26%	1,368	1,012	356	433	321	113
Base Clothes Dryer (EF=.46)	PG&E SF	0%	1,354	1,354	-	495	495	-
HE Clothes Dryer (EF=.52)	PG&E SF	5%	1,395	1,325	70	510	485	26

Non-Conditioning, Electric Measures

Measure	Building Type	Energy Savings Fraction	Base kWh/Unit (UEC)	HE kWh/Unit (UEC)	HE kWh/Unit Savings	Base Peak Watts/Unit	HE Peak Watts/Unit	HE Peak Watt Savings
Base Lighting, 30 Watts	SCE SF	0%	28.1	28.1	-	8.4	8.4	-
CFL, 7-watt, 0.5 Hrs/Day	SCE SF	77%	6.1	1.4	4.6	1.8	0.4	1.4
CFL, 7-watt, 2.5 Hrs/Day	SCE SF	77%	30.3	7.1	23.2	9.1	2.1	7.0
CFL, 7-watt, 6.0 Hrs/Day	SCE SF	77%	72.7	17.0	55.8	21.8	5.1	16.7
Base Lighting, 60 Watts	SCE SF	0%	56.3	56.3	-	16.9	16.9	-
CFL, 15-watt, 0.5 Hrs/Day	SCE SF	75%	12.1	3.0	9.1	3.6	0.9	2.7
CFL, 15-watt, 2.5 Hrs/Day	SCE SF	75%	60.6	15.1	45.4	18.2	4.5	13.6
CFL, 15-watt, 6.0 Hrs/Day	SCE SF	75%	145.4	36.3	109.0	43.6	10.9	32.7
Base Lighting, 100 Watts	SCE SF	0%	93.8	93.8	-	28.1	28.1	-
CFL, 25-watt, 0.5 Hrs/Day	SCE SF	75%	20.2	5.0	15.1	6.1	1.5	4.5
CFL, 25-watt, 2.5 Hrs/Day	SCE SF	75%	101.0	25.2	75.7	30.3	7.6	22.7
CFL, 25-watt, 6.0 Hrs/Day	SCE SF	75%	242.3	60.6	181.7	72.6	18.2	54.5
Base Refrigerator	SCE SF	0%	1,223	1,223	-	209	209	-
HE Refrigerator - Energy Star	SCE SF	20%	1,256	1,005	251	214	171	43
HE Refrigerator - 2001 Compliant	SCE SF	30%	1,227	859	368	209	147	63
HE Refrigerator - >2001 Compliant	SCE SF	37%	1,228	774	454	209	132	78
Base 40 gal. Water Heating (EF=0.88)	SCE SF	0%	2,512	2,512	-	553	553	-
Heat Pump Water Heater (EF=2.9)	SCE SF	70%	2,512	754	1,758	553	166	387
HE Water Heater (EF=0.93)	SCE SF	5%	2,520	2,385	136	555	525	30
Low Flow Showerhead	SCE SF	8%	2,610	2,414	196	574	531	43
Pipe Wrap	SCE SF	4%	2,517	2,416	101	554	532	22
Faucet Aerators	SCE SF	3%	2,550	2,474	77	561	544	17
Water Heater Blanket	SCE SF	10%	2,644	2,380	264	582	524	58
Base Clotheswasher (EF=1.18)	SCE SF	0%	1,218	1,218	-	507	507	-
Energy Star CW (EF=2.5)	SCE SF	53%	1,231	581	650	512	242	271
SEHA CW Tier 2 (EF=3.25)	SCE SF	64%	1,234	448	786	513	186	327
Base Dishwasher (EF=0.46)	SCE SF	0%	1,343	1,343	-	425	425	-
Energy Star DW (EF=0.52)	SCE SF	13%	1,359	1,183	177	431	375	56
SEHA DW Tier 1 (0.58)	SCE SF	26%	1,343	994	349	425	315	111
Base Clothes Dryer (EF=.46)	SCE SF	0%	1,572	1,572	-	575	575	-
HE Clothes Dryer (EF=.52)	SCE SF	5%	1,620	1,539	81	593	563	30

Non-Conditioning, Electric Measures

Measure	Building Type	Energy Savings Fraction	Base kWh/Unit (UEC)	HE kWh/Unit (UEC)	HE kWh/Unit Savings	Base Peak Watts/Unit	HE Peak Watts/Unit	HE Peak Watt Savings
Base Lighting, 30 Watts	SDG&E SF	0%	28.1	28.1	-	8.4	8.4	-
CFL, 7-watt, 0.5 Hrs/Day	SDG&E SF	77%	6.1	1.4	4.6	1.8	0.4	1.4
CFL, 7-watt, 2.5 Hrs/Day	SDG&E SF	77%	30.3	7.1	23.2	9.1	2.1	7.0
CFL, 7-watt, 6.0 Hrs/Day	SDG&E SF	77%	72.7	17.0	55.8	21.8	5.1	16.7
Base Lighting, 60 Watts	SDG&E SF	0%	56.3	56.3	-	16.9	16.9	-
CFL, 15-watt, 0.5 Hrs/Day	SDG&E SF	75%	12.1	3.0	9.1	3.6	0.9	2.7
CFL, 15-watt, 2.5 Hrs/Day	SDG&E SF	75%	60.6	15.1	45.4	18.2	4.5	13.6
CFL, 15-watt, 6.0 Hrs/Day	SDG&E SF	75%	145.4	36.3	109.0	43.6	10.9	32.7
Base Lighting, 100 Watts	SDG&E SF	0%	93.8	93.8	-	28.1	28.1	-
CFL, 25-watt, 0.5 Hrs/Day	SDG&E SF	75%	20.2	5.0	15.1	6.1	1.5	4.5
CFL, 25-watt, 2.5 Hrs/Day	SDG&E SF	75%	101.0	25.2	75.7	30.3	7.6	22.7
CFL, 25-watt, 6.0 Hrs/Day	SDG&E SF	75%	242.3	60.6	181.7	72.6	18.2	54.5
Base Refrigerator	SDG&E SF	0%	1,147	1,147	-	196	196	-
HE Refrigerator - Energy Star	SDG&E SF	20%	1,178	942	236	201	161	40
HE Refrigerator - 2001 Compliant	SDG&E SF	30%	1,150	805	345	196	137	59
HE Refrigerator - >2001 Compliant	SDG&E SF	37%	1,151	725	426	196	124	73
Base 40 gal. Water Heating (EF=0.88)	SDG&E SF	0%	2,340	2,340	-	515	515	-
Heat Pump Water Heater (EF=2.9)	SDG&E SF	70%	2,340	702	1,638	515	154	360
HE Water Heater (EF=0.93)	SDG&E SF	5%	2,348	2,222	126	517	489	28
Low Flow Showerhead	SDG&E SF	8%	2,431	2,249	182	535	495	40
Pipe Wrap	SDG&E SF	4%	2,345	2,251	94	516	495	21
Faucet Aerators	SDG&E SF	3%	2,376	2,304	71	523	507	16
Water Heater Blanket	SDG&E SF	10%	2,463	2,217	246	542	488	54
Base Clotheswasher (EF=1.18)	SDG&E SF	0%	1,222	1,222	-	509	509	-
Energy Star CW (EF=2.5)	SDG&E SF	53%	1,235	583	652	514	243	271
SEHA CW Tier 2 (EF=3.25)	SDG&E SF	64%	1,238	449	788	515	187	328
Base Dishwasher (EF=0.46)	SDG&E SF	0%	1,323	1,323	-	419	419	-
Energy Star DW (EF=0.52)	SDG&E SF	13%	1,340	1,165	174	424	369	55
SEHA DW Tier 1 (0.58)	SDG&E SF	26%	1,323	979	344	419	310	109
Base Clothes Dryer (EF=.46)	SDG&E SF	0%	1,435	1,435	-	525	525	-
HE Clothes Dryer (EF=.52)	SDG&E SF	5%	1,478	1,404	74	541	514	27

Non-Conditioning, Electric Measures

Measure	Building Type	Energy Savings Fraction	Base kWh/Unit (UEC)	HE kWh/Unit (UEC)	HE kWh/Unit Savings	Base Peak Watts/Unit	HE Peak Watts/Unit	HE Peak Watt Savings
Base Lighting, 30 Watts	PG&E MF	0%	28.1	28.1	-	8.4	8.4	-
CFL, 7-watt, 0.5 Hrs/Day	PG&E MF	77%	6.1	1.4	4.6	1.8	0.4	1.4
CFL, 7-watt, 2.5 Hrs/Day	PG&E MF	77%	30.3	7.1	23.2	9.1	2.1	7.0
CFL, 7-watt, 6.0 Hrs/Day	PG&E MF	77%	72.7	17.0	55.8	21.8	5.1	16.7
Base Lighting, 60 Watts	PG&E MF	0%	56.3	56.3	-	16.9	16.9	-
CFL, 15-watt, 0.5 Hrs/Day	PG&E MF	75%	12.1	3.0	9.1	3.6	0.9	2.7
CFL, 15-watt, 2.5 Hrs/Day	PG&E MF	75%	60.6	15.1	45.4	18.2	4.5	13.6
CFL, 15-watt, 6.0 Hrs/Day	PG&E MF	75%	145.4	36.3	109.0	43.6	10.9	32.7
Base Lighting, 100 Watts	PG&E MF	0%	93.8	93.8	-	28.1	28.1	-
CFL, 25-watt, 0.5 Hrs/Day	PG&E MF	75%	20.2	5.0	15.1	6.1	1.5	4.5
CFL, 25-watt, 2.5 Hrs/Day	PG&E MF	75%	101.0	25.2	75.7	30.3	7.6	22.7
CFL, 25-watt, 6.0 Hrs/Day	PG&E MF	75%	242.3	60.6	181.7	72.6	18.2	54.5
Base Refrigerator	PG&E MF	0%	1,015	1,015	-	173	173	-
HE Refrigerator - Energy Star	PG&E MF	20%	1,043	834	209	178	142	36
HE Refrigerator - 2001 Compliant	PG&E MF	30%	1,018	713	306	174	122	52
HE Refrigerator - >2001 Compliant	PG&E MF	37%	1,019	642	377	174	110	64
Base 40 gal. Water Heating (EF=0.88)	PG&E MF	0%	1,896	1,896	-	417	417	-
Heat Pump Water Heater (EF=2.9)	PG&E MF	70%	1,896	569	1,327	417	125	292
HE Water Heater (EF=0.93)	PG&E MF	5%	1,902	1,800	102	419	396	23
Low Flow Showerhead	PG&E MF	8%	1,969	1,822	148	433	401	33
Pipe Wrap	PG&E MF	4%	1,899	1,823	76	418	401	17
Faucet Aerators	PG&E MF	3%	1,924	1,867	58	424	411	13
Water Heater Blanket	PG&E MF	10%	1,995	1,796	200	439	395	44
Base Clotheswasher (EF=1.18)	PG&E MF	0%	1,056	1,056	-	440	440	-
Energy Star CW (EF=2.5)	PG&E MF	53%	1,067	504	564	444	210	235
SEHA CW Tier 2 (EF=3.25)	PG&E MF	64%	1,070	388	681	445	162	284
Base Dishwasher (EF=0.46)	PG&E MF	0%	1,045	1,045	-	331	331	-
Energy Star DW (EF=0.52)	PG&E MF	13%	1,058	920	138	335	292	44
SEHA DW Tier 1 (0.58)	PG&E MF	26%	1,045	773	272	331	245	86
Base Clothes Dryer (EF=.46)	PG&E MF	0%	840	840	-	307	307	-
HE Clothes Dryer (EF=.52)	PG&E MF	5%	866	823	43	317	301	16

Non-Conditioning, Electric Measures								
Measure	Building Type	Energy Savings Fraction	Base kWh/Unit (UEC)	HE kWh/Unit (UEC)	HE kWh/Unit Savings	Base Peak Watts/Unit	HE Peak Watts/Unit	HE Peak Watt Savings
Base Lighting, 30 Watts	SCE MF	0%	28.1	28.1	-	8.4	8.4	-
CFL, 7-watt, 0.5 Hrs/Day	SCE MF	77%	6.1	1.4	4.6	1.8	0.4	1.4
CFL, 7-watt, 2.5 Hrs/Day	SCE MF	77%	30.3	7.1	23.2	9.1	2.1	7.0
CFL, 7-watt, 6.0 Hrs/Day	SCE MF	77%	72.7	17.0	55.8	21.8	5.1	16.7
Base Lighting, 60 Watts	SCE MF	0%	56.3	56.3	-	16.9	16.9	-
CFL, 15-watt, 0.5 Hrs/Day	SCE MF	75%	12.1	3.0	9.1	3.6	0.9	2.7
CFL, 15-watt, 2.5 Hrs/Day	SCE MF	75%	60.6	15.1	45.4	18.2	4.5	13.6
CFL, 15-watt, 6.0 Hrs/Day	SCE MF	75%	145.4	36.3	109.0	43.6	10.9	32.7
Base Lighting, 100 Watts	SCE MF	0%	93.8	93.8	-	28.1	28.1	-
CFL, 25-watt, 0.5 Hrs/Day	SCE MF	75%	20.2	5.0	15.1	6.1	1.5	4.5
CFL, 25-watt, 2.5 Hrs/Day	SCE MF	75%	101.0	25.2	75.7	30.3	7.6	22.7
CFL, 25-watt, 6.0 Hrs/Day	SCE MF	75%	242.3	60.6	181.7	72.6	18.2	54.5
Base Refrigerator	SCE MF	0%	1,116	1,116	-	190	190	-
HE Refrigerator - Energy Star	SCE MF	20%	1,146	916	229	195	156	39
HE Refrigerator - 2001 Compliant	SCE MF	30%	1,119	783	336	191	134	57
HE Refrigerator - >2001 Compliant	SCE MF	37%	1,120	706	414	191	120	71
Base 40 gal. Water Heating (EF=0.88)	SCE MF	0%	1,906	1,906	-	419	419	-
Heat Pump Water Heater (EF=2.9)	SCE MF	70%	1,906	572	1,334	419	126	294
HE Water Heater (EF=0.93)	SCE MF	5%	1,912	1,809	103	421	398	23
Low Flow Showerhead	SCE MF	8%	1,980	1,831	148	436	403	33
Pipe Wrap	SCE MF	4%	1,909	1,833	76	420	403	17
Faucet Aerators	SCE MF	3%	1,935	1,877	58	426	413	13
Water Heater Blanket	SCE MF	10%	2,006	1,805	201	441	397	44
Base Clotheswasher (EF=1.18)	SCE MF	0%	1,062	1,062	-	442	442	-
Energy Star CW (EF=2.5)	SCE MF	53%	1,074	507	567	447	211	236
SEHA CW Tier 2 (EF=3.25)	SCE MF	64%	1,076	391	685	448	163	285
Base Dishwasher (EF=0.46)	SCE MF	0%	985	985	-	312	312	-
Energy Star DW (EF=0.52)	SCE MF	13%	997	868	130	316	275	41
SEHA DW Tier 1 (0.58)	SCE MF	26%	985	729	256	312	231	81
Base Clothes Dryer (EF=.46)	SCE MF	0%	869	869	-	318	318	-
HE Clothes Dryer (EF=.52)	SCE MF	5%	896	851	45	328	311	16

Non-Conditioning, Electric Measures

Measure	Building Type	Energy Savings Fraction	Base kWh/Unit (UEC)	HE kWh/Unit (UEC)	HE kWh/Unit Savings	Base Peak Watts/Unit	HE Peak Watts/Unit	HE Peak Watt Savings
Base Lighting, 30 Watts	SDG&E MF	0%	28.1	28.1	-	8.4	8.4	-
CFL, 7-watt, 0.5 Hrs/Day	SDG&E MF	77%	6.1	1.4	4.6	1.8	0.4	1.4
CFL, 7-watt, 2.5 Hrs/Day	SDG&E MF	77%	30.3	7.1	23.2	9.1	2.1	7.0
CFL, 7-watt, 6.0 Hrs/Day	SDG&E MF	77%	72.7	17.0	55.8	21.8	5.1	16.7
Base Lighting, 60 Watts	SDG&E MF	0%	56.3	56.3	-	16.9	16.9	-
CFL, 15-watt, 0.5 Hrs/Day	SDG&E MF	75%	12.1	3.0	9.1	3.6	0.9	2.7
CFL, 15-watt, 2.5 Hrs/Day	SDG&E MF	75%	60.6	15.1	45.4	18.2	4.5	13.6
CFL, 15-watt, 6.0 Hrs/Day	SDG&E MF	75%	145.4	36.3	109.0	43.6	10.9	32.7
Base Lighting, 100 Watts	SDG&E MF	0%	93.8	93.8	-	28.1	28.1	-
CFL, 25-watt, 0.5 Hrs/Day	SDG&E MF	75%	20.2	5.0	15.1	6.1	1.5	4.5
CFL, 25-watt, 2.5 Hrs/Day	SDG&E MF	75%	101.0	25.2	75.7	30.3	7.6	22.7
CFL, 25-watt, 6.0 Hrs/Day	SDG&E MF	75%	242.3	60.6	181.7	72.6	18.2	54.5
Base Refrigerator	SDG&E MF	0%	1,004	1,004	-	171	171	-
HE Refrigerator - Energy Star	SDG&E MF	20%	1,031	825	206	176	141	35
HE Refrigerator - 2001 Compliant	SDG&E MF	30%	1,007	705	302	172	120	52
HE Refrigerator - >2001 Compliant	SDG&E MF	37%	1,008	635	373	172	108	64
Base 40 gal. Water Heating (EF=0.88)	SDG&E MF	0%	1,940	1,940	-	427	427	-
Heat Pump Water Heater (EF=2.9)	SDG&E MF	70%	1,940	582	1,358	427	128	299
HE Water Heater (EF=0.93)	SDG&E MF	5%	1,947	1,842	105	428	405	23
Low Flow Showerhead	SDG&E MF	8%	2,016	1,865	151	444	410	33
Pipe Wrap	SDG&E MF	4%	1,944	1,866	78	428	411	17
Faucet Aerators	SDG&E MF	3%	1,970	1,911	59	434	421	13
Water Heater Blanket	SDG&E MF	10%	2,042	1,838	204	449	405	45
Base Clotheswasher (EF=1.18)	SDG&E MF	0%	1,034	1,034	-	430	430	-
Energy Star CW (EF=2.5)	SDG&E MF	53%	1,045	493	552	435	205	230
SEHA CW Tier 2 (EF=3.25)	SDG&E MF	64%	1,047	380	667	436	158	278
Base Dishwasher (EF=0.46)	SDG&E MF	0%	962	962	-	305	305	-
Energy Star DW (EF=0.52)	SDG&E MF	13%	974	847	127	308	268	40
SEHA DW Tier 1 (0.58)	SDG&E MF	26%	962	712	250	305	225	79
Base Clothes Dryer (EF=.46)	SDG&E MF	0%	869	869	-	318	318	-
HE Clothes Dryer (EF=.52)	SDG&E MF	5%	896	851	45	328	311	16

6.2.2 Gas Measures

Non-Conditioning, Gas Measures

Measure	Building Type	Energy Savings Fraction	Base Therms/Unit (UEC)	HE Therms/Unit (UEC)	HE Therm Savings
Base 40 gal. Water Heater (0.54 EF)	PG&E SF	0%	123	123	0
HE Water Heater (0.60 EF)	PG&E SF	10%	123	111	12
HE Water Heater (EF = 0.63)	PG&E SF	14%	124	107	18
Low Flow Showerhead	PG&E SF	8%	128	118	10
Pipe Wrap	PG&E SF	4%	123	119	5
Faucet Aerators	PG&E SF	3%	125	121	4
Water Heater Blanket	PG&E SF	10%	130	117	13
Base Clotheswasher (EF=1.18)	PG&E SF	0%	67	67	0
Energy Star CW (EF=2.5)	PG&E SF	53%	68	32	36
SEHA CW Tier 2 (EF=3.25)	PG&E SF	64%	68	25	43
Base Dishwasher (EF=0.46)	PG&E SF	0%	59	59	0
Energy Star DW (EF=0.52)	PG&E SF	13%	60	52	8
SEHA DW Tier 1 (EF=0.58)	PG&E SF	26%	59	44	15
Base Clothes Dryer	PG&E SF	0%	39	39	0
HE Clothes Dryer	PG&E SF	5%	41	39	2

Non-Conditioning, Gas Measures

Measure	Building Type	Energy Savings Fraction	Base Therms/Unit (UEC)	HE Therms/Unit (UEC)	HE Therm Savings
Base 40 gal. Water Heater (0.54 EF)	SCG/SCE SF	0%	128	128	0
HE Water Heater (0.60 EF)	SCG/SCE SF	10%	128	116	13
HE Water Heater (EF = 0.63)	SCG/SCE SF	14%	130	111	19
Low Flow Showerhead	SCG/SCE SF	8%	133	123	10
Pipe Wrap	SCG/SCE SF	4%	129	123	5
Faucet Aerators	SCG/SCE SF	3%	130	126	4
Water Heater Blanket	SCG/SCE SF	10%	135	122	14
Base Clotheswasher (EF=1.18)	SCG/SCE SF	0%	63	63	0
Energy Star CW (EF=2.5)	SCG/SCE SF	53%	63	30	34
SEHA CW Tier 2 (EF=3.25)	SCG/SCE SF	64%	64	23	41
Base Dishwasher (EF=0.46)	SCG/SCE SF	0%	56	56	0
Energy Star DW (EF=0.52)	SCG/SCE SF	13%	56	49	7
SEHA DW Tier 1 (EF=0.58)	SCG/SCE SF	26%	56	41	14
Base Clothes Dryer	SCG/SCE SF	0%	44	44	0
HE Clothes Dryer	SCG/SCE SF	5%	45	43	2

Non-Conditioning, Gas Measures

Measure	Building Type	Energy Savings Fraction	Base Therms/Unit (UEC)	HE Therms/Unit (UEC)	HE Therm Savings
Base 40 gal. Water Heater (0.54 EF)	SDG&E SF	0%	114	114	0
HE Water Heater (0.60 EF)	SDG&E SF	10%	114	102	11
HE Water Heater (EF = 0.63)	SDG&E SF	14%	115	98	16
Low Flow Showerhead	SDG&E SF	8%	118	109	9
Pipe Wrap	SDG&E SF	4%	114	109	5
Faucet Aerators	SDG&E SF	3%	115	112	3
Water Heater Blanket	SDG&E SF	10%	120	108	12
Base Clotheswasher (EF=1.18)	SDG&E SF	0%	56	56	0
Energy Star CW (EF=2.5)	SDG&E SF	53%	57	27	30
SEHA CW Tier 2 (EF=3.25)	SDG&E SF	64%	57	21	36
Base Dishwasher (EF=0.46)	SDG&E SF	0%	50	50	0
Energy Star DW (EF=0.52)	SDG&E SF	13%	50	44	7
SEHA DW Tier 1 (EF=0.58)	SDG&E SF	26%	50	37	13
Base Clothes Dryer	SDG&E SF	0%	38	38	0
HE Clothes Dryer	SDG&E SF	5%	39	37	2

Non-Conditioning, Gas Measures

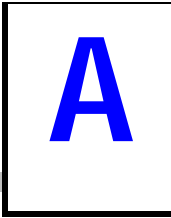
Measure	Building Type	Energy Savings Fraction	Base Therms/Unit (UEC)	HE Therms/Unit (UEC)	HE Therm Savings
Base 40 gal. Water Heater (0.54 EF)	PG&E MF	0%	115	115	0
HE Water Heater (0.60 EF)	PG&E MF	10%	115	103	11
HE Water Heater (EF = 0.63)	PG&E MF	14%	116	99	17
Low Flow Showerhead	PG&E MF	8%	119	110	9
Pipe Wrap	PG&E MF	4%	115	111	5
Faucet Aerators	PG&E MF	3%	117	113	3
Water Heater Blanket	PG&E MF	10%	121	109	12
Base Clotheswasher (EF=1.18)	PG&E MF	0%	62	62	0
Energy Star CW (EF=2.5)	PG&E MF	53%	62	29	33
SEHA CW Tier 2 (EF=3.25)	PG&E MF	64%	62	23	40
Base Dishwasher (EF=0.46)	PG&E MF	0%	52	52	0
Energy Star DW (EF=0.52)	PG&E MF	13%	53	46	7
SEHA DW Tier 1 (EF=0.58)	PG&E MF	26%	52	39	14
Base Clothes Dryer	PG&E MF	0%	24	24	0
HE Clothes Dryer	PG&E MF	5%	25	23	1

Non-Conditioning, Gas Measures

Measure	Building Type	Energy Savings Fraction	Base Therms/Unit (UEC)	HE Therms/Unit (UEC)	HE Therm Savings
Base 40 gal. Water Heater (0.54 EF)	SCG/SCE MF	0%	115	115	0
HE Water Heater (0.60 EF)	SCG/SCE MF	10%	115	103	11
HE Water Heater (EF = 0.63)	SCG/SCE MF	14%	116	99	17
Low Flow Showerhead	SCG/SCE MF	8%	119	110	9
Pipe Wrap	SCG/SCE MF	4%	115	111	5
Faucet Aerators	SCG/SCE MF	3%	117	113	3
Water Heater Blanket	SCG/SCE MF	10%	121	109	12
Base Clotheswasher (EF=1.18)	SCG/SCE MF	0%	59	59	0
Energy Star CW (EF=2.5)	SCG/SCE MF	53%	60	28	32
SEHA CW Tier 2 (EF=3.25)	SCG/SCE MF	64%	60	22	38
Base Dishwasher (EF=0.46)	SCG/SCE MF	0%	46	46	0
Energy Star DW (EF=0.52)	SCG/SCE MF	13%	46	40	6
SEHA DW Tier 1 (EF=0.58)	SCG/SCE MF	26%	46	34	12
Base Clothes Dryer	SCG/SCE MF	0%	24	24	0
HE Clothes Dryer	SCG/SCE MF	5%	25	24	1

Non-Conditioning, Gas Measures

Measure	Building Type	Energy Savings Fraction	Base Therms/Unit (UEC)	HE Therms/Unit (UEC)	HE Therm Savings
Base 40 gal. Water Heater (0.54 EF)	SDG&E MF	0%	108	108	0
HE Water Heater (0.60 EF)	SDG&E MF	10%	108	97	11
HE Water Heater (EF = 0.63)	SDG&E MF	14%	109	93	16
Low Flow Showerhead	SDG&E MF	8%	112	104	8
Pipe Wrap	SDG&E MF	4%	108	104	4
Faucet Aerators	SDG&E MF	3%	110	106	3
Water Heater Blanket	SDG&E MF	10%	114	102	11
Base Clotheswasher (EF=1.18)	SDG&E MF	0%	55	55	0
Energy Star CW (EF=2.5)	SDG&E MF	53%	55	26	29
SEHA CW Tier 2 (EF=3.25)	SDG&E MF	64%	55	20	35
Base Dishwasher (EF=0.46)	SDG&E MF	0%	43	43	0
Energy Star DW (EF=0.52)	SDG&E MF	13%	44	38	6
SEHA DW Tier 1 (EF=0.58)	SDG&E MF	26%	43	32	11
Base Clothes Dryer	SDG&E MF	0%	23	23	0
HE Clothes Dryer	SDG&E MF	5%	23	22	1



ADM Associates, 2000. *Statewide Survey of Multi-Family Common Area/Building Owners Market*, prepared for Southern California Edison.

ACEEE, 1999. *ACEEE's Annual Guide to the Most Energy-Efficient Appliances*, published by the American Council for an Energy Efficient Economy, Washington, D.C.

Anello, Michael T., D. Parker, J. Sherwin, and K. Richards, 2000. "Measured Impact of Advanced Windows on Cooling Energy Use", in *Proceedings of ACEEE 2000 Summer Study on Energy Efficiency in Buildings*, 1:29-38. Washington, D.C.: American Council for an Energy-Efficient Economy.

Berkeley Solar Group, 1993. *Occupancy Patterns and Energy Consumption in New California Homes (1984 to 1988), Phase Two of the Residential Monitoring Project*, CEC #400-90-012, prepared by Berkeley Solar Group and XENERGY Inc., March.

Bouchelle, Matthew P., D. Parker, M. Anello, and K. Richardson, 2000. "Factors Influencing Space Heat and Heat Pump Efficiency from a Large-Scale Residential Monitoring Study", in *Proceedings of ACEEE 2000 Summer Study on Energy Efficiency in Buildings*, 1:39-51. Washington, D.C.: American Council for an Energy-Efficient Economy.

California Energy Commission, 1997. *Summaries of California Utilities' Measurement and Evaluation Studies as Presented in the Database of Energy Efficient Resources (DEER)*.

Cavallo, James and J. Mapp, 2000. "Targeting Refrigerators for Repair or Replacement", in *Proceedings of ACEEE 2000 Summer Study on Energy Efficiency in Buildings*, 2:15-33. Washington, D.C.: American Council for an Energy-Efficient Economy.

California Energy Commission, 1999. *Evaluation of Small Air Conditioning Units for Northern/Central California Climates, Task 3 – Research Available Technologies*, prepared by Pacific Gas & Electric Company, CEC Contract #500-97-10, Project #1. November.

California Energy Commission, 2000. *Proposed Changes to Appliance Efficiency Regulations, and, Corresponding Changes to Building Standards*, California Code of Regulations, Title 20 and 24, November.

California Energy Commission, 2001. *Appliance Efficiency Database*, www.energy.ca.gov/efficiency/appliances.

Consortium for Energy Efficiency, 2001. Website summary of Consortium for Energy Efficiency programs, www.ceeforMT.org.

- Chris Neme, John Proctor, Stephen Nadel, 1999. *Energy Savings Potential from Addressing Residential Air Conditioner and Heat Pump Installation Problems*, ACEEE Publication, February.
- Coito, Fred, G. Syphers, A Lekov, and V. Richardson, 1998. "Are Your Ducts All in a Row? Duct Efficiency Testing and Analysis for 150 New Homes in Northern California." In *Proceedings of the ACEEE 1998 Summer Study on Energy Efficiency in Buildings*, 1:33-41. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Davis, Bob, D Baylon, and A. Houseknecht, 1998. "Developing a Market-Based Utility Duct Sealing Program." In *Proceedings of the ACEEE 1998 Summer Study on Energy Efficiency in Buildings*, 2:21-31. Washington, D.C.: American Council for an Energy-Efficient Economy.
- DOE, 2001. *National Appliance Energy Conservation Act (NAECA) Standards*, United States Department of Energy, www.energy.gov.
- Downey, T and J. Proctor, 1998. *Investigation of the AC2 Air Conditioner, Final Report*, San Ramon, CA: Pacific Gas and Electric Company, Research and Development Department.
- Farrar-Nagy, S., P. Reeves, C. Hancock, and R. Anderson, 2000. "Impacts of Shading and Glazing Combinations on Residential Energy Use in a Hot Dry Climate", in *Proceedings of ACEEE 2000 Summer Study on Energy Efficiency in Buildings*, 1:63-76. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Francisco, Paul W. and, L. Palmiter, 2000. "Performance of Duct Leakage Measurement Techniques in Estimating Duct Efficiency: Comparison to Measured Results", in *Proceedings of ACEEE 2000 Summer Study on Energy Efficiency in Buildings*, 1:77-88. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Francisco, Paul W., L. Palmitter, and B. Davis, 1998. "Modeled vs. Measured Duct Distribution Efficiency in Six Forced-Air Gas-Heated Homes." In *Proceedings of the ACEEE 1998 Summer Study on Energy Efficiency in Buildings*, 1:103-114. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Haberl, Jeff, T. Bou-Saada, A. Reddy, and V. Soebarto, 1996. "An Evaluation of Residential Energy Conservation Options Using Side-By-Side Measurements of Two Habitat for Humanity Houses in Houston, Texas." In *Proceedings of ACEEE 1996 Summer Study on Energy Efficiency in Buildings*, 1:247-254. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Heshong Mahone Group, 1997. *Lighting Efficiency Technology Report, Volume 2: Scenarios Report*, prepared for the California Energy Commission, Report Number 400-95-012, May.

- Heshong Mahone Group, 1997. *Lighting Efficiency Technology Report, Volume 3: Market Barriers Report*, prepared for the California Energy Commission, Report Number 400-95-012, May.
- Heshong Mahone Group, 1997. *Lighting Efficiency Technology Report, Volume 4: Recommendations Report*, prepared for the California Energy Commission, Report Number 400-95-012, May.
- Hoeschele, Marc A., M. Berman, L. Elberling, and M. Hunt, 1998. "Evaporative Condensers: The Next Generation in Residential Air Conditioning?" In *Proceedings of the ACEEE 1998 Summer Study on Energy Efficiency in Buildings*, 1:147-158. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Jump, D., M. Modera, 1996. "Field Measurements of Efficiency and Duct Retrofit Effectiveness in Residential Forced Air Distribution Systems." In *Proceedings of ACEEE 1996 Summer Study on Energy Efficiency in Buildings*, 1:147-155. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Lerman, David, 1998. "Getting our Ducts in a Row: Evaluation of the Tacoma Duct Sealing Program." In *Proceedings of ACEEE 1998 Summer Study on Energy Efficiency in Buildings*, 2:115-126. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Mowris and Associates, 1999. *Major Incentives and Cost-effectiveness for the California Residential Contractor Program*, prepared for Southern California Gas Company, prepared by Robert Mowris & Associates, September.
- Neme, C., J. Proctor, and S. Nadel, 1999. *National Energy Savings Potential from Addressing Residential HVAC Installation Problems*, Washington, D.C.: American Council for an Energy-Efficient Economy.
- NEOS Corporation, 1994. *Technology Energy Savings Volume 1: Baseline Energy Use Characteristics*, prepared for the California Energy Commission, May.
- NEOS Corporation, 1994. *Technology Energy Savings Volume 2: Building Prototypes*, prepared for the California Energy Commission, May.
- NEOS Corporation, 1994. *Technology Energy Savings Volume 3: Measure Definition and Impact Estimation Methodology*, prepared for the California Energy Commission, May.
- NEOS Corporation, 1997. *Post Occupancy Residential Survey*, prepared for the California Energy Commission, prepared by NEOS Corporation. P400-94-015CN
- Pacific Energy Associates, Inc., 1998. *A Second Washwise market Progress Evaluation Report, Final Draft Report*, prepared for the Northwest Energy Efficiency Alliance, July.

- Pacific Gas and Electric Company, 2000. *Low Income Energy Efficiency Program Costs and Bill Saving Standardization (Draft) Report*.
- Pacific Gas and Electric Company, 2001. *Utility PY2001 Program Applications*, November.
- Proctor, John, M. Hoeschele, M. Berman, and L. Elberling, 2000. "The Home Cooling Program: Lessons Learned in Transforming the Residential Cooling Market." In Proceedings of ACEEE 2000 Summer Study on Energy Efficiency in Buildings, 2:139-151. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Regional Economic Research, Inc., 1997. *First-Year Load Impacts of Southern California Gas Company's 1994 Energy Advantage Home Program*, prepared for Southern California Gas Company, February.
- Regional Economic Research, Inc., 2000. *California Residential Efficiency Market Share Tracking: First Year Interim Report (Draft)*, prepared for Southern California Edison Company, October.
- RLW Analytics, Inc., 2000. *Statewide Residential Lighting and Appliance Saturation Study*, prepared for San Diego Gas and Electric Company, Sacramento Municipal Utility District and the California Public Utilities Commission, June.
- RS Means, 2000. *Means Light Commercial Cost Data, 2000*.
- RS Means, 2000. *Means Mechanical Cost Data, 2000*.
- RS Means, 2000. *Means Repair & Remodeling Cost Data, 2000*.
- San Diego Gas and Electric, 2001. *Utility PY2001 Program Applications*, November.
- San Diego Gas and Electric, 1998. *1996 Residential Weatherization Retrofit Incentives, First Year Load Impact Evaluation*, March.
- Schell, Mike and Dan Int-Hout, 2001. *The Drop in Price for CO2 Sensors*, ASHRAE Journal, February, p 18.
- Southern California Edison, 2001. *Utility PY2001 Program Applications*, November.
- Springer, David, L. Rainer, and G. Loisos, 2000. "Non-Compressor Cooling Alternatives for Reducing Residential Peak Load", in Proceedings of ACEEE 2000 Summer Study on Energy Efficiency in Buildings, 1:319-330. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Stone & Webster Management Consultants, Inc., 1993. *Resource Planning Guide: Volume 5 Reference Data*, prepared for Western Area Power Administration, December.

- Thorne, J., and K. Toru, 2000. "National and State-by-State Energy Savings and Pollutant Reductions: Making the Case for Stronger Appliance and Equipment Efficiency Standards", in Proceedings of ACEEE 2000 Summer Study on Energy Efficiency in Buildings, 9:355-369. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Walker, Iain S., M. Modera, A. Tuluca, and I. Graham, 1996. "Energy Effectiveness of Duct Sealing and Insulation in Two Multifamily Buildings." In Proceedings of ACEEE 1996 Summer Study on Energy Efficiency in Buildings, 1:247-254. Washington, D.C.: American Council for an Energy-Efficient Economy.
- Wilson, A., and J. Morrill, 1996. *Consumer Guide to Home Energy Savings*, published by the American Council for an Energy Efficient Economy, Washington, D.C.
- XENERGY, Inc., 1992. *Measure Cost Study*, prepared for the California Conservation Inventory Group.
- XENERGY, Inc., 1993. *Residential High Efficiency New Home Program Redesign*, prepared for Southern California Gas Company, December.
- XENERGY Inc., and Business Economic Analysis and Research, 1994. *Phase I Impact Analysis of the "A Better Idea" Program Final Report*, prepared for the Los Angeles Department of Water and Power, April.
- XENERGY, Inc., 1994. *Measure Cost Study*, prepared for the California Demand Side Management Committee.
- XENERGY, Inc., 1994. *R1 and R8 Residential DSM Programs: Impact Evaluation Final Report*, prepared for PSI ENERGY, Plainfield, India, August.
- XENERGY, Inc., 1996. *Demand-side Management Potential Study Final Report*, prepared for the Imperial Irrigation District, prepared by XENERGY, Inc., December.
- XENERGY, Inc., 1996. *Measure Cost Study*, prepared for the California Demand Side Management Committee.
- XENERGY, Inc., 1997. *Impact Evaluation of Pacific Gas and Electric Company's 1995 Residential Direct Assistance and 1995 Residential Energy Management Services Programs*, prepared for Pacific Gas & Electric Company, March.
- XENERGY, Inc., 1997. *Impact Evaluation of the 1995 Residential Direct Assistance Program, Final Report*, prepared for Southern California Edison Company, February.
- XENERGY, Inc., 1998. *PG&E and SDG&E Commercial Lighting Market Effects Study*, prepared for Pacific Gas and Electric Company and San Diego Gas and Electric Company.

XENERGY, Inc., 2000. *Energy Efficiency Saturation Compilation for PY2001; Response to Elements of Ordering Paragraphs #51 and #54*, prepared for Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas and Electric Company, and Southern California Gas Company, November.

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LIST OF ACRONYMS

ACEEE	American Council for an Energy Efficient Economy
AFUE	Annual Fuel Utilization Efficiency
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BDL	Building Descriptive Language, the computer language of the DOE-2 building energy simulation software.
CADMAC	California Demand Side Management Advisory Committee (earlier group that created the measure cost database)
CCIG	The California Conservation Inventory Group. The CCIG numbers are used for tracking broad categories of measures in the database.
CEC	California Energy Commission
CF-6R	Installation Certificate form from California's Title 24 energy code
CFL	Compact Fluorescent Lamp
CFM	Cubic Feet Per Minute
DEC	Direct Evaporative Cooler
DEER	Database for Energy Efficient Resources
DHW	Domestic Hot Water
DOE	U.S. Department of Energy
DOE-2	Simulation tool used to model building energy use
DX	Direct Expansion (a type of air conditioner)
E.F.	Energy Factor
EER	Energy Efficiency Ratio
EMS	Energy Management System
EUI	Energy Use Intensity/End Use Intensity
HDD	Heating Degree Days
HE	High Efficiency
HID	High Intensity Discharge
HO	High Output (e.g. HO-T5 lamps)
hp	Horsepower
HP	Heat Pump
HSPF	Heating Seasonal Performance Factor (heat pumps)

HVAC	Heating, Ventilation and Air Conditioning
IDEC	Indirect/Direct Evaporative Cooler
IEC	Indirect Evaporative Cooler
LADWP	Los Angeles Department of Water and Power
LED	Light Emitting Diode
Low-E	Low Emissivity: A coating on glass that limits heat transmittance from warm bodies and air masses; also referred to as “winter low-E”.
Low-E ²	Low Emissivity Squared: Second generation coating on glazings that limits heat transmittance from direct beam sunlight; also called “summer low-E”.
MCS	Measure Cost Study
MH	Metal Halide
NEMA	National Electrical Manufacturers Association
PAR	Parabolic Aluminized Reflector
PG&E	Pacific Gas and Electric
PRC	The Partnership for Resource Conservation
PTAC	Package Terminal Air Conditioner
PTHP	Package Terminal Heat Pump
RASS	Residential Appliance Saturation Survey
RCP	Residential Contractor Program
RER	Regional Economic Research
RET	Retrofit
ROB	Replace on Burnout
SCE	Southern California Edison
SCG	Southern California Gas
SDG&E	San Diego Gas and Electric
SEER	Seasonal Energy Efficiency Ratio
SMUD	Sacramento Municipal Utility District
Title 24	The California Energy Code
UEC	Unit Energy Consumption
VSD/VFD	Variable-Speed Drive/Variable-Frequency Drive