

### 2005 MEASURE COST STUDY FINAL REPORT

CALMAC Study ID: PGE0235.01

### Prepared by:

Summit Blue Consulting and Heschong Mahone Group

#### Contacts:

### **Summit Blue Consulting:**

Marshall Keneipp 720-564-1130 Floyd Keneipp 925-672-9431

### **Heschong Mahone Group:**

Cathy Chappell Cynthia Austin 916-962-7001

### Prepared for:

Ingrid Bran, Project Manager PG&E

**December 9, 2005** 

# **TABLE OF CONTENTS**

Ex	ecutive	Summary	1
]	ES.1 Pr	ocess Overview	1
]	ES.2 Re	esults and Findings	3
]	ES.3 Re	ecommendations for Future Studies	4
1.	Intro	duction	6
	1.1	Background	6
	1.2	Project Coordination	7
	1.3	Overview of Differences Between 2001 and 2005 Measure Cost Data	7
	1.4	Issues and Recommendations for Future Studies	8
	1.5	Organization of the Report	10
2.	Data	Collection Methodology and Data Sources	11
,	2.1	Introduction	11
,	2.2	Data Collection Methods and Sources	11
	2.2.1	Web Search and Retail Data Collection	12
	2.2.2	Manufacturers, Manufacturer Sales Representatives, and Wholesale Data Collection	13
	2.2.3	Contractor and Design Professional Data Collection	14
	2.2.4	Cost Data from Utility Program Files and Databases	14
	2.2.5	Secondary Sources	14
,	2.3	Measure Technical Specifications	15
,	2.4	Data Management.	15
3.	Cost	Analysis Methodology	17
	3.1	Cost Analysis Process Overview	17
	3.2	Analytic Methods	19
4.	Meas	ure Cost Results	21
4	4.1	Guide to the Measure Cost Data	21

4.1.1	Organization of the Cost Data	22
4.1.2	Using the Cost Data	22
4.1.3	Application and Cost Basis	23
4.1.4	Cost Units	25
4.1.5	Data Definitions	26
4.2 N	Market Factors Affecting Measure Costs	27
4.2.1	Appliances	28
4.2.2	Building Shell	29
4.2.3	Lighting	30
4.2.4	Residential HVAC	32
4.3 N	Measure Cost Data	33
Appendix A	: Measure Technical Specifications for Cost Research	A-1
Appendix B	: Measure Cost Data	B-1
Appendix C	: Analytic Methods, Observations and Measure Statistics	C-1

### **EXECUTIVE SUMMARY**

This report presents the results and findings from the 2005 Measure Cost Study (MCS). The measure cost data are summarized in this report and are available online at the Database for Energy Efficiency Resources (DEER) website (http://eega.cpuc.ca.gov/deer/). The MCS results provide cost information on the complete list of non-weather sensitive and weather-sensitive residential and non-residential measures, and refrigeration measures as included in the 2004-05 DEER Update conducted by Itron. This study was completed under contract to Pacific Gas & Electric Company (PG&E) on behalf of California's investor owned utilities, the California Public Utilities Commission (CPUC) Energy Division, the California Energy Commission (CEC), and the CPUC Office of Ratepayer Advocates. The study was funded with Public Goods Charge (PGC) monies.

### **ES.1 Process Overview**

In the 2005 MCS, an important improvement over the previous measure cost updates was the coordination and synchronization of the energy savings and measure cost data in the DEER Update. The DEER Update project was conducted by Itron. The Summit Blue team and the Itron team coordinated throughout the course of the two projects on a number of issues. The specific measures to be included in the DEER Update were defined by the Itron team and a list of these measures with their descriptions was provided to the Summit Blue team. In addition to coordination on the measures to be examined, the two teams coordinated on technical definitions of each measure and collaborated on how the cost data would be presented in the database.

A critical component of the coordination effort was to obtain clarification of the measure specifications used in the savings analysis for the DEER Update and link those specifications to the range of available products for pricing in any given measure category. In some respects, measure definitions for savings analysis purposes can be different than measure definition for pricing purposes. The primary difference lies in the fact that the measure specifications for savings analysis, in general, are intended to portray representative or average performance characteristics for a given technology or application, while specifications for pricing purposes are necessarily linked to discrete product and system features, and for levels of products and services that are actually available in the market. For example, the savings estimated for residential AC systems are based on assumptions about home construction characteristics, climate zone, and typical baseline and energy efficient equipment efficiencies by vintage. Costing on the other hand has little to do with home characteristics and is entirely related to size (tons), efficiency, manufacturer, and product features (e.g., type of expansion valve). The teams corresponded frequently to ensure that the measure specifications used in the savings and cost analyses were as closely coordinated as possible. In addition, the project required that the cost data be submitted in a format that facilitated the update to the online DEER database. In order to ensure that the cost data were consistent with the savings data, it was necessary to coordinate on measure lists, data presentation format, data elements to be reported, and the normalization units used.

Throughout the course of the project, the project team strived to develop a systematic approach to the cost data collection and analysis. Data collection instruments were prepared as one of the first tasks in the project. The instruments were pre-tested for a few select measures and revised to provide consistency of data elements and flexibility across measure categories in terms of specific performance variables needed to identify the product or system to be priced. The data collection methods employed in the study were generally similar to those developed and utilized for the 2001 Measure Cost Study with the exception that extensive use was made of the Internet for mass market and product oriented measures such as appliances and commodity items.

Several different data collection strategies were employed to meet the unique data collection and analysis needs associated with each type of technology or measure. Data sources included:

- Website and on-site cost surveys of retailers
- Cost quotes from manufacturers, manufacturer sales representatives, and distributors
- Cost surveys of contractors and design professionals
- Cost data from California DSM program files, particularly local programs
- Secondary sources and reports

Data to support the development of measure costs were collected from the above wide range of sources. A total of over 12,100 cost observations were collected in the preparation of the results presented in this report. The cost observations include over 145 observations on actual equipment and installation data on residential furnace systems from contractors through a California local energy efficiency program.

The raw cost data were entered into and organized in a series of Cost Analysis Workbooks; a separate workbook was created for each end use and measure category. The Cost Analysis Workbooks also include the technical specifications pertinent to each measure and are structured to provide the ability to capture all cost elements in one form. The Cost Analysis Workbooks are comprised of six information or data components:

- 1. **Contact log** Each of the contacts from which data were obtained were noted including contact name, company, contact information and website URL
- 2. **Raw cost data** All of the cost data for each measure category and measure ID are recorded in this workbook.
- 3. **Data sorted for analysis** The raw cost data sorted and organized for the purpose of analyzing each measure ID.
- 4. **Analysis** Analysis of the raw cost data of each measure was completed with the appropriate method.
- 5. **Results** The final results to be reported and posted on the website were compiled in this section of the workbook.
- 6. **Statistical summary** A basic statistical summary of the cost data for each measure was prepared, including range, confidence, and standard deviation of the data.

The Cost Analysis Workbooks were submitted electronically to the PG&E project manager as a separate deliverable to this report. Because of confidentiality considerations, these workbooks do not include the contact log. This log will be maintained by Summit Blue.

In the preparation of the cost data, the raw cost data were processed through one of four different analytic methods which are summarized below. The analytic approaches are embedded in the Cost Analysis Workbooks.

• **Simple average** – The simple average method takes all cost observations for a particular measure and averages them – discarding outliers in some cases where a particular observation appeared drastically out of line.

- **Weighted average** The weighted average uses one or more observed market variables (market share of a particular model, cost based on specific volume purchase, etc.) to derive the average cost.
- Regression cost model Regression modeling was employed for many measures. Relevant
  performance factors were incorporated as independent variables in the cost model for each
  measure.
- Custom cost estimates This approach was typical of "engineered" and/or technically complex types of measure. Custom cost estimates were employed where a unique equipment or system configuration needed to be defined by the project team and a cost estimate "built up" for the specific technical details of the measure.

### **ES.2 RESULTS AND FINDINGS**

Measure Cost Data are available in three different forms. First, the data are available as part of the measure savings data available on the DEER website. These data are specifically linked to each measure configuration used by the savings data on the website. Second, the data are available as a supplemental downloadable file titled "Cost Data" under Supporting Documents on the website. These data contain more detail and measure variations than the pricing included in the measure savings data detail. Finally, the measure cost data are provided as a hard copy in this final project report.

The measure cost data include full installed and incremental equipment cost estimates as deemed appropriate for each of the measures included in the DEER Update. Cost estimates are provided for three hundred and forty-one (341) non-weather sensitive and weather sensitive, residential and non-residential measures and refrigeration measures/technologies. All of the costs are presented in 2005 dollars. It is also important to note that the costs are first costs only and *do not include life cycle or ongoing operations and maintenance (O&M) costs or cost savings*. In addition to the pricing values, the presentation includes descriptive factors for each measure including measure and base case descriptions, application, cost basis, cost units, and other attributes as defined in this report.

In addition to the measure cost data, this report and the detail provided in the cost analysis includes detailed statistics and values on the cost data collected during the data analysis phase of the project. These data include factors such as mean, minimum and maximum costs, standard deviation, precision and a variety of other statistical indicators related to the cost data. These data are useful for assessing the statistical validity of the cost data, and understanding the identifying extreme price points and the range of costs for a given measure

There are five data elements to the cost reporting of measures:

- 1. Measure equipment cost the cost of the energy-efficient technology
- 2. Base equipment cost the cost of the baseline efficiency technology
- 3. Incremental cost the difference between the measure equipment cost and the base equipment cost
- 4. Labor cost the installation cost of the measure including contractor overhead & profit
- 5. Installed cost the sum of the incremental measure equipment cost and labor cost

For a measure, the cost reporting may include all of these cost elements or only a subset depending on the characteristics of the measure. Application and Cost Basis factors were used to determine which cost

elements are reported. These two factors are linked in the sense that the application typically leads to the determination of the cost basis. The application identifies the types of projects where the measure is expected to be applied. There are three application scenarios that have been used. Each scenario is also designated by a three letter code as indicated in the parentheses below:

- **Retrofit** (**RET**) replacing an existing, working technology with a new energy efficient technology or installing an energy efficient technology that was not there before in lieu of a standard technology. This application basis is also known as "early replacement".
- **Replace-on-burnout** (**ROB**) replacing an existing technology at the end of its useful life with a new energy efficient technology in lieu of a standard technology
- New construction (NEW) installing an energy efficient technology in a new construction or a major renovation project in lieu of a standard technology

The cost basis is used to define for each measure whether the appropriate cost is the incremental equipment or full installed cost. The cost basis is determined by: a) the application (RET, ROB, or NEW); and b) whether it is displacing an existing technology, installed in the absence of an existing technology, or is an alternative to a competing technology. The cost basis designation is used to define whether the cost is:

- **Incremental (INCR)** the differential cost between a base technology and an energy-efficient technology
- Installed (FULL) the full or installed cost of the measure including incremental equipment cost, labor, overhead & profit (OH&P)

Note that each cost basis is also designated by a four letter code as indicated in the parentheses above.

There are two types of normalization or common units (e.g., square foot, tons, horsepower, etc.) used in DEER: savings common units and cost common units. In many cases the units for savings and cost are the same. For some measures, however, the common units differ. In the presentation of the data, this is indicated by the cost common unit field in the downloadable supporting cost data. The cost common unit codes are also indicated under the cost basis field in the measure savings data details on the website.

The cost data compiled for the 2005 MCS differs from the 2001 DEER Update measure cost data in several substantive ways. First, several measures have been eliminated. Most notably, most T8 systems have been eliminated with the exception of premium efficiency and dimming T8 ballasts. In other cases, new measures and measure categories have been added. For example, agriculture measures, vending machine occupancy sensor controls, high-efficiency office copiers, high-efficiency commercial cooking equipment, and premium-efficiency motors have been added, and the list of non-residential HVAC measures has been expanded. In addition, equipment efficiencies for packaged air conditioners and other HVAC equipment have been increased to account for the 2005 Title 20/24 code changes. A summary comparison of 2001 and 2005 cost data is provided in Section 4 of this report. In terms of new data sources, the project team was able to utilize the Internet much more extensively for cost observations than was possible for previous updates.

### **ES.3 RECOMMENDATIONS FOR FUTURE STUDIES**

The experience of the MCS team indicates that the cost analysis process is best served by a systematic approach to pricing that is consistent with industry practices. Every attempt was made by the project team

to systematize the process and bring as much rigor to the cost research as possible. The project team believes that future DEER cost studies will benefit from this type of approach and can further refine and enhance the process. Below are several specific recommendations for conducting future measure cost studies.

- 1. Develop a clear specification for each measure, and make sure the measure specifications are coordinated between the savings analysis and the pricing. In many cases, the definitions and parameters used in savings analysis need to be translated into equipment specifications that are actually being offered in the market. This is an important first step in developing a set of technology specifications that can be priced. It is recommended that measure specifications include the following details for both the base and energy-efficient technology or application:
  - Technology or application description
  - Size or capacity for example, 150 tons, 18 Watts, 25 horsepower. This may not always be known in advance but a representative range can almost always be identified.
  - Efficiency for example, 13 SEER, 10 EER, 85%.
  - Other performance characteristics for example, two-speed, variable speed, dimming.
  - Application new construction, retrofit, replace-on-burnout.
  - Normalization units for example, square foot, horsepower, ton.
  - Cost basis incremental cost, installed cost.
- 2. **Systematize the pricing process to the extent possible.** The pricing process should be systematized so that it is transparent to the user, reproducible, transferable to the next analyst, consistent with industry pricing practices, and sufficiently well documented so that reviewers can retrace the data sources and analytic process.
- 3. Index certain costing elements to industry recognized pricing methods and resources. Referring to industry recognized sources for some aspects of the research allows the analyst to minimize the need for original research from hard-to-access resources (e.g., contractors), and provides consistency with other accepted methods.
- 4. Conduct more frequent, targeted, and less expansive updates. While the periodic comprehensive update approach certainly has merit, some costs have a short shelf life and need to be updated more frequently while others are more stable over time. It may be advisable to conduct limited annual updates to keep in touch with the market and be on top of market dynamics for selected measures, to research new measures as they become mature in the market, and to account for changes in the focus of California's DSM programs.
- 5. Integrate cost data collection and reporting into program implementation if possible. There is potentially a wealth of data available through the program implementation process. Clearly, integrating cost data collection and reporting into existing programs where data and fulfillment processes are already in place is easier said than done. However, for future programs, this integrated approach could be adopted. It may be most useful for specific types of applications such as HVAC system installations or new construction applications, where pricing is relative to and dependent on other aspects of the project and often hard to get on a systematic basis from busy contractors and trade professionals.

### 1. Introduction

This report presents the results of the 2005 Measure Cost Study (MCS). The results of the cost analysis are presented in this report and available on the Database of Energy Efficiency Resources (DEER) website (<a href="http://eega.cpuc.ca.gov/deer/">http://eega.cpuc.ca.gov/deer/</a>) as part of the measure savings data details and in a more expansive form as a downloadable supplemental dataset. This report provides an overview of the MCS project, a discussion of the coordination of the cost research with the work of the DEER Update project team, a review of the data collection and cost analysis process, and a summary of the measure cost data. This study was completed under contract to Pacific Gas & Electric Company (PG&E) on behalf of California's investor owned utilities, the California Public Utilities Commission (CPUC) Energy Division, the California Energy Commission (CEC), and the CPUC Office of Ratepayer Advocates. The study was funded with Public Goods Charge (PGC) monies.

### 1.1 Background

The Database of Energy Efficiency Resources (DEER) provides measure savings and cost data that are used by energy efficiency program planners in California to estimate the potential demand and energy savings and costs attributable to specific energy-efficient measures (EEMs) that may be included in demand-side management (DSM) programs. A comprehensive update of DEER was initiated in 2003 to update the savings data in DEER. The DEER Update was managed by Itron. During the 2004-05 phase of the DEER Update, a separate contract was awarded to Summit Blue to conduct parallel research on cost updates to be incorporated into the DEER Update. This was a necessary aspect of the DEER Update because cost data is essential in assessing the cost-effectiveness of programs designed to achieve demand and energy savings in residential and non-residential sector applications. The cost data contained in this deliverable are pertinent to current planning efforts underway at utilities and other program implementers in the state for the 2006-08 program cycle.

The MCS results presented herein provide cost information on the complete list of non-weather sensitive and weather sensitive measures included in the 2004-05 DEER Update. An interim MCS report presenting the results of the cost analysis of the non-weather sensitive and high priority weather sensitive measures was submitted on March 15, 2005. This report includes the measures submitted for the March 15 deadline as well as the balance of the measures analyzed in the intervening time period. It should be noted that the results for some of the measures submitted for the March 15 deadline have been refined and adjusted for this deliverable. For all its intended purposes, this final report and the final cost data supersede all previous deliverables of the 2005 MCS project.

The measure cost study was initiated at the kick-off meeting at PG&E's San Francisco offices on January 5, 2005. Development of the research plan, data collection protocols, and data collection instruments began shortly after project kick-off. As part of the project initiation process, the project team attempted to access data collection instruments and contact information from the prior study in order to "quick start" the data collection process and make sure that the current study built upon and was as consistent as possible with prior work. Other than those documents that are available publicly through CALMAC or the CEC website, however, we were not able to access electronic documentation on the prior efforts, and thus the project team developed its own data collection systems. Throughout the course of the project, the project team developed a systematic approach to cost data collection and analysis, and worked to index data collection and data reduction procedures to commonly accepted cost estimating methods and standards.

### 1.2 Project Coordination

In the 2005 MCS, an important improvement over the previous measure cost updates was the coordination and synchronization of the savings and measure cost data in the DEER Update. The Summit Blue team and the Itron team coordinated throughout the course of the two projects on a number of issues. The specific measures to be included in the DEER Update were defined by the Itron team and a list of these measures with their descriptions was provided to the Summit Blue team. In addition to coordination on the measures to be examined, the two teams coordinated on technical definitions of each measure and collaborated on how the cost data would be presented in the database.

Measure definition for savings analysis purposes can be different than measure definition for pricing purposes in some respects. The primary difference lies in the fact that measure specification for the savings analysis is intended to portray representative or average performance characteristics for a given technology or application, while specification for pricing purposes is necessarily linked to discrete product and system features and products and services that are actually available in the market. An important overall aspect of the coordination effort was to obtain clarification of the specifications used in the savings analysis for the DEER update and link those specifications to the range of available products for pricing in any given measure category. The clarification process was executed through a series of discussions and email correspondence with the Itron team.

The project required that cost data be submitted in a format that facilitated the cost data incorporation into the online DEER. In order to assure that the cost data were consistent with the savings data, it was necessary to coordinate on measure lists, data presentation format, data elements to be reported, and the normalization units to be used.

In addition to coordination with the Itron team, the project team communicated regularly with the PG&E project manager through emails, as-needed telephone calls, a regularly scheduled biweekly project status call, and monthly status reports.

# 1.3 Overview of Differences Between 2001 and 2005 Measure Cost Data

The cost data compiled for the 2005 MCS differs from the 2001 DEER Update measure cost data in several substantive ways. First, several measures have been eliminated. Most notably, most T8 systems have been eliminated with the exception of premium efficiency and dimming T8 ballasts. The primary reason for this is that T8's are now considered the baseline technology for lighting retrofits and new construction in California. In other cases, new measures and measure categories have been added. For example, agriculture measures, vending machine occupancy sensor controls, high-efficiency office copiers, high-efficiency commercial cooking equipment, and premium-efficiency motors have been added, and the list of non-residential HVAC measures has been expanded. In addition, equipment efficiencies for packaged air conditioners and other HVAC equipment have been increased to account for the 2005 Title 20/24 code changes.

In addition to the elimination or modification of the specifications of some measures, other measures have become more widely available and accepted by the market. For example, the 2001 DEER Update included only low income direct evaporative coolers. The 2004-05 DEER Update includes both direct coolers as well as direct/indirect coolers. These latter units provide better comfort at high temperatures, and therefore are applicable in many parts of California that previously did not utilize evaporative coolers. In terms of data sources, the project team was able to utilize the Internet much more extensively for cost observations than was possible for previous updates. Many more retailers, for example, make a wide

range of product prices available online today than did four years ago. Observations on market factors and cost trends from 2001 to 2005 measure cost data for selected technologies are presented in Section 4.

### 1.4 Issues and Recommendations for Future Studies

As noted above, the project team attempted early on to review the methodologies and resources used in the prior study. We believe that the cost analysis process is best served by a systematic approach to pricing that is consistent with industry practices, and the project team has made every attempt to systematize the process and bring as much rigor to the cost research as possible. Going forward, we believe that future DEER cost analyses will benefit from this type of approach and can further refine and enhance the process. Below are several specific recommendations for conducting future measure cost studies.

1. Develop a clear measure specification for each measure, and make sure the measures specifications are synchronized between the savings analysis and the pricing. Most measures that are promoted by DSM programs are discrete technologies or applications with fairly clear boundary conditions. A clear and complete measure description forms the basis for both the savings and cost analyses. Formulating the measure description should take into account how the measure is defined in the marketplace. For example, commercial windows were defined as a percentage improvement in energy efficiency. While this may be a program-needed formulation for defining the measure and determining energy savings through modeling, it is less straightforward as a basis for obtaining costs. In this case, the project team had to determine a range of window types which would fit into the measure specification in order to collect costs. Similarly, normalization units need to reflect how the measure is priced. For example, the energy savings for residential evaporative coolers were calculated per 1000 square feet of house floor area. For the cost analysis, it is difficult to determine cost per square foot since cooling area per unit depends on variety of factors. Measure specifications should also account for any location or building type factors that could significantly impact pricing.

We recommend that the measure descriptions be completed and that the coordination process between the savings and cost teams be started as early as possible, preferably before research has begun. In the view of the MCS team, the measure specifications should have the following details for both the base and energy-efficient technology or application:

- Technology or application description
- Size or capacity for example, 150 tons, 18 Watts, 25 horsepower. This may not always be known in advance but a representative range can almost always be identified.
- Efficiency for example, 13 SEER, 10 EER, 85%.
- Other performance characteristics for example, two-speed, variable speed, dimming.
- Application new construction, retrofit, replace-on-burnout.
- Normalization units for example, square foot, horsepower, ton.
- Cost basis incremental cost, installed cost.

The measure specifications could be developed in a form such as that shown in Exhibit 1-1.

**Exhibit 1-1. Sample Measure Specification Layout** 

	Energy-efficient Case			Base Case							
Measure ID	Measure Description	Size	Efficiency	Performance Characteristics	Baseline Description	Size	Efficiency	Performance Characteristics	Application	Cost Basis	Cost Units
1											
2											

It should be noted that much of this information was included in the descriptions of the measures included in the DEER Update. However, in many cases the measure descriptions required significant interpretation and the MCS team had to detail the measure specifications according to the types of information indicated in Exhibit 1-1 for costing purposes. The difficulty with this approach is the occasional asymmetry between the savings and cost analyses that results from independent interpretations. Using a format similar to that shown in Exhibit 1-1 would help to minimize this difficulty. This does not necessarily need to be a daunting task and a nominal investment in developing these specifications would pay off in terms of less ambiguity and interpretation on the part of both researchers and users.

- 2. **Systematize the pricing process to the extent possible.** The pricing process should be systematized so that it is transparent to the user, reproducible, transferable to the next analyst, consistent with industry pricing practices, and sufficiently well documented so that reviewers can retrace the data sources and analytic process. To this end, the cost team has developed a set of data collection and analysis tools designed to systematize the pricing process to the extent possible. In addition to providing for greater transparency, consistency, and reproducibility in the final product, this has the additional advantage that future analysts will have a rigorous and well defined starting point for their work and be able to build upon the results of prior measure cost studies. The MCS team has developed a data collection and analytic template in Microsoft Excel that includes the raw dataset, analytic method, final results, and a statistical summary of the data. We recommend that this template or a next generation variant be used for pricing purposes for future studies.
- 3. **Index certain costing elements to industry-recognized pricing methods and resources.** Referring to industry recognized sources for some aspects of the research allows an analyst to minimize the need for original research from hard-to-access resources (e.g., contractors). We believe that it is both useful and necessary to index to and refer to industry benchmark pricing resources and processes such as R.S. Means. This brings the ability to leverage the substantial data mine of these resources and bring greater analytic consistency with established, recognized, and well developing pricing processes. This may be most applicable in the case of defining installation costs.
- 4. **Conduct more frequent, targeted, and less expansive updates.** While the periodic comprehensive update approach certainly has merit, some costs have a short shelf life and need to be updated more frequently or in response to market dynamics while others are more stable over time. It may be advisable to conduct limited annual updates to keep in touch with the market and be on top of market dynamics for selected measures, to research new measures as they become mature in the market, and to account for changes in the focus of California's DSM programs.

As noted in the previous measure cost studies, limiting measure cost research to major periodic studies results in an important limitation. Incremental measure costs are a critical input to tests that are used in energy-efficiency planning process to determine program cost effectiveness. Because measure costs change over time, they should not be unnecessarily static. To the extent that measure costs are used as part of the program planning and regulatory approval process, a process should be put in place that allows these benchmark costs to be "refreshed" between major study efforts as new information warrants.

5. Integrate cost data collection and reporting into program implementation if possible. There is potentially a wealth of data available through the program implementation process. For example, in the current cost update the cost team was able to get actual contractor equipment and installed cost data for some HVAC measures through one of the local efficiency program implementation contractors. This is among the best quality data because it reflects what a customer actually paid a contractor for the equipment and installation. Program data collection systems could be put in place specifically to collect cost data as part of an integrated data collection process. We recognize that this is easier said than done, particularly for existing programs where data and fulfillment processes are already in place. However, for future programs, this integrated approach could be adopted. It may be most useful for specific types of applications such as HVAC system installations or new construction applications where pricing is relative to and dependent on other aspects of the project and often hard to get on a systematic basis from busy contractors and trade professionals.

### 1.5 Organization of the Report

A discussion of data collection methodology and data sources is contained in Chapter 2, a discussion of cost analysis methodologies is provided in Chapter 3, and a discussion of the measure cost data and a guide to interpreting the cost data is provided in Chapter 4. A cost data user's guide for inclusion on the DEER website was also provided as a separate deliverable. The appendices contain the following information including a print listing of the measure cost data:

Appendix A: Measure Technical Specifications for Pricing

Appendix B: Measure Cost Data

Appendix C: Analytic Methods, Observations, and Measure Statistics

In addition to this report, project deliverables include:

- A cost data user's guide for inclusion on the DEER website.
- A supplemental downloadable cost data file in Microsoft Excel for inclusion on the DEER website.
- A 3-page summary of the salient findings of the project.
- A set of Cost Analysis Workbooks in Microsoft Excel provided electronically to the PG&E project manager.

### 2. DATA COLLECTION METHODOLOGY AND DATA SOURCES

### 2.1 Introduction

This section provides an overview of the methods and data sources used to collect the measure cost information developed for the 2005 Measure Cost Study. The methods employed are generally similar to those developed and utilized for the 2001 DEER Update measure cost data with one very notable exception. The boom of the Internet as an information resource has enabled a great deal of cost research, particularly for mass market and product oriented measures such as appliances. For those measures which are more custom or engineered in nature, the Internet is not quite as useful directly for pricing, but is a powerful tool for measure research and understanding of technical features and options and for contact information.

One of the first tasks undertaken by the project team was to clarify which measures were to be researched and what the technical specifications (e.g., capacity/size, efficiency, performance parameters) were for each measure. As noted above, Itron provided lists of measures to the project team and a copy of the October 2004 draft DEER phase 1 report on non-weather sensitive measures. While the lists and the October report provided basic details on each measure, the project team requested clarification on several occasions on technology performance characteristics and sizes for costing purposes. From these communications, the project team compiled a set of performance specifications for cost purposes for each measure. A data collection process was designed to capture cost data according to these specifications.

### 2.2 Data Collection Methods and Sources

Data to support development of the measure costs provided in this report were collected from a wide range of sources. A total of over 12,100 cost observations were collected in the preparation of the results presented in this report. These data included over 145 observations on actual equipment and installation cost data on residential furnace systems from contractors through a California local energy efficiency program. Appendix C provides information on the number of observations by measure.

Data collection instruments were prepared as one of the first tasks in the project. The instruments were pre-tested for a few select measures and revised to provide consistency of data elements and flexibility across measure categories in terms of specific performance variables needed to identify the product or system to be priced.

To accommodate the large number and variety of technologies and measures for which cost estimates were developed on this project, several different data collection strategies were employed to meet the unique data collection and analysis needs associated with each type of technology or measure. The resulting portfolio of sources consisted of:

- Website searches and on-site cost surveys of retailers
- Cost quotes from manufacturers, manufacturer sales representatives, and distributors
- Cost surveys of contractors and design professionals
- Cost data from California DSM program files, particularly local programs
- Secondary sources and reports

The data collected generally fell into three categories: 1) wholesale data, 2) retail data, and 3) Manufacturers Suggested Retail Prices (MSRP). The goal of the cost data analysis was to portray the

cost that would be experienced by the end use customer, so various adjustment factors were applied to these different data types to compute values that represented retail costs at the customer level.

A mapping of data collection sources to technology types is provided in Exhibit 2-1 for Non-Weather Sensitive, Residential Weather Sensitive, Non-Residential Weather Sensitive and Refrigeration measures. Each of the source types is described in more detail in the subsections that follow.

**Exhibit 2-1: Summary of Data Sources** 

	Website Searches and	Manufacturers, Manufacturer	Contractors and	Utility and Local Program	
	On-Site Retail	Representatives,	Design	Implementator	Secondary
Measure Category	Surveys	and Distributors	Professionals	Data	Sources
Non-Weather Sensitive Measures					
Appliances	X	X			
Commercial Cooking	X	X			
Copiers	X	X			
Domestic Hot Water	X	X			
Lighting	X	X			X
Lighting Controls	X	X			X
Motors	X	X			X
Pool Pumps	X	X			X
Vending Machine Occupancy Controls	X	X			
Residential Weather Sensitive Measures					
HVAC	X	X		X	X
HVAC Diagnostics and Tuneup			X		X
Insulation	X	X	X		X
Windows	X	X			X
Sunscreens	X	X			X
Window Films	X	X			X
Non-Residential Weather Sensitive Meaures					
HVAC	X	X	X		X
Domestic Hot Water	X	X			X
HVAC Motors		X			X
Cool Roof		X	X		
Windows		X			X
Lighting Controls		X	X		X
Skylights		X	X		
HVAC Diagnostics and Tuneup			X		X
Time Clocks	X	X			
Duct Insulation	X	X			
Energy Management Systems		X	X		
Refrigeration Measures					
Supermarket Refrigeration		X	X		
Warehouse Refrigeration		X	X		

#### 2.2.1 Web Search and Retail Data Collection

As noted above, the maturity of the Internet as an information resource has enabled a great deal of online research including technical information on measure performance and price information. As a pricing tool, the Internet is primarily useful in researching the costs of mass market or product oriented measures. The advantages of Internet price research include the ability to research a large number of cost sources and measure variations for a relatively low cost, transparency of pricing as the price quotations are publicly posted and directly available to all potential purchasers, and ease of refreshing the cost data for future updates. In addition, for those measures which do not lend themselves to direct pricing over the Internet, web research still serves as a valuable tool for technical research on measure features and performance variables that impact pricing. Internet research was used extensively for this measure cost update.

The technologies and measures relying substantially on Internet and retail outlet cost data collection included:

- Compact fluorescent lamps, metal halide and high pressure sodium lamps, fluorescent ballasts, and exit signs
- Office copiers
- Refrigerators, clothes washers, clothes dryers, and dish washers
- Room air conditioners, package terminal air conditioners, and water-source heat pumps
- Water heaters, tank insulation, duct insulation, low-flow showerheads and faucet aerators
- Pool pumps

Many of the mass market or product oriented technologies within the scope of this study are normally purchased directly by end users from retail stores, and on-site surveys at retail outlets were also utilized for data collection for this class of measures. The on-site surveys were concentrated in the San Francisco Bay and Central Valley areas. Research at Southern California outlets was conducted by phone or over the Internet via location specific websites. Surveys were conducted at hardware stores, department stores, and home improvement outlets.

# 2.2.2 Manufacturers, Manufacturer Sales Representatives, and Wholesale Data Collection

Much of the cost data collected for this study was derived directly from manufacturers, manufacturer sales representatives, and wholesale distributors. This is a particularly important research path for products such as non-residential air conditioning, some commercial building products such as high performance commercial glazing, and refrigeration measures. Some of the unique considerations in approaching manufacturers about pricing are: a) manufacturers often supply their products through a distributed network of sales representatives and wholesale or vendor outlets, and b) pricing for certain types of products such as air conditioning is quite competitive and sources often require management approval and assurances of confidentiality to release price information.

It is important to recognize and note the nature of the price information received from these sources. Generally, price quotations can be grouped into wholesale pricing (the price to vendor outlets), Manufacturers Suggested Retail Pricing (pricing available for public consumption and the price that manufacturers suggest that contractors charge), and retail pricing (the actual consumer price for the product). With regard to retail pricing, exceptional conditions such as sales or promotional events were excluded from the research. As a general guide, the pricing presented in the 2005 MCS represents enduse level pricing with the distinction that some measures lend themselves to price discounts for volume purchases. Thus, pricing for some measures distinguishes between low and high volume purchases. When working with wholesale pricing, it is typically required to apply a contractor mark-up in order to arrive at end-user pricing. This method is important for technologies that are typically purchased and installed for end-users by contractors.

The technologies for which manufacturers and wholesale costs were most important for this update include:

- Non-residential HVAC equipment and systems
- Residential HVAC equipment
- Non-residential refrigeration and systems

- Non-residential high performance glazing
- Premium-efficiency motors
- Vending machine occupancy sensor controls
- Commercial cooking equipment

### 2.2.3 Contractor and Design Professional Data Collection

It is quite 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 cost values. Contractors can be a particularly important source of information on field installed types of measures (as opposed to over-the-counter purchases) where the practicalities of field installation are an important consideration and may have little to do with the cost of the product itself. Contractors with specialized knowledge of the HVAC, refrigeration, and building construction practices provided information on installation times, competitive product pricing, hourly rates, equipment markup percentages, and high volume discount percentages.

Information provided by contractors was used to develop prices for measures such as:

- System oriented measures such as refrigerant charging and duct leakage sealing
- Furnaces
- Air conditioning
- Whole house fans

Design professionals such as mechanical engineers, were also consulted on pricing for more complex, system-oriented engineered types of measures such as waterside economizers.

### 2.2.4 Cost Data from Utility Program Files and Databases

Another valuable source of cost data for this project has been utility program records. For the 2005 MCS, a local partnership program was a particularly fruitful source where the project team was able to gather over 145 data points for the installation of high-efficiency furnaces and air conditioning units.

### 2.2.5 Secondary Sources

The final sources of cost data included in this study came from several secondary sources. Most notably, the following resources were drawn upon as a resource for cost data:

- MotorMaster for motor cost data. This resource was supplemented by contacts with motor manufacturers.
- RS Means CostWorks 2005. RS Means is the preeminent costing resource for construction cost estimating. This resource was used to determine equipment and installation costs for selected measures.
- Vaughens motor rewind cost data.

### 2.3 Measure Technical Specifications

The measure lists and measure descriptions provided by the Itron team included basic information on the base case and energy-efficient technologies. It was necessary for the MCS team to expand upon the measure definitions and developed more detailed specifications in terms of equipment size, efficiency, and features. Measure specifications were developed for each measure as part of the data collection effort. The types of data included in the specifications for each measure include:

- Baseline measure/technology size or capacity
- Energy-efficient measure/technology size or capacity
- Baseline measure/technology efficiency
- Energy-efficient measure/technology efficiency
- Performance features such as speed, flow rate, insulating value, and electrical characteristics

Appendix A summarizes the measure specifications identified for each measure in each measure/technology category.

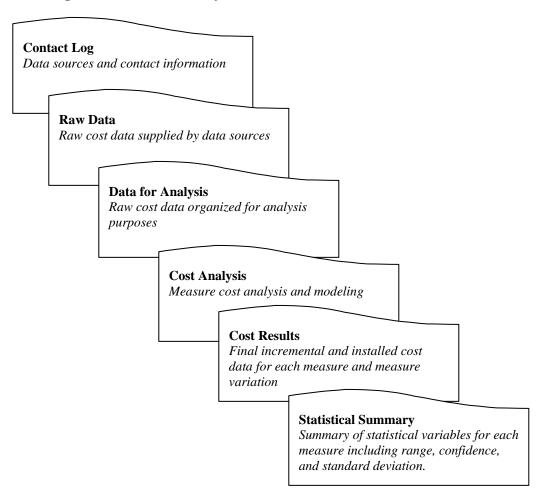
### 2.4 Data Management

The raw cost data were then entered into and organized in a series of Cost Analysis Workbooks; a separate workbook was created for each different end use and measure category. The cost data, analysis approach, and final results were compiled in the Cost Analysis Workbooks. The workbooks were segmented by end use category so as to allow each researcher in the MCS team to have their own data recording and analysis tool. The Cost Analysis Workbooks are comprised of six information or data components:

- 1. **Contact log** Each of the contacts from which data were obtained were noted including contact name, company, contact information, and website URL
- 2. **Raw cost data** All of the cost data for each measure category and measure ID were recorded in the workbook.
- 3. **Data sorted for analysis** The raw cost data were sorted and organized for the purpose of analyzing each measure ID.
- 4. **Analysis** Analysis of the cost data took one of four different forms: 1) simple averaging, 2) weighted averaging, 3) regression modeling, or 4) custom cost estimate. Each of these methods is discussed below.
- 5. **Results** The final results to be reported and posted on the website were compiled in this section of the workbook.
- 6. **Statistical summary** A basis statistical summary of the cost data for each measure was prepared including range, confidence and standard deviation of the data.

Exhibit 2-2 provides a description of the organization of the Cost Analysis Workbooks.

**Exhibit 2-2: Organization of Cost Analysis Workbooks** 



The same format for the Cost Analysis Workbook was used by each researcher on the MCS team to provide uniformity in process across the different measure categories. The Cost Analysis Workbooks also include the technical specifications pertinent to the specific measure and are structured to provide the ability to capture all cost elements in one form.

There are two types of common units in use on the DEER website: 1) savings units and 2) cost units. In most cases the common units are the same. However, for certain measures the cost common unit is different than the savings unit. In the presentation of the data, this is indicated by the cost common unit field in the downloadable supporting cost data. The cost common unit codes are also indicated under the cost basis field in the measure savings data details on the website. The cost units and presentation of the cost data are discussed in more detail in Section 4 below.

### 3. Cost Analysis Methodology

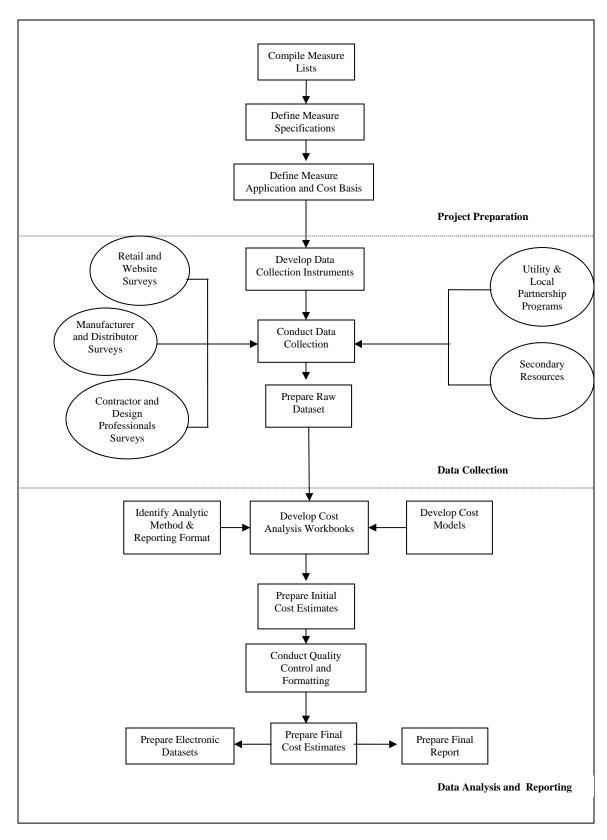
### 3.1 Cost Analysis Process Overview

As the collection of the raw cost data was completed, the data were subjected to several different types of analyses, depending on the technology, to develop the cost estimates. In some cases, simple averages provided the best estimates of costs, while in other cases other techniques were employed to control for variations in the data and 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, the project team 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. In cases where such models could not be developed, we analyzed the raw data directly to determine the most appropriate analytic technique for the measure.

The overall process was completed in three phases: a) the project preparation and planning, b) data collection instrument development, data collection and management, and c) data analysis and reporting. Exhibit 3-1 presents an overview of the process.

**Exhibit 3-1. Measure Cost Analysis Process** 



### 3.2 Analytic Methods

In the preparation of the cost data, the raw cost data were processed through one of four different analytic methods, which are summarized below. The analytic approaches are embedded in the Cost Analysis Workbooks and a summary of the analytic method employed for each measure is provided in Appendix C. The analytic methods used in arriving at cost estimates are:

- **Simple average** The simple average method takes all cost observations for a particular measure and averages them, discarding outliers in some cases where a particular observation appeared drastically out of line. An example of a measure that received simple average treatment is a faucet aerator (Measure ID: D03-412). The cost basis is FULL or installed, and the project team gathered 112 cost observations, averaging those observations to arrive at an equipment cost of \$6.28 per aerator.
- Weighted average The weighted average uses one or more observed market variables (market share of a particular model, cost based on specific volume purchase, etc.) to derive a weighted average cost estimate. An example of a measure where a weighted average is used for cost estimate is Vending Machine Controls where market distribution by product sales volume and product type were used to weight the cost estimate.
- Regression cost model Regression modeling was employed for many measures including residential refrigerators, residential and non-residential air conditioning, furnaces, and non-residential cooking measures. The regression modeling involved a multi-variate linear regression analysis of cost data. Relevant performance factors were incorporated as independent variables in the cost model for each measure. For example, the capacity (kBtuh) and Annual Fuel Utilization Efficiency (AFUE) were utilized as independent variables in the furnace cost model, while SEER and equipment tonnage were used for residential air conditioning equipment.
- Custom cost estimates –This approach was typical of "engineered" and/or technically complex types of measures. Custom cost estimates were employed where a unique equipment or system configuration needed to be defined by the project team and a cost estimate "built up" for the specific technical details of the measure. Refrigeration measures and some of the non-residential HVAC measures fell into this category.

An issue that impacts some measures is the need to distinguish between whether the technology is a self-contained system or a component in a larger system. A component typically requires combination with other components to form a useful system. In many cases, it is necessary to include other components in order to develop a reasonable cost estimate. For example, packaged air conditioning equipment is a self-contained system that can be priced without much concern for ancillary components. On the other hand, adding a waterside economizer to an air conditioning system requires the consideration of additional pump, pipe and fittings, heat exchanger, site preparation, and engineering costs. Engineered measures of this type typically indicate the need to "build up" a custom cost estimate.

Exhibit 3-2 presents an example of one of the regression models developed as part of the 2005 MCS study. The example case is for residential batt insulation. Using a spreadsheet multivariable linear regression tool, the results shown in Exhibit 3-2 were produced. The general form of the algorithm used to compute costs from the regression model is shown in equation 1. The algorithm used to obtain costs for batt insulation for any R-value within the range of raw data used in the study is shown in equations 2 and 3.

**Exhibit 3-2. Regression Model for Residential Batt Insulation** 

Regression Statistics						
Multiple R	0.896160803					
R Square	0.803104185					
Adjusted R Square	0.793259395					
Standard Error	0.083935723					
Observations	22					

#### ANOVA

	Df	SS	MS	F	Significance F
Regression	1	0.5747237	0.5747237	81.57656233	1.70315E-08
Residual	20	0.1409041	0.0070452		
Total	21	0.7156278			

		Standard						
	Coefficients	Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	<i>Upper 95.0%</i>
Intercept	0.05046414	0.0500739	1.0077937	0.325591585	-0.053988095	0.154916374	-0.053988095	0.154916374
R Value	0.017145338	0.0018983	9.0319744	1.70315E-08	0.013185569	0.021105107	0.013185569	0.021105107

**Eq.** 1

$$Cost = I + X_1 \times C_1 + ... + X_n \times C_n$$

Where:

I = intercept

X = regression variable

C = regression variable coefficient

In the case of the model presented above for batt insulation, the regression equation takes the form shown in Equations 2 and 3:

$$Cost_{batt\ insulation} = Intercept + R-Value\ x\ R-Value\ coefficient$$
 Eq. 2 
$$Cost_{batt\ insulation} = \$0.505 + R-Value\ x\ \$0.017$$
 Eq. 3

The analytic method along with the number of observations and basic statistical information for each measure included in the 2005 MCS is summarized in Appendix C for non-weather sensitive and weather sensitive residential and non-residential measures, and refrigeration measures.

### 4. MEASURE COST RESULTS

In this section, we provide a summary of the cost estimates developed for the 2004-05 DEER Update. The key results of the 2005 MCS are contained in the tables presented below, as part of the detailed measure savings data available on the DEER website, and as a supplemental download from the website.

### 4.1 Guide to the Measure Cost Data

The measure cost data below provide installed and incremental cost estimates for each of the measures included in the 2004-05 DEER Update and present cost detail for a range of sizes, efficiencies, and features. Cost estimates are provided for three hundred and forty-one (341) non-weather sensitive and weather sensitive residential and non-residential measures, and refrigeration measures.. All of the costs are presented in 2005 dollars. In addition to the pricing values, the presentation includes descriptive factors for each table including measure and base case descriptions, application, cost basis, cost units, and other attributes.

It is also important to note that the costs provided in this report are for *first costs only and do not include lifecycle or operations and maintenance* (O&M) costs or cost savings. Although analysts did encounter and uncover ongoing O&M or lifecycle costs as part of the research, systematic documentation of these costs was not a part of this study. Examples of measures where lifecycle or O&M costs may be an important factor in program planning and measure analysis activities include:

- Reduced lamp replacement costs with compact fluorescent lamps. CFLs have a lamp life that is 5 to 10 times longer than an incandescent lamp. Assuming a CFL lamp life of 10,000 hours compared 2000 for long-life incandescent lamps and 5 incandescent replacements over the life of the CFL, the resulting lifecycle materials and labor cost savings are approximately 5 x (\$0.61 + \$3.77) = \$21.90.
- Water treatment cost for water-cooled air conditioning systems. While water-cooled air conditioning systems are attractive because of their greater operating and peak load efficiencies, they do result in additional water use and water treatment costs compared to air cooled equipment. One vendor estimated water treatment costs for non-residential water-cooled systems at \$20/ton/year.
- Reduced fluorescent lamp life with no occupancy sensors. Some reports state that the useful life of compact fluorescent lamps and some fluorescent lamp-ballast combinations can be shortened due to more frequent switching, causing increased replacement costs. For example, Osram Sylvania estimates the T8 lamp life can be reduced from 24,000 hours to 7000 hours when the switch cycle is reduced from 12 hours to 30 minutes.<sup>1</sup>

The following discussion section provides a guide to using the Measure Cost Data. The guide is organized into the following sections:

- 1. Organization of the Cost Data
- 2. Using the Cost Data
- 3. Application and Cost Basis

<sup>&</sup>lt;sup>1</sup> Osram Sylvania, Ballast-Lamp Technology Update FAQ, 2000.

- 4. Cost Units
- 5. Definitions

### 4.1.1 Organization of the Cost Data

There are five elements to the cost reporting of measures:

- 1. Measure equipment cost the cost of the energy-efficient technology
- 2. Base equipment cost the cost of the baseline efficiency technology
- 3. Incremental cost the difference between the measure equipment cost and the base equipment cost
- 4. Labor cost the installation cost of the measure including contractor overhead & profit
- 5. Installed cost the sum of the measure equipment cost and the labor cost

A measure may include all of these cost elements or only a subset depending on the characteristics of the measure. The "application" and "cost basis" designators discussed below are used to determine which cost elements are reported for each measure.

The cost data are reported on the website both in the measure details and as a supplemental downloadable Excel workbook from the Supporting Documents. For many measures, the downloadable file contains additional detail in the cost data. In all cases the data are reported as discussed in the users guide.

In addition to the measure cost data, this report and the detail provided in the Cost Analysis Workbooks and results summaries includes detailed statistics and values on the cost data collected during the research phase of the project. These data include factors such as mean, minimum and maximum costs, standard deviation, precision and a variety of other statistical indicators related to the cost data. These data are useful for assessing the statistical validity of the cost data, and understanding the identifying extreme price points and the range of costs for a given measure.

#### 4.1.2 Using the Cost Data

Measure Cost Data are available in three different forms. First, the data are available as part of the measure detail from the DEER website. These data are specific to each measure configuration on the website. Second, the data are available as a downloadable file under Supporting Documents from the website. These data contain more detail and measure variations than the pricing included in the measure detail. Finally, the measure cost data are provided in hard copy below as part of this report.

When interpreting the cost data, there are several important points to remember:

- **Discrete vs. representative prices.** Some of the measure cost values are discrete prices for a specific technology, while some of the cost values are representative prices for a range of product sizes and/or efficiencies. For example, incremental costs are provided for specific motor horsepowers for non-weather sensitive motor measures. On the other hand, the pricing for non-residential HVAC motor measures is representative of a range of horsepowers.
- **First cost only.** The pricing contained in the measure cost data is for first cost only and does not include O&M or life cycle cost data. For example, it is well known that compact

fluorescent lamps last 5-10 times longer than an incandescent lamp, thus saving on lamp replacement costs. No systematic attempt was made to capture these types of life cycle cost factors.

- Scalability of cost units. Each measure cost is associated with a "cost unit" which means that the cost data have been normalized to some common unit of measure. For example, motor cost data are normalized to a per horsepower value and air conditioning equipment is normalized to a per ton value. However, there are limits to the amount that a single normalized cost variable can be scaled to compute a price for units with a broad size range. In those instances where an analyst is examining a measure with a wide range of sizes, it is advisable to review the more detailed costs in the downloadable file to see if there are cost data for sizes that are more consistent with those being analyzed.
- Refrigeration measure costs. Incremental and installed costs for refrigeration measures can vary depending on the application and cost basis. The values reported in the measure details from the website are for one application and cost basis configuration. Users of the refrigeration cost data are advised to consult the supplemental downloadable cost file for additional variation in refrigeration measure cost information relative to different applications.

### 4.1.3 Application and Cost Basis

Application and cost basis are used to determine what kind of cost is reported. The two designators are linked and the application typically leads to the determination of the cost basis. Each of these designators is discussed below.

#### **Application**

The application designation is important because it helps to define what type of cost estimate is needed by identifying the types of projects where the measure is expected to be applied. There are three application codes that have been used to identify how the measure is expected to be applied:

- **Retrofit** (**RET**) replacing a working system with a new technology or installing a technology that was not there before
- **Replace-on-burnout** (**ROB**) replacing a technology at the end of its useful life
- New construction (NEW) installing a technology in a new construction or major renovation project

In general, new construction (NEW) and replace-on-burnout (ROB) applications are associated with incremental costs because a customer's analysis of efficiency alternatives is typically made when an equipment purchase must be made anyway. 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. For example, the labor cost for installing a high-efficiency fluorescent fixture in a new office building is no greater than for 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.

#### Cost Basis

The cost basis designator is used to define for each measure if the appropriate cost is the incremental or installed cost. The cost basis is determined by: a) the application (RET, ROB, or NEW); and b) whether it is displacing an existing technology, installed in the absence of an existing technology, or is an alternative to a competing technology.

The cost basis designation is used to define whether the cost is:

■ Incremental (INCR) – the differential cost between a base technology and an energy-efficient technology

Incremental cost (INCR) = Measure cost - base case cost

■ **Installed** (**FULL**) – the full or installed cost of the measure including equipment, labor, overhead & profit (OH&P)

Installed cost (FULL) = measure equipment cost + labor including OH&P

The application and cost basis are defined for each measure. As a general guide, retrofit (RET) applications typically means that the cost basis is FULL or installed cost. In these cases, a customer is replacing a working system with a new technology or is installing a technology that was not there before, thus bearing the full cost of the installation. Examples include replacing incandescent exit signs in existing buildings with LED, replacing incandescent lamps before the end of their useful life with CFLs, and installing ceiling insulation in a home that did not formerly have any insulation.

Replace-on-burnout (ROB) and new construction (NEW) applications typically have a cost basis of incremental cost (INCR). In these applications, a customer is choosing between a standard or less efficient technology and more efficient option. Incremental cost usually means incremental equipment cost with no labor cost; that is, there is no labor cost or it is the same in both cases thus a zero sum. Examples include installing a higher SEER AC unit at the end of its useful life, installing a premium-efficiency motor as opposed to a rewind at the time of burnout, and installing a higher efficiency chiller in a new construction application.

These are not hard and fast rules and there are exceptions. For example, occupancy sensors have been designated as retrofit and new construction applications, yet their cost bases are considered to be FULL or installed in both cases since there is a cost to the installation beyond that of normal on/off switching in both applications. Similarly, installing a heat recovery system is considered to be a retrofit and new construction application, yet the cost basis is defined as FULL or installed in both cases because it is an addition or option to a conventional system. Therefore, each measure needs to be examined individually with respect to application and cost basis.

FULL or installed cost typically uses the measure equipment cost of the technology, not an incremental cost. In most cases, there is no "incremental cost". For example, occupancy sensors are assumed to have a cost basis of FULL and use the cost of the sensor (measure equipment cost) plus the labor to install it. There is no incremental cost in this case because the baseline is the absence of a sensor or an existing conventional on/off switch that is being displaced.

The cost calculations follow the formulas for each cost basis designation as described in Exhibit 4-1.

**Exhibit 4-1. Calculation of Costs According to Cost Basis** 

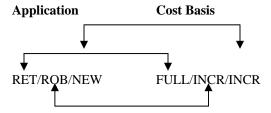
Cost Basis	Base Equipment Cost	Measure Equipment Cost	Incremental Cost	Labor Cost	Installed Cost
Incremental (INCR)	a	b	b-a		
Installed (FULL)		b		с	b + c

Most measures have more than one application code and many have all three. In these cases, the appropriate cost basis is identified for each measure application designator. For example, CFL replacements are considered to be applicable to all three designations. Examples of this method and how the cost data are organized are presented in Exhibit 4-2.

**Exhibit 4-2. Examples of Measure Cost Calculations** 

Measure	Application	Cost Basis	Base Equip Cost	Measure Equip Cost	Incremental Cost	Labor Cost	Installed Cost
H.E. Packaged AC	RET/ROB/NEW	FULL/INCR/INCR - tons	a	b	b – a		
LED Exit Signs	RET	FULL - Sign		b		С	b + c
Integral CFLs	RET/ROB/NEW	FULL/INCR/INCR - lamp	a	b	b – a	С	b + c

It should be noted that the layout of the application and the cost basis designators is linked; the first designator in the application is related to the first designator in the cost basis. For measures with multiple applications and cost bases, the designators may be interpreted as follows:



The application and cost basis for each measure are identified in the measure cost data in Appendix B. Some measures have multiple cost bases reported, for example, when both the equipment cost and the installed cost are specified by the DEER update, and the measure may commonly be priced from multiple bases.

### 4.1.4 Cost Units

There are two types of units (e.g., square foot, tons, horsepower) in use in the database: savings units and cost units. In many cases the units for savings and the units for cost are the same. For some measures, however, the units differ. For example, for Energy Management Systems the normalization unit is per building for energy savings estimates, while the cost unit is per control point. The presentation of the data accounts for this by appending the cost units to the cost basis designators in the measure details, and indicating the cost units as a distinct field in the presentation of the data in the supplemental downloadable file. As a general guide, the cost units are presented as follows:

FULL – Cost Units
INCR/INCR – Cost Units
FULL/INCR/INCR – Cost Units

For example, high efficiency packaged air conditioning equipment is considered to be a RET/ROB/NEW application with a FULL/INCR/INCR cost basis. The cost units are per ton. The cost units will then be presented as shown in Exhibit 4-2 above.

The cost units used for reporting purposes for each measure are included in the measure cost data in Appendix C.

### 4.1.5 Data Definitions

For the purposes of both data collection and analysis, it was important to define key variables related to the cost research. Working definitions of key variables that cut across measures are summarized in Exhibit 4-3.

**Exhibit 4-3. MCS Study Data Definitions** 

Name	Definition
Measure ID Number	The unique measure ID number for each measure as defined by Itron.
Application	Three application codes are used to identify how the measure is expected to be applied:  Retrofit (RET) – replacing a working system prior to failure with a new technology or installing a technology that was not there before  Replace-on-burnout (ROB) – replacing a technology at the end of its useful life  New construction (NEW) – installing a technology in a new construction or major renovation project
Cost Value	Cost values are the estimated incremental or installed cost and are defined as what a program participant would pay to implement the measure. Note: The costs provided in this report are for first costs only and do not include differences in ongoing operations and maintenance (O&M) costs.
Cost Unit	The cost units of the values shown, e.g., SqFt, Ton, HP, etc. Measure cost units are indicated on the website in the cost basis field and separately identified for each measure in the downloadable supplemental cost data.
Cost Basis	Defines whether the cost is:  Incremental (INCR) – the differential cost between a base technology and an energy-efficient technology.  Installed (FULL) – the full or installed cost of the measure including equipment, labor, overhead & profit
Volume	Defines the volume or bulk purchase levels associated with the cost estimate.  High – A quantity purchase that may result in a discount on the price.  Low – A single or lowest volume tier purchase.
Cost Type	Defines whether the cost is:  Wholesale Retail Manufacturer's Suggested Retail Price (MSRP)
Measure Equipment Cost	The cost of the energy efficient technology or equipment.
Base Equipment Cost	The cost of the less efficient base case technology or equipment.
Incremental Cost	The differential cost between the energy efficient and base case or less efficient alternative.
Labor Cost	The cost associated with labor to install the technology or measure.
Installed Cost	The installed cost of technology or measure including equipment and labor including contractor overhead and profit. The equipment cost component is typically the measure equipment cost.
Cost Observation	A single price point for an individual measure or measure configuration.
Number of Observations	The number of raw cost observations available for analysis. This count of observations is done at the individual technology or technology configuration level.
Sector	Identifies if the sector where the measure is applied is:  Res – residential NonRes – non-residential
Delivery Channel	The market distribution channel by which a program participant would access or acquire the measure:  Contractor Retail

## 4.2 Market Factors Affecting Measure Costs

This section provides observations on market factors effecting measure costs and cost trends for selected technologies. The market factors are intended to provide insight into variations in measures costs that

may be observed in field applications, such as the incremental cost of replacing the refrigerant coil when upgrading from a 10 SEER to a 13 SEER residential AC condenser.

Cost trends are based on comparisons to the 2001 DEER Update measure cost data. As with the 2001 measure cost data, the robustness of the comparisons of incremental costs over time is limited somewhat by the relatively small sample sizes available for many of the technologies, and also changes in measures definitions since the 2001 report. Based on the cost comparisons made to date, it is clear that some measure costs have changed significantly over time, such as integral CFL lamps. Trends in the costs of many other measures are less certain.

The following technologies are discussed below:

- Appliances
  - o Refrigerators
  - o Gas tank-type water heaters
- Building Shell
  - New commercial and residential windows
  - Window film
  - o Residential insulation
  - o Light colored roofs
- □ Lighting
  - o Integral CFL Lamps
  - o Fluorescent Ballasts
  - o Lighting Controls
  - o Skylights
- Residential HVAC
  - o Residential AC

#### 4.2.1 Appliances

#### Refrigerators

Compared to the 2001 DEER Update measure cost data, the incremental costs for all high-efficiency residential refrigerators (all configurations) remained fairly constant at \$218 / unit, though significant variations were noted depending upon freezer configuration. In general, refrigerators with top mounted and side-by-side freezers tend to be the most commonly available. Those with side-by-side freezers tend toward the larger size capacities making price comparisons in the smaller size ranges a challenge. Similarly, refrigerators with bottom mounted freezers are less commonly available but generally more energy efficient complicating the pricing of less efficient baseline models. In general, units with side mounted freezers with 'through-the-door ice' tended to be the most common configuration offered by manufacturers. Refrigerators with side mounted freezers without through the door ice dispensers are specialty item and the incremental costs for this configuration are high due to limited manufacturer availability.

#### Gas tank-type water heaters

Although the measure definition lists the efficient case as having an energy factor of 0.64, in reality there were very few units on the market that met this criteria. For 30 and 65 gallon sizes, the highest EF listed on the ACEEE site is 0.62 energy factor. For the 40 and 50 gallon sizes, a 0.63 energy factor could be priced. The average price for an efficient gas hot water heater in the 2005 DEER is \$107, for all

configurations except 50 gallon units for which pricing data was limited. This indicates that prices may have increased from the 2001 incremental costs range of between \$50 and \$100 per unit.

### 4.2.2 Building Shell

#### **Insulation**

Insulation specifications were determined by current building code requirements for newly constructed buildings. Insulation requirements (R-value) are given for four representative climate zones. However, the same R-Value is specified for three out of the four climate zones. In general, the cost of the insulation material is the same regardless of application so incremental material costs tended to be consistent amongst the various installation configurations (ceiling, floor, etc). The labor costs varied, however, as the application changes between floor, wall or ceiling installations. The main variable in determining the cost of the insulation is the R value, whether or not the material is faced and the thickness of the batts. For one of the most common insulation configurations, R-30 ceiling installations, prices tended to be consistent with the 2001 DEER study, showing a slight decrease form \$0.79 to \$0.76 per square foot. Differences in measure definitions did not allow for a meaningful comparison with other 2001 insulation cost configurations.

#### **Light Colored Roof**

This measure is based on a roof absorptivity of 0.7. To achieve this level, a variety of roofing materials could be used which vary substantially in labor and expense. For the purpose of this analysis, only costs of elastomeric roof coatings were collected as it is the most common type of cool roof product in the market. For future DEER updates, it may be advisable to increase the number of cool roof measures to include a broader sample of the various types of roofing materials available.

#### Windows

The residential windows measures were defined in the DEER study by U-Factor (UF) and solar heat gain coefficient (SHGC). However, in the market, residential windows are characterized beyond performance specifications. Variables that influence cost include framing material, size, glazing type and number of panes, and construction (i.e. double hung, single hung, casement). The majority of windows sold are constructed in vinyl framing materials. Very few distributors offered metal windows. Wood and composite were also less prevalent. The base specification for the study was a lowest performing clear double pane window allowed by the building code. Costs models for the residential windows were developed for various configurations based on finished product delivered and installed, and performance characteristics such as the U-Factor and SHGC. The average cost of all double pane windows (regardless of frame type with U-Factor between 0.25 and 0.50 and SHGC between 0.22 and 0.65) for the 2005 DEER update was \$2.50 per square foot. This is relatively consistent with the 2001 average value of approximately \$2.60 for coated low E<sup>2</sup> coated windows.

Commercial glazing systems are often site-built and the most common frame type is metal. Double pane glass is the most commonly used. Many different special options are available, such as grids, frames, tints and coatings, and some of these options tended to influence price to a greater degree than SHGC and LIE

#### **Window Films**

Window films were collected based on three measure descriptions: standard film, reflective film and spectrally selective film. For the residential market, standard film was still the least costly and the most

widely available. Spectrally selective window film was considered to be a high-end product with an increasing market share due to its greater ability to lower the solar heat gain co-efficient without affecting the aesthetic of the window. Reflective films are more likely to be used in commercial buildings and are thus a more mass produced film than spectrally selective films. Costs for standard window film showed some decrease from the 2001 to 2005. Residential projects with spectrally selective or reflective window film was approximately \$2.41 per square foot (installed) compared \$3.30 per square in the 2001 DEER update.

### 4.2.3 Lighting

#### **Fluorescent Ballasts**

The cost for electronic ballasts for the T-8/EB system has stayed fairly constant since the 2001 update. The 2005 study indicates that the average cost for an electronic ballast ranges from \$19 to \$23, depending on purchase volume, while the previous study indicates an average price of approximately \$20 per ballast.

### **Integral CFL Lamps**

The price of integral CFL lamps continues to decrease, though the range of prices available for any single lamp configuration remains quite broad. Exhibit 4-4 shows the spread between retail prices observed for various lamp wattages. The narrowest price spread existed for 13 Watt lamps, while 26Watt units had the largest spread between high and low price. This spread may be due to several factors

- ☐ The large number of retailers who offer CFL lamps online
- ☐ The large number of manufacturers in the market
- ☐ The potential for variations in lamp quality among various producers.

While a full market characterization study was beyond the scope of this report, it was observed that name brand products frequently commanded a higher price, and that quality issues do persist among some manufacturers. It is also likely that the range of products offered will narrow as some wattages become standard and others lose market share. For example, the market may not support 7 different wattages in the 13 to 20 watt range.

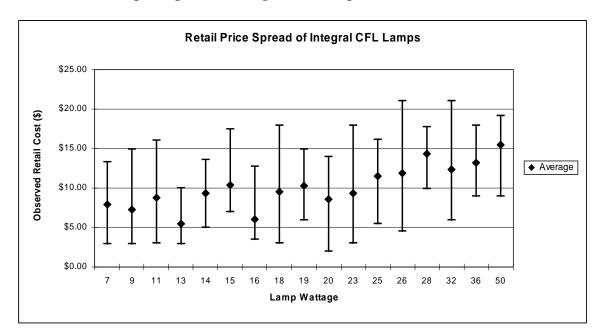


Exhibit 4-4: Retail price spread for integral CFL lamps

On average the price of integral CFL lamps has decreased by approximately 30% since the 2001 DEER update as shown in Exhibit 4-5. This decrease was consistent among all wattages.

Exhibit 4-5: Retail price trends for integral CFL lamps

Wattage	Volume	2001 DEER	2005* DEER	Average price decrease		
13 W and less	High	\$5.90	\$4.17	29.3%		
13 W and less	Low	\$6.90	\$4.98	27.8%		
14 W to 26 W	High	\$8.80	\$5.81	34.0%		
14 W to 20 W	Low	\$10.00	\$7.16	28.4%		
* Average price for 9 wattages within this range						

#### **Lighting Controls**

Lighting controls can be complex and there are great differences in systems configurations. These variations include differences in each manufacturer's fundamental control technology and communication interface. The pricing model developed for this study used the following "daylight controller type" variables to establish consistent pricing metrics among various technologies:

- □ Fixture integrated, i.e. the ballast has a photocell built in to it, which either protrudes from the bottom of a suspended fixture, or from the ceiling next to a recessed fixture
- □ Standalone controller, i.e. a controller placed in the ceiling void that sends out one to three separate 1-10V dimming signals, each of which can control up to 50 fixtures
- □ Central controller, i.e. a controller placed in a circuit panel that takes its input from one or more photocells (one of which may be outside the building), and separately controls many channels of dimming fixtures either with 1-10V analogue of a digital signal

□ Addressable ballasts, i.e. a DALI-like system in which a digital bus allows each ballast to be separately addressed and controlled by any combination of input devices including photocells.

In addition to the daylight controller type, four typical buildings were used so that all the manufacturers' quotes would be comparable. The cost for providing a lighting control system varies greatly between one building type and another. This is typically because the controllers are capable of controlling many fixtures in a large building, but in buildings with small zones each controller is only connected to a few fixtures, thus increasing its per-kW cost. Small offices are significantly more costly than other building types of comparable physical size due to the diversity of space types.

### **Skylights**

The largest unknown in the cost of skylights is the cost of modifications to the roof of the building to accommodate the skylight curbs or purlines, and the cost of finishing the roofing material around the skylight. These costs were not included in this research effort because they could not be quantified; the cost is highly dependent on what type of roof is used, and how it's designed. The cost of finishing the roof depends on whether or not a self-flashing skylight is used, and several manufacturers said these did not differ in cost from regular skylights.

Manufacturers indicated that the labor cost for installing the skylights themselves is very low, since they are simple to attach to the curbs. Two manufacturers (Bristolite and Sunoptics) account for a very large proportion of the market, and also for the highest-performing products.

#### 4.2.4 Residential HVAC

#### **Residential Air Conditioning Equipment**

Cost data was gathered for a range of residential air-cooled split AC systems based on SEER, tonnage, and baseline efficiency variations. Baseline efficiency variations included both 10 SEER and 13 SEER costs baselines. Exhibit 4-6 shows that the incremental price (above 10 SEER baseline) for this equipment ranges from \$270 per ton for a 13 SEER unit to \$730 per ton for an 18 SEER system. The incremental equipment costs in upgrading from a 10 SEER system to a 13 or higher SEER system include the cost of replacing the condenser coil. Incremental costs in increasing from a 13 SEER baseline are smaller because it is assumed that the refrigerant coil will not be replaced.

Also shown in Exhibit 4-6 are the incremental values for 13 and 14 SEER equipment provided in the 2001 DEER study. The higher incremental cost of the 13 SEER unit shown in the 2005 MCS may be due to the inclusion of the AC coil as part of the equipment costs. In general, this comparison would indicate that the cost of residential AC systems is staying relatively constant for 13 SEER systems, but may be dropping as the system efficiency increases.

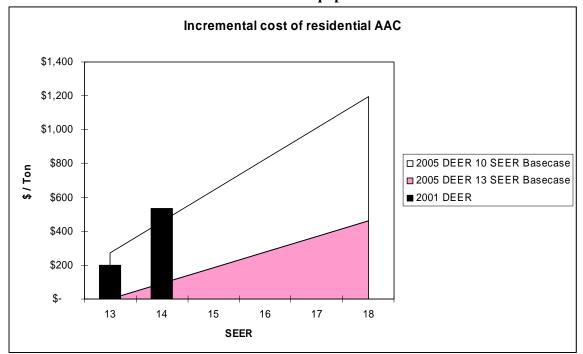


Exhibit 4-6: Incremental costs of residential AC equipment

### 4.3 Measure Cost Data

A print listing of the costs for all measures included in this submittal is provided in Appendix B for Non-Weather Sensitive, Residential Weather Sensitive, Non-Residential Weather Sensitive and Refrigeration measures. Appendix C contains basic statistical information on each measure including mean, minimum, maximum, precision and R-square for measures employing regression-based analytic methods. Measure cost data are included in the detailed measure summaries on the DEER website and in a downloadable supplemental file in Microsoft Excel workbook format under Supporting Documents directly from the DEER website. The cost data in the supplemental downloadable file contains additional details and measure variations that the data provided in the measure details. The cost data provided in Appendix B includes the following descriptors and cost values:

- Measure ID number
- Measure category
- Measure name
- Measure description
- Base description
- Delivery channel
- Application
- Whether the technology is Energy Star rated or not
- Purchase volume related to the cost value
- Cost basis
- Base equipment cost

- Measure equipment cost
- Incremental cost
- Labor cost
- Installed cost
- Cost units

# APPENDIX A: MEASURE TECHNICAL SPECIFICATIONS FOR COST RESEARCH

Non-Residential Weather Sensitive Measure Technical Specifications

Residential Weather Sensitive Measure Technical Specifications

Non-Residential and Residential Non-Weather Sensitive Measure Technical Specifications

Refrigeration Measure Technical Specifications

Measure ID	Measure Name	Tech Spec	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5	Tech Spec 6	Tech Spec 7	Tech Spec 8
D03-003	Occupancy Sensor Pack-200 SF	Interface type	controller type	Ballast type	Occupancy sensor type	Building type			
D03-004	Occupancy Sensor Pack-1000 SF	Interface type	controller type	Ballast type	Occupancy sensor type	Building type			
D03-005	DayLtg Controls, Side Ltg, Cont. Ctrl	Interface type	controller type	Ballast type	Occupancy sensor type	Building type			
D03-006	DayLtg Controls, Side Ltg, 2-step Ctrl	Interface type	controller type	Ballast type	Occupancy sensor type	Building type			
D03-007	DayLtg Controls, Top Ltg, Cont. Ctrl	Interface type	controller type	Ballast type	Occupancy sensor type	Building type			
D03-008	DayLtg Controls, Top Ltg, 1-step Ctrl	Interface type	controller type	Ballast type	Occupancy sensor type	Building type			
D03-009	DayLtg Controls, Top Ltg, 2-step Ctrl	Interface type	controller type	Ballast type	Occupancy sensor type	Building type			
D03-010	Timeclock for Lighting	Interface type	controller type	Ballast type	Occupancy sensor type	Building type			
D03-013	Ceiling/Roof Insulation	Size	R Value	Batts or Blown	Location	faced or unfaced			
D03-014	Tank Insulation-Fiber Blanket	R-value	Gal						
D03-016	Light Colored Roof	Coverage Area	Color	Solar Reflectance	Thermal Emmittance				
D03-017	Low SHGC Windows -15% - North	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-018	Low SHGC Windows -20% - East	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-019	Low SHGC Windows -20% - South	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-020	Low SHGC Windows -20% - West	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-021	Low SHGC Windows -20% - North	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-022	Low SHGC Windows -30% - East	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-023	Low SHGC Windows -30% - South	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-024	Low SHGC Windows -30% - West	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-025	Hi Perf. Glass, PI=1.15, Side Ltg, Cont. Ctrl	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-026	Hi Perf. Glass, PI=1.26, Side Ltg, Cont. Ctrl	Square	SHGC	U Factor	T-Vis	Frame	# of	construction	Coatings

Measure ID	Measure Name	Tech Spec	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5	Tech Spec 6	Tech Spec 7	Tech Spec 8
		Feet				Material	Panes		
D03-027	Hi Perf. Glass, PI=1.38, Side Ltg, Cont. Ctrl	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-028	Hi Perf. Glass, PI=1.15, Side Ltg, 2-Step Ctrl	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-029	Hi Perf. Glass, PI=1.26, Side Ltg, 2-Step Ctrl	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-030	Hi Perf. Glass, PI=1.38, Side Ltg, 2-Step Ctrl	Square Feet	SHGC	U Factor	T-Vis	Frame Material	# of Panes	construction	Coatings
D03-031	Hi Perf. Glass, PI=0.81, Top Ltg, Cont. Ctrl	Square Feet	SHGC	Tvis	U Factor	Performance Index			
D03-032	Hi Perf. Glass, PI=0.92, Top Ltg, Cont. Ctrl	Square Feet	SHGC	Tvis	U Factor	Performance Index			
D03-033	Hi Perf. Glass, PI=1.03, Top Ltg, Cont. Ctrl	Square Feet	SHGC	Tvis	U Factor	Performance Index			
D03-034	Hi Perf. Glass, PI=0.81, Top Ltg, 1-Step Ctrl	Square Feet	SHGC	Tvis	U Factor	Performance Index			
D03-035	Hi Perf. Glass, PI=0.92, Top Ltg, 1-Step Ctrl	Square Feet	SHGC	Tvis	U Factor	Performance Index			
D03-036	Hi Perf. Glass, PI=1.03, Top Ltg, 1-Step Ctrl	Square Feet	SHGC	Tvis	U Factor	Performance Index			
D03-037	Hi Perf. Glass, PI=0.81, Top Ltg, 2-Step Ctrl	Square Feet	SHGC	Tvis	U Factor	Performance Index			
D03-038	Hi Perf. Glass, PI=0.92, Top Ltg, 2-Step Ctrl	Square Feet	SHGC	Tvis	U Factor	Performance Index			
D03-039	Hi Perf. Glass, PI=1.03, Top Ltg, 2-Step Ctrl	Square Feet	SHGC	Tvis	U Factor	Performance Index			
D03-040	High Efficiency Centrifugal Chillers < 150 Tons	tons	full-load kW/ton	IPLV kW/ton					
D03-041	High Efficiency Air-Cooled Recip Packaged Chillers	tons	full-load kW/ton	IPLV kW/ton					
D03-042	High Efficiency VSD Centrifugal Chillers < 150 Tons	tons	full-load kW/ton	IPLV kW/ton					
D03-043	Gas Absorption Chiller	tons	full-load kW/ton	IPLV kW/ton					
D03-044	Chilled Water Reset								
D03-045	Hot Water Reset								
D03-046	Variable Flow Chilled Water Loop	GPM							
D03-047	VSD Chilled Water Loop Pump	HP							

Measure ID	Measure Name	Tech Spec	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5	Tech Spec 6	Tech Spec 7	Tech Spec 8
D03-048	Variable Flow Hot Water Loop	GPM							
D03-049	VSD Hot Water Loop Pump	HP							
D03-050	Variable Air Volume Box	CFM							
D03-051	VSD Supply Fan Motors	HP							
D03-052	Fan Powered Mixing Boxes	CFM							
D03-053	Evap Cool Indirect - Central System	CFM	EER	Pressure drop	System Effectiveness				
D03-054	Evap Cool Indirect - Packaged Sys	CFM	EER	Pressure drop	System Effectiveness				
D03-055	Reducing Overventilation	Size							
D03-056	Air To Air Heat Exchanger	CFM	Efficiency						
D03-057	Rotary Heat Recovery	CFM	Efficiency						
D03-058	Economizer - Packaged System	tons	CFM						
D03-060	Economizer Maintenance	tons							
D03-061	Clean Condenser Coils	tons							
D03-062	Cooling Tower for Packaged System	CT type	tons	Total fan HP					
D03-063	Two-Speed Cooling Tower Fans	CT type	tons	Total fan HP					
D03-064	VSD Cooling Tower Fans	CT type	tons	Total Fan HP					
D03-065	Efficient Gas Furnace	kBtuh	AFUE						
D03-066	High Efficiency Large Boilers	kBtuh	Eff	HW or Steam					
D03-067	High Efficiency Small HW Boilers	kBtuh	Eff	HW or Steam					
D03-068	High Efficiency Small Steam Boilers	kBtuh	Eff	HW or Steam					
D03-069	Efficient Water Source Heat Pump	Tons	EER	Cond					
D03-070	Hydronic Heat Pump Var Flow Valve	HP							
D03-071	Time Clocks (heating/cooling)	Volts	Amps	No. of Poles	No. Channels				
D03-072	Energy Management System	Functions	No. Points	Zone Per Points	Area Per Zone				
D03-073	Setback Programmable Thermostats								
D03-075	Duct Insulation Material	R-value	Square Feet	Thickness (inch)					
D03-076	H.E. Air-Cooled Split A/C < 65k (single phase)	Tons	SEER	EER					

Measure ID	Measure Name	Tech Spec	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5	Tech Spec 6	Tech Spec 7	Tech Spec 8
D03-077	H.E. Air-Cooled Split HP < 65k (single phase)	Tons	SEER	EER					
D03-078	H.E. Air-Cooled Package A/C < 65k (single phase)	Tons	SEER	EER					
D03-079	H.E. Air-Cooled Split/Package A/C 65k-134k	Tons	EER	AFUE					
D03-080	H.E. Air-Cooled Package HP < 65k (single phase)	Tons	SEER	EER					
D03-081	H.E. Air-Cooled Split/Package HP 65k-134k	Tons	EER						
D03-082	H.E. Evap/Water-Cooled Pkg A/C < 65k	Tons	EER	Cond					
D03-083	H.E. Evap/Water-Cooled Pkg A/C >=65k	Tons	EER	Cond					
D03-084	H.E. Package Terminal A/C < 7k	Type	Btuh	EER					
D03-085	H.E. Package Terminal HP < 7k	Type	Btuh	EER					
D03-086	Efficient HVAC Motors - Supply Fans	Enclosure	HP	RPM	Eff	Voltage			
D03-087	Efficient HVAC Motors - Return Fans	Enclosure	HP	RPM	Eff	Voltage			
D03-088	Efficient HVAC Motors - Clg Tower Fans	Enclosure	HP	RPM	Eff	Voltage			
D03-089	Effic. Motors - Chilled Water Loop Pumps	Enclosure	HP	RPM	Eff	Voltage			
D03-090	Effic. Motors - Hot Water Loop Pumps	Enclosure	HP	RPM	Eff	Voltage			
D03-091	Effic. Motors - Cond. Water Loop Pumps	Enclosure	HP	RPM	Eff	Voltage			
D03-092	High Efficiency Gas Water Heater	Gal.	Eff	Btuh					
D03-093	Gas Tankless Water Heating	Eff	Btuh/kW	Eff					
D03-094	Point of Use Water Heating	KW							
D03-095	Circulation Pump Timeclock Retrofit								
D03-096	High Eff Large Size Gas Water Heater	kBtuh	Eff	HW or Steam					
D03-097	High Eff Med Size Gas Water Heater	kBtuh	Eff	HW or Steam					
D03-098	Water Side Economizer	tons	GPM						
D03-099	H.E. Package Terminal A/C 7k-15k	Type	Btu	SEER	EER	AFUE			
D03-100	H.E. Package Terminal A/C > 15k	Type	Btu	SEER	EER	AFUE			
D03-101	H.E. Package Terminal HP 7k-15k	Type	Btu	SEER	EER	AFUE			
D03-102	H.E. Package Terminal HP > 15k	Type	Btu	SEER	EER	AFUE			
D03-103	H.E. Air-Cooled Split/Package A/C 135-239k	Tons	SEER	EER	AFUE				
D03-104	H.E. Air-Cooled Split/Package A/C 240-759k	Tons	SEER	EER	AFUE				
D03-105	H.E. Air-Cooled Split/Package A/C >= 760k	Tons	SEER	EER	AFUE				
D03-106	H.E. Air-Cooled Split/Package HP 135-239k	Tons	SEER	EER					
D03-107	H.E. Air-Cooled Split/Package HP 240-759k	Tons	SEER	EER					

Measure ID	Measure Name	Tech Spec	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5	Tech Spec 6	Tech Spec 7	Tech Spec 8
D03-108	H.E. Air-Cooled Split A/C < 65k (3 phase before 2008)	Type	Tons	SEER					
D03-109	H.E. Air-Cooled Package A/C < 65k (12 SEER, 3 phase before 2008)	Tons	SEER	EER	AFUE				
D03-110	H.E. Air-Cooled Package A/C < 65k (13 SEER, 3 phase before 2008)	Tons	SEER	EER	AFUE				
D03-111	H.E. Air-Cooled Split HP < 65k (3 phase before 2008)	Phase	Tons	SEER					
D03-112	H.E. Air-Cooled Package HP < 65k (12 SEER, 3 phase before 2008)	Tons	SEER	EER					
D03-113	H.E. Air-Cooled Package HP < 65k (13 SEER, 3 phase before 2008)	Tons	SEER	EER					
D03-114	High Efficiency Air-Cooled Screw Packaged Chillers	tons	full-load kW/ton	IPLV kW/ton					
D03-115	High Efficiency Water-Cooled Recip Chillers	tons	full-load kW/ton	IPLV kW/ton					
D03-116	High Efficiency Centrifugal Chillers 150-299 Tons	tons	full-load kW/ton	IPLV kW/ton					
D03-117	High Efficiency Centrifugal Chillers >= 300 Tons	tons	full-load kW/ton	IPLV kW/ton					
D03-118	High Efficiency Screw Chillers < 150 Tons	tons	full-load kW/ton	IPLV kW/ton					
D03-119	High Efficiency Screw Chillers 150-299 Tons	tons	full-load kW/ton	IPLV kW/ton					
D03-120	High Efficiency Screw Chillers >= 300 Tons	tons	full-load kW/ton	IPLV kW/ton					
D03-121	High Efficiency VSD Centrifugal Chillers 150-299 Tons	tons	full-load kW/ton	IPLV kW/ton					
D03-122	High Efficiency VSD Centrifugal Chillers >= 300 Tons	tons	full-load kW/ton	IPLV kW/ton					
D03-123	Floor Insulation								
D03-124	H.E. Air-Cooled Split/Package HP >= 760k	Tons	SEER	EER					

Measure	Measure Name	Tech Spec 1	Tech	Tech Spec	Tech Spec 4	Tech	Tech	Tech Spec 7
<b>ID</b> D03-401	Programmable Thermostat		Spec 2	3		Spec 5	Spec 6	
D03-401	-	- true o	toma	SEER	EER	-		
	13 SEER(11.09 EER) Split System Air Conditioner	type	tons					
D03-403 D03-404	14 SEER(12.15 EER) Split-System Air Conditioner	type	tons	SEER	EER EER			
	15 SEER(12.72 EER) Split-System Air Conditioner	type	tons	SEER				
D03-463	16 SEER (11.61 EER) Split System Air Conditioner	type	tons	SEER	EER			
D03-464	17 SEER (12.28 EER) Split-System Air Conditioner	type	tons	SEER	EER			
D03-465	18 SEER (13.37 EER) Split-System Air Conditioner	type	tons	SEER	EER			
D03-405	Direct Evaporative Cooler	Rated CFM	HP	Pad Size				
D03-406	Indirect Evaporative Cooler	Rated CFM	HP	Pad Size				
D03-407	Direct-Indirect Evaporative Cooler	Rated CFM	HP	Pad Size				
D03-408	Refrigerant charge - typical charge adjustment	tons						
D03-409	Refrigerant charge - high charge adjustment	tons						
D03-410	Condensing 90 AFUE(1.11 HIR) Furnace	kBtuh	AFUE					
D03-411	Condensing 92 AFUE(1.08 HIR) Furnace	kBtuh	AFUE					
D03-412	Condensing 94 AFUE(1.06 HIR) Furnace	kBtuh	AFUE					
D03-413	Condensing 96 AFUE(1.03 HIR) Furnace	kBtuh	AFUE					
D03-414	13 SEER(11.07 EER)/8.1 HSPF(3.28 COP) A/C Heat pump	type	tons	SEER	EER			
D03-415	14 SEER(12.19 EER)/8.6 HSPF(3.52 COP) A/C Heat Pump	type	tons	SEER	EER			
D03-416	15 SEER(12.70 EER)/8.8 HSPF(3.74 COP) A/C Heat Pump	type	tons	SEER	EER			
D03-466	16 SEER (12.06 EER) / 8.4 HSPF (3.48 COP) A/C Heat Pump	type	tons	SEER	EER			
D03-467	17 SEER (12.52 EER) / 8.6 HSPF (3.26 COP) A/C Heat Pump	type	tons	SEER	EER			
D03-417	18 SEER(12.8 EER)/9.2 HSPF(3.66 COP) A/C Heat Pump	type	tons	SEER	EER			
D03-418	Duct Sealing (Total Leakage Reduction 28% of AHU flow)	tons						
D03-420	Ceiling R-0 to R-30 Insulation-Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-421	Ceiling R-0 to R-38 Insulation-Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-422	R-30 Insulation-Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-423	R-38 Insulation-Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-424	R-49 Insulation-Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		

Measure ID	Measure Name	Tech Spec 1	Tech Spec 2	Tech Spec	Tech Spec 4	Tech Spec 5	Tech Spec 6	Tech Spec 7
D03-426	Floor R-0 to R-19 Insulation Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced	Брес 0	
D03-427	Floor R-0 to R-30 Insulation Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-428	Floor R-19 to R-30 Insulation-Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-429	Wall 2x4 R-15 Insulation-Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-430	Wall 2x6 R-19 Insulation-Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-431	Wall 2x6 R-21 Insulation-Batts	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-435	Wall 2x4 R-13 Batts + R-5 Rigid	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-436	Wall 2x6 R-19 Batts + R-5 Rigid	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-437	Wall 2x6 R-21 Batts + R-5 Rigid	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-438	Wall Blow-In R-0 to R-13 Insulation	Square Feet	R Value	Batts or Blown	Location	faced or unfaced		
D03-441	Whole House Fans	CFM	Amps	Watts	Drive			
D03-442	Default Window With Sunscreen	Width	Length					
D03-443	Single Pane Clear Glass With Reflective Film	Shading Coefficient	SHGC	Solar Energy Rejected	UV Transmission			
D03-444	Single Pane Clear Glass With Spectrally Selective Film	Shading Coefficient	SHGC	Solar Energy Rejected	UV Transmission			
D03-445	Single Pane Clear Glass With Standard Film	Shading Coefficient	SHGC	Solar Energy Rejected	UV Transmission			
D03-446	U-0.50/SHGC-0.65 (clear) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-447	U-0.40/SHGC-0.65 (clear) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-448	U-0.35/SHGC-0.55 (clear) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-449	U-0.25/SHGC-0.35 (clear) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction

Measure ID	Measure Name	Tech Spec 1	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5	Tech Spec 6	Tech Spec 7
D03-450	U-0.50/SHGC-0.40 (tint) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-451	U-0.40/SHGC-0.40 (tint) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-452	U-0.35/SHGC-0.32 (tint) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-453	U-0.25/SHGC-0.22 (tint) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-454	U-0.50 / SHGC-0.40 (tint) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-455	U-0.40 / SHGC-0.40 (tint) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-456	U-0.35 / SHGC-0.32 (tint) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-457	U-0.25 / SHGC-0.22 (tint) Window	Square Feet	SHGC	U Factor	Glass Type	Frame Material	Number of Panes	Construction
D03-458	Duct Sealing (Total Leakage Reduction 12% of AHU flow)	tons						
D03-459	Refrigerant charge - typical charge adjustment & duct sealing	tons						
D03-460	Refrigerant charge - high charge adjustment & duct sealing	tons						

Appendix A. Non-Residential and Residential Non-Weather Sensitive Measure Technical Specifications for Cost Research

Measure ID	Measure Name	Tech Spec 1	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5
D03-801	13 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-802	13 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-803	14 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-804	15 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-805	16 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-806	18 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-807	18 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-808	19 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-809	20 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-810	23 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-811	25 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-812	25 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-813	26 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-814	26 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-815	28 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-816	30 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-817	36 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-818	40 Watt Integral CFL	Watts	Type/ Life	Lumens		
D03-819	13 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-820	13 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-821	14 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-822	15 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-823	16 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-824	18 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-825	18 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-826	19 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-827	20 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-828	23 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-829	25 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-830	25 Watt Modular CFL	Watts	Type/ Life	Lumens		

Measure ID	Measure Name	Tech Spec 1	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5
D03-831	26 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-832	26 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-833	28 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-834	30 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-835	40 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-836	55 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-837	65 Watt Modular CFL	Watts	Type/ Life	Lumens		
D03-838	20W CFL Table Lamp	Watts	Type/ Life	Lumens		
D03-839	25W CFL Table Lamp	Watts	Type/ Life	Lumens		
D03-840	32W CFL Table Lamp	Watts	Type/ Life	Lumens		
D03-841	50W CFL Table Lamp	Watts	Type/ Life	Lumens		
D03-842	55W CFL Torchiere	Watts				
D03-843	70W CFL Torchiere (two bulbs)	Watts				
D03-844	50W Metal Halide	Watts				
D03-845	75W Metal Halide	Watts				
D03-846	100W Metal Halide	Watts				
D03-847	175W PS Metal Halide	Watts				
D03-848	175W PS Metal Halide	Watts				
D03-849	250W PS Metal Halide	Watts				
D03-850	200W HPS	Watts				
D03-851	180W LPS	Watts				
D03-852	Premium T8 El Ballast	No. lamps	Ballast type	Lamp type		
D03-853	T8 32W Dimming El Ballast	No. lamps	Ballast type	Lamp type		
D03-854	De-lamp from 4', 4 lamp/fixture					
D03-855	De-lamp from 8', 4 lamp/fixture					
D03-856	Occ-Sensor - Wall box	Sensor type	Fixtures controlled			
D03-857	Occ-Sensor - Plug loads	Sensor type	Load controlled			
D03-858	Timeclock	Volts	Amps	No. of poles		
D03-859	Photocell	Fixtures controlled				
D03-860	LED Exit Sign (New)	Sign type	Watts			
D03-861	LED Exit Sign Retrofit Kit	Sign type	Watts			
D03-862	Electroluminescent Exit Sign (New)	Sign type	Watts			

Measure ID	Measure Name	Tech Spec 1	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5
D03-863	Electroluminescent Exit Sign Retrofit Kit	Sign type	Watts			
D03-901	High Efficiency Copier	Size (CPM)	Energy Star?	Color?	Fax?	Printer?
D03-902	High Efficiency Copier	Size (CPM)	Energy Star?	Color?	Fax?	Printer?
D03-903	High Efficiency Copier	Size (CPM)	Energy Star?	Color?	Fax?	Printer?
D03-904	High Efficiency Gas Fryer	Size	Btuh/kW			
D03-905	High Efficiency Gas Griddle	Size	Btuh/kW			
D03-906	High Efficiency Electric Fryer	Size	Btuh/kW			
D03-907	Hot Food Holding Cabinet	Size	Btuh/kW			
D03-908	Connectionless Steamer	Size	Btuh/kW			
D03-909	Point of Use Water Heat	Gal.	Eff	Btuh		
D03-910	Circulation Pump Timeclock					
D03-911	High Eff. Water Heater, EF=0.64	Gal.	Eff	Btuh		
D03-912	Vending Machine Controller	Control type				
D03-913	Vending Machine Controller	Control type				
D03-914	Premium Efficiency Motor - 1 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-915	Premium Efficiency Motor - 5 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-916	Premium Efficiency Motor - 10 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-917	Premium Efficiency Motor - 15 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-918	Premium Efficiency Motor - 20 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-919	Premium Efficiency Motor - 25 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-920	Premium Efficiency Motor - 50 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-921	Premium Efficiency Motor - 100 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-922	Premium Efficiency Motor - 150 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-923	Premium Efficiency Motor - 200 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-924	Premium Efficiency Motor - 1 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-925	Premium Efficiency Motor - 5 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-926	Premium Efficiency Motor - 10 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-927	Premium Efficiency Motor - 15 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-928	Premium Efficiency Motor - 20 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-929	Premium Efficiency Motor - 25 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-930	Premium Efficiency Motor - 50 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-931	Premium Efficiency Motor - 100 HP	Enclosure	HP	RPM	Eff.	Voltage

Measure ID	Measure Name	Tech Spec 1	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5
D03-932	Premium Efficiency Motor - 150 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-933	Premium Efficiency Motor - 200 HP	Enclosure	HP	RPM	Eff.	Voltage
D03-934	Faucet Aerators	GPM				
D03-935	Heat Pump Water Heater	Gal.	Eff			
D03-936	Pipe Wrap	Linear Feet	R-value			
D03-937	Low Flow Showerhead	GPM				
D03-938	High Efficiency Water Heater	Gal.	Eff	Btuh		
D03-939	High Efficiency Water Heater	Gal.	Eff	kW		
D03-940	Point of Use Water Heat	Gal.	Eff	Btuh		
D03-941	Efficient Clothes Dryer	Cubic Feet	kWh/year	Moist, sens	Volts	
D03-942	Efficient Clothes Dryer	Cubic Feet	kWh/year	Moist, sens	Volts	
D03-943	Energy Star Clothes Washer	Cubic Feet	MEF	Volts		
D03-944	Energy Star Clothes Washer	Cubic Feet	MEF	Volts		
D03-945	Energy Star Clothes Washer	Cubic Feet	MEF	Volts		
D03-946	Energy Star Clothes Washer	Cubic Feet	MEF	Volts		
D03-947	Energy Star Clothes Washer	Cubic Feet	MEF	Volts		
D03-948	Energy Star Clothes Washer	Cubic Feet	MEF	Volts		
D03-949	Energy Star Clothes Washer	Cubic Feet	MEF	Volts		
D03-950	Energy Star Clothes Washer	Cubic Feet	MEF	Volts		
D03-951	Energy Star Clothes Washer	Cubic Feet	MEF	Volts		
D03-952	Energy Star Dish Washer	EF				
D03-953	Energy Star Dish Washer	EF				
D03-954	Refrigerator: Bottom Mount Freezer without through-the-door ice	Cubic Feet	Freezer loc.	w/wo ice		
D03-955	Refrigerator: Bottom Mount Freezer without through-the-door ice	Cubic Feet	Freezer loc.	w/wo ice		
D03-956	Refrigerator: Top Mount Freezer without through-the-door ice	Cubic Feet	Freezer loc.	w/wo ice		
D03-957	Refrigerator: Top Mount Freezer without through-the-door ice	Cubic Feet	Freezer loc.	w/wo ice		
D03-958	Refrigerator: Top Mount Freezer without through-the-door ice	Cubic Feet	Freezer loc.	w/wo ice		
D03-959	Refrigerator: Side Mount Freezer without through-the-door ice	Cubic Feet	Freezer loc.	w/wo ice		
D03-960	Refrigerator: Side Mount Freezer without	Cubic Feet	Freezer loc.	w/wo ice		

Measure ID	Measure Name	Tech Spec 1	Tech Spec 2	Tech Spec 3	Tech Spec 4	Tech Spec 5
	through-the-door ice					
D03-961	Refrigerator: Side Mount Freezer with through- the-door ice	Cubic Feet	Freezer loc.	w/wo ice		
D03-962	Refrigerator: Side Mount Freezer with through- the-door ice	Cubic Feet	Freezer loc.	w/wo ice		
D03-964	Refrigerator Recycling					
D03-965	Freezer Recycling					
D03-966	Efficient Single Speed Pool Pump	HP	Speed			
D03-967	Efficient Two Speed Pool Pump	HP	Speed			

Appendix A. Refrigeration Measure Technical Specifications for Cost Research

Appendix A.	Refrigeration Measure Technical Specifications for C	ost Research
Measure ID	Measure Name	Tech Spec 1
D03-201	Retrocommissioning	tons
D03-202	High Efficiency Walk-in Fan Motors	type
D03-203	High Efficiency Display Fan Motors	type
D03-204	Heat Recovery from Central Refrigeration System	square feet
D03-205	Night Covers for Display Cases (medium temp)	linear feet
D03-206	Medium Temp Glass Doors (open display cases)	linear feet
D03-207	New Medium Temp Refrig Display Case with Doors	linear feet
D03-208	Auto-Closers on Main Cooler Doors	
D03-209	Auto-Closers on Main Freezer Doors	
D03-210	Evaporator Fan Control on Walk-in Coolers & Freezers	
D03-211	Air-Cooled Condenser to Evaporative Condenser	tons
D03-212	Energy Efficient Air-Cooled Condenser	tons
D03-213	Energy Efficient Evap-Cooled Condenser	tons
D03-214	Multiplex System with Mech Subcooling (air-cooled)	tons
D03-215	Multiplex System with Mech Subcooling (evap-cooled)	tons
D03-216	Multiplex System with Mech Subcooling (high eff air-cooled)	tons
D03-217	Multiplex System with Mech Subcooling (high eff evap-cooled)	tons
D03-218	Low Temperature Mechanical Subcooling	tons
D03-219	Low and Medium Temp Mechanical Subcooling	tons
D03-220	Floating Suction Pressure	tons
D03-221	Floating Head Pressure, Fixed Setpoint (air-cooled)	tons
D03-222	Floating Head Pressure, Fixed Setpoint (evap-cooled)	tons
D03-223	Floating Head Pressure, Variable Setpoint (air-cooled)	tons
D03-224	Floating Head Pressure, Variable Setpoint (evap-cooled)	tons
D03-225	Floating Head Pressure, Variable Setpt & Speed (air-cooled)	tons
D03-226	Floating Head Pressure, Variable Setpt & Speed (evap-cooled)	tons
D03-227	Display Case Lighting Control	linear feet
D03-228	Zero Heat Reach-in Glass Doors	
D03-301	Retrocommissioning	tons
D03-302	Oversized Evaporative Condenser	tons
D03-303	Oversized Evaporative Condenser & Floating Head	tons
D03-304	Variable-Speed Compressors	tons
D03-305	Low-Temperature Subcooling	tons
D03-306	Floating Suction Pressure	tons
D03-307	Floating Head Pressure, Fixed Setpoint (evap-cooled)	tons
D03-308	Floating Head Pressure, Variable Setpoint (evap-cooled)	tons
D03-309	Floating Head Pressure, Variable Setpt & Speed (evap-cooled)	tons
	1 1 1 1	

# **APPENDIX B: MEASURE COST DATA**

#### APPLIANCES

Measure ID	Category	Measure Name	Measure Description	Base Description	Delivery Channel	Application	Energy Star?	Purchase Volume	Cost Basis	Base Equipment Cost	Measure Equipment Cost	Incremental Equipment Cost	ahor Cost Ins	stalled Cost Cost Unit
Measure 1D	Category		er CEE Tier 1: MEF=1.42, 1.5	Base Description	Chaimer	Application	our.	voidine	Cost Dasis	Cost	Equipment Cost	Equipment Cost	Labor Cost Ins	tanca cost cost cint
D03-943	Appliances	- 1.5 cf	cf Capacity	clothes washer (small capacity)	Retail	ROB/NEW	Yes	Low	INCR/INCR	\$565.08	no data available	\$0.00	\$0.00	\$0.00 CWasher
D03-944	Appliances	- 1.5 cf	er CEE Tier 2: MEF=1.60, 1.5 cf capacity	clothes washer (small capacity)	Retail	ROB/NEW	Yes	Low	INCR/INCR	\$565.08	\$946.40	\$381.32	\$0.00	\$0.00 CWasher
			er CEE Tier 3: MEF=1.80, 1.5	(							42.101.10	*******	40100	
D03-945	Appliances	- 1.5 cf	cf capacity er CEE Tier 1: MEF=1.42, 2.65	clothes washer (small capacity)	Retail	ROB/NEW	Yes	Low	INCR/INCR	\$565.08	\$1,349.87	\$784.78	\$0.00	\$0.00 CWasher
D03-946	Appliances	- 2.65 cf	cf capacity	clothes washer (med. capacity)	Retail	ROB/NEW	Yes	Low	INCR/INCR	\$588.39	\$769.17	\$180.78	\$0.00	\$0.00 CWasher
		Energy Star Clothes Wash	er CEE Tier 2: MEF=1.60, 2.65											
D03-947	Appliances	- 2.65 cf Energy Star Clothes Wash	cf capacity er CEE Tier 3: MEF=1.80, 2.65	clothes washer (med. capacity)	Retail	ROB/NEW	Yes	Low	INCR/INCR	\$588.39	\$1,137.38	\$548.99	\$0.00	\$0.00 CWasher
D03-948	Appliances	- 2.65 cf	cf capacity	clothes washer (med. capacity)	Retail	ROB/NEW	Yes	Low	INCR/INCR	\$588.39	\$1,181.16	\$592.77	\$0.00	\$0.00 CWasher
D02 040	A1:		er CEE Tier 1: MEF=1.42, 3.5	alathar analas (lama anasita)	D-4-il	DODAIEW	V	T	INICID/INICID	051554	67/1/0	6246.14	60.00	\$0.00 CWasher
D03-949	Appliances	- 3.5 cf Energy Star Clothes Wash	er CEE Tier 2: MEF=1.60, 3.5	clothes washer (large capacity)	Ketan	ROB/NEW	Yes	Low	INCR/INCR	\$515.54	\$761.68	\$246.14	\$0.00	50.00 C wasner
D03-950	Appliances	- 3.5 cf	cf Capacity	clothes washer (large capacity)	Retail	ROB/NEW	Yes	Low	INCR/INCR	\$515.54	\$1,368.54	\$853.00	\$0.00	\$0.00 CWasher
D03-951	Appliances	Energy Star Clothes Wash - 3.5 cf	er CEE Tier 3: MEF=1.80, 3.5 cf Capacity	clothes washer (large capacity)	Datail	ROB/NEW	Yes	Low	INCR/INCR	\$515.54	\$1,280.46	\$764.92	\$0.00	\$0.00 CWasher
D03-931	Appliances	- 3.3 CI	High Efficiency Electric	cionies wasier (large capacity)	Ketali	KOB/NEW	1 05	LOW	INCK/INCK	\$313.34	\$1,200.40	3704.92	\$0.00	30.00 C Washer
				Electric Clothes Dryer EF=3.01.										
D03-941	Appliances	Efficient Clothes Dryer	Sensor. High Efficiency Electric	Single Family, 416 dry cycles	Retail	ROB/NEW	No	low	INCR/INCR	\$319.02	\$557.25	\$238.24	\$0.00	\$0.00 Dryer
				Electric Clothes Dryer EF=3.01.										
D03-941	Appliances	Efficient Clothes Dryer	Sensor.	Single Family, 200 dry cycles	Retail	ROB/NEW	No	low	INCR/INCR	\$319.02	\$557.25	\$238.24	\$0.00	\$0.00 Dryer
			High Efficiency Gas Clothes	Gas Clothes Dryer EF=2.67.										
D03-942	Appliances	Efficient Clothes Dryer		Single Family, 416 dry cycles	Retail	ROB/NEW	No	low	INCR/INCR	\$362.65	\$604.91	\$242.26	\$0.00	\$0.00 Dryer
			High Efficiency Gas Clothes	Gas Clothes Driver EE=2 67										
D03-942	Appliances	Efficient Clothes Dryer		Single Family, 200 dry cycles	Retail	ROB/NEW	No	low	INCR/INCR	\$362.65	\$604.91	\$242.26	\$0.00	\$0.00 Dryer
			Energy Star Dish Washer,	EF=0.46, 160 wash cycles,										
D03-952	Appliances	Energy Star Dish Washer	EF=0.58 Energy Star Dish Washer,	electric water heat EF=0.46, 160 wash cycles,	Retail	ROB/NEW	Yes	low	INCR/INCR	\$292.65	\$426.30	\$133.64	\$0.00	\$0.00 Dwasher
D03-952	Appliances	Energy Star Dish Washer	EF=0.61	electric water heat	Retail	ROB/NEW	Yes	low	INCR/INCR	\$292.65	\$426.30	\$133.64	\$0.00	\$0.00 Dwasher
D02.052	. 1:	E C DILWI	Energy Star Dish Washer,	EF=0.46, 160 wash cycles,	D + 3	DODAIEW	**	,	DICD DICD	6202.65	8426.20	6122.64	<b>#0.00</b>	60 00 D
D03-952	Appliances	Energy Star Dish Washer	EF=0.64 Energy Star Dish Washer,	electric water heat EF=0.46, 215 wash cycles,	Retail	ROB/NEW	Yes	low	INCR/INCR	\$292.65	\$426.30	\$133.64	\$0.00	\$0.00 Dwasher
D03-953	Appliances	Energy Star Dish Washer	EF=0.58	electric water heat	Retail	ROB/NEW	Yes	low	INCR/INCR	\$292.65	\$426.30	\$133.64	\$0.00	\$0.00 Dwasher
D03-953	Appliances	Energy Star Dish Washer	Energy Star Dish Washer, EF=0.61	EF=0.46, 215 wash cycles, electric water heat	Retail	ROB/NEW	Yes	low	INCR/INCR	\$292.65	\$426.30	\$133.64	\$0.00	\$0.00 Dwasher
D03-933	Appliances	Energy Star Dish washer	Energy Star Dish Washer,	EF=0.46, 215 wash cycles,	Retail	KOB/NE W	103	IOW	INCIDINCIA	3272.03	3420.30	3133.04	\$0.00	30.00 Dwasiici
D03-953	Appliances	Energy Star Dish Washer	EF=0.64	electric water heat	Retail	ROB/NEW	Yes	low	INCR/INCR	\$292.65	\$426.30	\$133.64	\$0.00	\$0.00 Dwasher
		Refrigerator: Bottom Mou	Refrigerator: Bottom Mount nt Freezer without through-the-	Bottom Mount Freezer without through-the-door ice: 16.1 - 20 c	·f									
D03-954	Appliances	Freezer	door ice	total volume	Retail	ROB/NEW	Yes	low	INCR/INCR	\$880.00	\$894.66	\$14.66	\$0.00	\$0.00 Refrigerator
		D.C D M	Refrigerator: Bottom Mount	Bottom Mount Freezer without	c									
D03-955	Appliances	Freezer	nt Freezer without through-the- door ice	through-the-door ice: 20.1 - 25 c total volume	Retail	ROB/NEW	Yes	low	INCR/INCR	\$945.00	\$1,086.81	\$141.81	\$0.00	\$0.00 Refrigerator
			Refrigerator: Top Mount	Top Mount Freezer without						47.10.00	21,000.01		4	
D02.05/	A	Refrigerator: Top Mount		through-the-door ice: <16.1cf	D-4-II	DODAIEW	V	l	INCD/INCD	6507.14	6450.75	(85( 20)	60.00	60 00 D -6-i
D03-956	Appliances	Freezer	door ice Refrigerator: Top Mount	Top Mount Freezer without	Retail	ROB/NEW	Yes	low	INCR/INCR	\$507.14	\$450.75	(\$56.39)	\$0.00	\$0.00 Refrigerator
		Refrigerator: Top Mount	Freezer without through-the-	through-the-door ice: 16.1 - 20 c										
D03-957	Appliances	Freezer	door ice Refrigerator: Top Mount	total volume Top Mount Freezer without	Retail	ROB/NEW	Yes	low	INCR/INCR	\$448.64	\$590.00	\$141.36	\$0.00	\$0.00 Refrigerator
		Refrigerator: Top Mount		through-the-door ice: 20.1 - 25 c	ef .									
D03-958	Appliances	Freezer	door ice	total volume	Retail	ROB/NEW	Yes	low	INCR/INCR	\$537.75	\$698.67	\$160.92	\$0.00	\$0.00 Refrigerator
		Refrigerator: Side Mount	Refrigerator: Side Mount Freezer without through-the-	Side Mount Freezer without through-the-door ice: up to 25 ct	f									
D03-959	Appliances	Freezer	door ice	total volume	Retail	ROB/NEW	Yes	low	INCR/INCR	\$939.60	\$1,890.41	\$950.81	\$0.00	\$0.00 Refrigerator
		D.C C.1.25	Refrigerator: Side Mount	Side Mount Freezer without										
D03-960	Appliances	Refrigerator: Side Mount Freezer	Freezer without through-the- door ice	through-the-door ice: 25 cf and higher total volume	Retail	ROB/NEW	Yes	low	INCR/INCR	\$1,052.10	\$1,150.48	\$98.37	\$0.00	\$0.00 Refrigerator
200,700	primites	- 100201	Refrigerator: Side Mount	Side Mount Freezer with through			100	.011	a.c.unck	91,032.10	\$1,120.40	970.37	φυ.σο	go.oo renigeratoi
D02.071	. 1	Refrigerator: Side Mount	-	or the-door ice: up to 25 cf total	D . 3	DODAIEW	**		DICD DICE	8002.22	61 152 52	0170 00	60.00	60 00 P. C.
D03-961	Appliances	Freezer	ice	volume	Retail	ROB/NEW	Yes	low	INCR/INCR	\$983.30	\$1,153.52	\$170.22	\$0.00	\$0.00 Refrigerator

Refrigerator: Side Mount Freezer with through-the-door tee: 25 cf and higher  D03-962 Appliances Freezer ice total volume Retail ROB/NEW Yes low INCR/INCR \$928.74 \$1,064.50 \$135.76 \$0.00 \$0.00 Refrigerator				Refrigerator: Side Mount	Side Mount Freezer with throug	h									
March   Marc			Refrigerator: Side Mount												
Ministry		Appliances	Freezer	ice	total volume		ROB/NEW	Yes	low	INCR/INCR		\$1,064.50	\$135.76		\$0.00 Refrigerator
Minor   Mino															\$97.75 Refrigerator
	D03-965	Appliances	Freezer Recycling	Freezer removed	Old extra freezer	Utility	RET	No	low	FULL	\$0.00		\$0.00	\$0.00	\$97.75 Freezer
	ROII EDS														
Manual   M	DOILLERS					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Process   Proc	Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application			Cost Basis	Cost	<b>Equipment Cost</b>	<b>Equipment Cost</b>	Labor Cost In	nstalled Cost Cost Unit
MAX_MOR   Page Particus   South Section   So						retail/contracto									
Section   Sect	D03-066					r		Yes	Low	INCR/INCR	\$11.37	\$14.94	\$3.57	\$0.00	\$0.00 kBtuh
MAX No.   Big   Efficiency States before control states before the control state before the control state	D02.067					retail/contracto		**		DICD DICD	611.00	624.11	612.21	60.00	60 00 I D: 1
Mary   Section   Sectio	D03-067					retail/contracto		res	Low	INCR/INCR	\$11.80	\$24.11	\$12.31	\$0.00	\$0.00 KBtun
Marie   Mari	D03-068					г		Yes	Low	INCR/INCR	\$10.54	\$37.87	\$27.32	\$0.00	\$0.00 kBtuh
Manuser   Manu			,												
Manual Part	COMMERCI	IAL COOKING													
Section   Sect		<i>a</i> .						-			• •				
Second   S	Measure ID	Category	Measure Name			Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost Ir	istalled Cost Cost Unit
						Retail/Contract									
Base use = 2 Sibilation   Series   Series   Series   Solution   Sol	D03-904	Cooking	High Efficiency Gas Fryer		30-50 lbs can: Normal Fryer			Ves	Low	INCR/INCR	\$1,520,61	\$4 103 15	\$2 582 54	\$0.00	\$0.00 Erver
	1003-704	Cooking	riigii Emeleney Gas rryer		f	OI .	ROD/IVE W	103	Low	пчентиск	\$1,520.01	94,105.15	\$2,502.54	\$0.00	30.00 1190
Second   Part	D03-905	Cooking	High Efficiency Gas Griddl			Retail	ROB/NEW	No	Low	INCR/INCR	\$1,758.36	\$3,860.67	\$2,102.31	\$0.00	\$0.00 Griddle
					8										
	D03-906	Cooking	High Efficiency Elec Fryer					Yes	Low	INCR/INCR	\$3,326.73	\$12,088.62	\$8,761.89	\$0.00	\$0.00 Fryer
Reserve   10 Works   10 Works   Reserve   10 Works   10 Works   Reserve   10 Works	D03 907	Cooking	Hot Food Holding Cabinat					Vac	Low	INCD/INCD	\$1.545.67	\$2.580.81	\$1.044.12	\$0.00	\$0.00 Cabinat
Control   Cont	D03=907	Cooking	Hot rood Holding Cabillet					103	Low	INCIOINCI	31,343.07	32,369.61	\$1,044.13	30.00	30.00 Cabillet
Measure   Meas	D03-908	Cooking	Connectionless Steamer					Yes	Low	INCR/INCR	\$5,128.24	\$3,206.64	\$0.00	\$0.00	\$0.00 Steamer
Measure   Meas															
Modes   Mode	CONTROLS	- MISCELLANEOU	JS			D. II		r	n .		D D		¥		
	Measure ID	Category	Measure Name	Measure Description	Base Description		Application			Cost Basis				Labor Cost In	nstalled Cost Cost Unit
	D03-011	Controls	Plug Loads reduced by 5%	all plug loads reduced by 5%	all plug loads reduced by 5%	Not priced						Not priced			
Assume control SW of task   lighting and a computer   monitor					and programme and a second second				-			p		-	
Measure   Implication   Measure   Implication   Measure   Measur	D03-012	Controls	Plug Loads reduced by 10%			Not priced						Not priced			
Day   Part   Day															
Assume control 50W of lask lighting and a computer   Section   S	D02 057	Control	One Course Dhombards		N			NI-	T	ELILI /ELILI	60.00	692.25	60.00	625.00	6117.25 6
Retail Contract   Retail Con	D03-837	Controls	Occ-Sensor - Plug loads			OF	KEI/NEW	NO	Low	FULL/FULL	\$0.00	\$82.23	\$0.00	\$33.00	\$117.25 Sensor
COOL ROOF   Cole Roof   Category   Measure Name   Measure Description   Base Description   Base Description   Cole Roof   Co						Retail/Contract									
Delivery   Measure Name   Measure Description   Base Description   Base Description   Base Description   Category   Measure Name   Measure Description   Base Description   Category   Category   Measure Name   Measure Description   Base Description   Category   Category   Measure Name   Measure Description   Category   Category   Category   Measure Name   Measure Description   Category   Category   Category   Category   Measure Name   Measure Description   Category   Categ	D03-857	Controls	Occ-Sensor - Plug loads		No occupancy sensor	or	RET/NEW	No	High	FULL/FULL	\$0.00	\$74.67	\$0.00	\$26.25	\$100.92 Sensor
Delivery   Measure Name   Measure Description   Base Description   Base Description   Base Description   Category   Measure Name   Measure Description   Base Description   Category   Category   Measure Name   Measure Description   Base Description   Category   Category   Measure Name   Measure Description   Category   Category   Category   Measure Name   Measure Description   Category   Category   Category   Category   Measure Name   Measure Description   Category   Categ															
Measure   Day   Measure   Name   Measure   Name   Measure   Day   Category   Measure   Name   Nam	COOL ROOI	F				D-12		F	Donalos		D Fi	M	I		
Part	Managama ID	Cotogowy	Maaguna Nama	Manager Description	Paga Dagawintian		Amplication			Cost Posis				Labou Cost I	notelled Cost - Cost Unit
Dot-10    Col Roof   Light Colored Roof   Roof absorptivity = 0.45   Roof absorptivity = 0.7   Ref./NEW   Yes   High   FULL/FULL   \$0.00   \$664.88   \$0.00   \$7,789.79   \$8,454.67   1000 SqFt   FOLE   FOL	Measure ID	Category	Measure Name	Measure Description	Base Description		Application	star:	volume	Cost Dasis	Cost	Equipment Cost	Equipment Cost	Labor Cost II	istalieu Cost Clift
Measure Name	D03-016	Cool Roof	Light Colored Roof	Roof absorptivity = 0.45	Roof absorptivity = 0.7			Yes	High	FULL/FULL	\$0.00	\$664.88	\$0.00	\$7,789.79	\$8,454.67 1000 SqFt
Measure Name															
Measure ID   Measure Name   Measure Name   Measure Name   Measure Name   Measure Name   Measure Name   Scopies/minute, copy only;	COPIERS														
Retail/Contract   Sopies/minute, copy only;   Sopies/minute, copy onl		<i>a</i> .		M 10 1 11	n n					G (D )					
Dos-901   Copiers   High Efficiency Copier   Energy Star   No idle-off control   or   ROB/NEW   Yes   Low   INCR/INCR   \$404.09   \$443.28   \$39.19   \$0.00   \$0.00   copier	Measure ID	Category	Measure Name		Base Description			Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost Ir	istalled Cost Cost Unit
10 copies/minute, copy only;   Retail/Contract   10 copies/minute, copy only;   Retail/Contract   15 copies/min, b/w, copy   15 copies/min, b/w, copy   15 copies/min, b/w, copy   15 copies	D03-901	Conjers	High Efficiency Conjer		No idle-off control			Vec	Low	INCR/INCR	\$404.09	\$443.28	\$39.19	\$0.00	\$0.00 copier
Doi-901   Copiers   High Efficiency Copier   Energy Star   No idle-off control   or   ROB/NEW   Yes   Low   INCR/INCR   \$808.19   \$886.57   \$78.38   \$0.00   \$0.00   copier	1505-701	Copiers	riigii Emelency Copiei					103	Low	пченнек	\$404.07	\$ <del>113.20</del>	337.17	30.00	30.00 copici
15 copies/minute, copy only;   Retail/Contract   15 copies/minute, copy only;   Energy Star   No idle-off control   or   ROB/NEW   Yes   Low   INCR/INCR   \$1,212.28   \$1,329.85   \$117.57   \$0.00   \$0.00   copier   \$1,000	D03-901	Copiers	High Efficiency Copier					Yes	Low	INCR/INCR	\$808.19	\$886.57	\$78.38	\$0.00	\$0.00 copier
D03-901   Copiers   High Efficiency Copier   Energy Star   No idle-off control   or   ROB/NEW   Yes   Low   INCR/INCR   \$1,616.38   \$1,773.14   \$156.76   \$0.00   \$5.00   copier				15 copies/minute, copy only		Retail/Contract								_	
D03-901   Copiers   High Efficiency Copier   Energy Star   No idle-off control   or   ROB/NEW   Yes   Low   INCR/INCR   \$1,616.38   \$1,773.14   \$156.76   \$0.00   \$0.00   copier	D03-901	Copiers	High Efficiency Copier					Yes	Low	INCR/INCR	\$1,212.28	\$1,329.85	\$117.57	\$0.00	\$0.00 copier
D03-902   Copiers   High Efficiency Copier   Copiers   High Efficiency Copier   Copiers   Copiers   Copiers   Copiers   Copiers   Copiers   Copiers   Copiers   High Efficiency Copier   Copiers	D02 001	Coming	Hi-h E65-i C- '					V	T	DICD/DICD	61 (1/ 20	61 772 14	6177.77	60.00	60.00
D03-902   Copiers   High Efficiency Copier   only, Energy Star   No idle-off control   or   ROB/NEW   Yes   Low   INCR/INCR   \$2,928.75   \$4,784.18   \$1,855.43   \$0.00   \$0.00 copier	D03-901	Copiers	ніgh Епісіенсу Copier		NO IGIE-OII control			Y es	LOW	INCK/INCK	\$1,616.38	\$1,773.14	\$156.76	\$0.00	\$0.00 copier
30 copies/min, b/w, copy Retail/Contract  D03-902 Copiers High Efficiency Copier only, Energy Star No idle-off control or ROB/NEW Yes Low INCR/INCR \$3,514.50 \$5,741.02 \$2,226.52 \$0.00 \$0.00 copier  35 copies/min, b/w, copy Retail/Contract	D03-902	Copiers	High Efficiency Conier		No idle-off control			Yes	Low	INCR/INCR	\$2 928 75	\$4 784 18	\$1 855 43	\$0.00	\$0.00 copier
D03-902 Copiers High Efficiency Copier only, Energy Star No idle-off control or ROB/NEW Yes Low INCR/INCR \$3,514.50 \$5,741.02 \$2,226.52 \$0.00 \$0.00 copier 35 copies/min, b/w, copy	202 702	copiero	g. z.me.ency copiei		rate off control			100		c.c.iiicit	92,720.73	ψ <del>1</del> ,/0 <del>1</del> .10	φ1,055.45	φ0.00	50.00 copiei
35 copies/min, b/w, copy Retail/Contract	D03-902	Copiers	High Efficiency Copier		No idle-off control			Yes	Low	INCR/INCR	\$3,514.50	\$5,741.02	\$2,226.52	\$0.00	\$0.00 copier
D03-902 Copiers High Efficiency Copier only, Energy Star No idle-off control or ROB/NEW Yes Low INCR/INCR \$4,100.25 \$6,697.85 \$2,597.60 \$0.00 \$0.00 copier				35 copies/min, b/w, copy								-			•
	D03-902	Copiers	High Efficiency Copier	only, Energy Star	No idle-off control	or	ROB/NEW	Yes	Low	INCR/INCR	\$4.100.25	\$6,697.85	\$2,597.60	\$0.00	\$0.00 copier
												,			

			40 copies/min, b/w, copy		Retail/Contrac	t								
D03-902	Copiers	High Efficiency Copier	only, Energy Star	No idle-off control	or	ROB/NEW	Yes	Low	INCR/INCR	\$4,686.00	\$7,654.69	\$2,968.69	\$0.00	\$0.00 copier
			Over 45 copies/min; copy		Retail/Contrac									
D03-903	Copiers	High Efficiency Copier	only	No idle-off control	or Tree	ROB/NEW	Yes	Low	INCR/INCR	no data available	\$10,924.63	no data available	\$0.00	\$0.00 copier
D03-903	Copiers	High Efficiency Copier	Over 45 copies/min; copy & printer	No idle-off control	Retail/Contrac or	ROB/NEW	Yes	Low	INCR/INCR	\$0.00	\$13,027.06	\$0.00	\$0.00	\$0.00 copier
D03-903	Copicis	riigii Emelency Copiei	printer	No idic-off control	OI .	KOD/NEW	103	Low	INCIVINCI	30.00	313,027.00	30.00	30.00	30.00 copici
DOMESTIC	HOT WATER													
					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure II	D Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	<b>Equipment Cost</b>	Equipment Cost I	Labor Cost In	nstalled Cost Cost Unit
			Improved EF of 0.53 (based											
D02 002	DINV		on tank size/vintage), Gas, 3		Retail/Contrac		N		DIGD DIGD	6474.10	0621.41	6157.22	eo oo	60 00 W. H.
D03-092	DHW	EF	75 gal tank; EF>=0.63 Improved EF of 0.53 (based	Gas, 30-75 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$474.18	\$631.41	\$157.22	\$0.00	\$0.00 WtrHtr
		Improved gas water heater			Retail/Contrac	t								
D03-092	DHW	EF	75 gal tank; EF>=0.62	Gas, 30-75 gal tank; EF<=0.594		ROB/NEW	No	Low	INCR/INCR	\$474.18	\$495.72	\$21.54	\$0.00	\$0.00 WtrHtr
			Improved EF of 0.53 (based							411111	*******	, , , , , , , , , , , , , , , , , , ,	40.00	
		Improved gas water heater	r on tank size/vintage), Gas, 4	10	Retail/Contrac	t								
D03-092	DHW	EF	gal tank; EF>=0.63	Gas, 40 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$375.65	\$550.95	\$175.30	\$0.00	\$0.00 WtrHtr
			Improved EF of 0.53 (based											
			r on tank size/vintage), Gas, 5		Retail/Contrac									
D03-092	DHW	EF	gal tank; EF>=0.63 Improved EF of 0.53 (based	Gas, 50 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$455.73	\$765.51	\$309.77	\$0.00	\$0.00 WtrHtr
		Improved gas water heater	r on tank size/vintage), Gas, 4		Retail/Contrac	t								
D03-092	DHW	EF	gal tank; EF>=0.62	Gas, 40 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$375.65	\$482.72	\$107.07	\$0.00	\$0.00 WtrHtr
203 072	DII.	2.2	Improved EF of 0.53 (based		0.	TOD/TET	110	2011	nicionici	ψ373.03	\$102.72	\$107.07	\$0.00	\$0.00 WHITE
		Improved gas water heater	r on tank size/vintage), Gas, 5		Retail/Contrac	t								
D03-092	DHW	EF	gal tank; EF>=0.62	Gas, 50 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$455.73	\$534.44	\$78.71	\$0.00	\$0.00 WtrHtr
			Improved EF of 0.53 (based											
			r on tank size/vintage), Gas, 4		Retail/Contrac									
D03-092	DHW	EF	50 gal tank; EF>=0.62 zero tank loss, improved EF	Gas, 40-50 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$375.65	\$479.89	\$104.24	\$0.00	\$0.00 WtrHtr
		tankless gas water heater	of 0.67, Gas Tankless, Elec		Retail/Contrac	t .			FULL/INCR/INC					
D03-093	DHW	used	Ignition; 250kBtu/h	Gas Tank; EF<=0.60	or	RET/ROB/NEW	No	Low	R	\$1,844.19	\$1,517.24	(\$326.95)	\$250.90	\$1,768.14 WtrHtr
		tankless electric hot water		electric water heater with EF	Retail/Contrac				FULL/INCR/INC	41,01112	41,611.12	(00=0170)		41,7001111111111111111111111111111111111
D03-094	DHW	system	zero tank loss	based on tank size	or	RET/ROB/NEW	No	Low	R	\$292.33	\$789.30	\$496.97	\$270.75	\$1,060.05 WtrHtr
			DHW circulation pump turn											
		DHW circulation pump	off during low operation	DHW circulation pump runs	retail/contracto									
D03-095	DHW	contolled by timeclock	hours	continuously	r	RET/NEW	No	Low	FULL/FULL	\$0.00	\$59.00	\$0.00	\$165.28	\$224.27 Timeclock
		Improved eff. large water	Same tank size/capacity wit improved efficiency burner	Tank size and burner capacity a	retail/contracto									
D03-096	DHW	heater ( > 155k BTU/hr)	(90%)	function of building type, 80% of		ROB/NEW	Yes	Low	INCR/INCR	\$2,033.91	\$3,695.60	\$1,661.69	\$0.00	\$0.00 WtrHtr
203 070	DII.	neuter (* 1334 BT G/III)	Same tank size/capacity wit			ROBINE	100	2011	nicionici	02,033.51	\$3,072.00	\$1,001.07	\$0.00	90.00 114114
		Improved eff. medium wa	ter improved efficiency burner	Tank size and burner capacity a	retail/contracto	)								
D03-097	DHW	heater ( > 75k BTU/hr)	(90%)	function of building type, 80% of	effr	ROB/NEW	Yes	Low	INCR/INCR	\$2,258.17	\$3,919.86	\$1,661.69	\$0.00	\$0.00 WtrHtr
			Point of Use Water Heat, G	as										
D02.000	DINV	D : . CII W. II .	Tankless, Elec Ignition;	C T 1 FF - 0.60	Retail/Contrac		N		FULL/INCR/INC		6062.60	6270.64	6250.00	Ø1 114 50 W. II.
D03-909	DHW	Point of Use Water Heat	150kBtu/h	Gas Tank; EF<=0.60 DHW circulation pump runs	or retail/contracto	RET/ROB/NEW	No	Low	R	\$492.96	\$863.60	\$370.64	\$250.90	\$1,114.50 WtrHtr
D03-910	DHW	Circulation Pump Timecle	ockCirculation Pump Timecloc		r r	RET/NEW	No	Low	FULL/FULL	\$0.00	\$59.00	\$0.00	\$165.28	\$224.27 Timeclock
					-					40100	44,,,,,	40100	4.00.20	<u> </u>
		High Eff. Water Heater,	High Eff. Water Heater, Gas	,	Retail/Contrac	t								
D03-911	DHW	EF=0.64	30-75 gal tank; EF>=0.63	Gas, 30-75 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$474.18	\$631.41	\$157.22	\$0.00	\$0.00 WtrHtr
202.011	D.1111	High Eff. Water Heater,	High Eff. Water Heater, Gas		Retail/Contrac				nion mion	0.5.40	0.40.5.50			00 00 W. W.
D03-911	DHW	EF=0.64 High Eff. Water Heater,	30-75 gal tank; EF>=0.62 High Eff. Water Heater, Ga	Gas, 30-75 gal tank; EF<=0.594		ROB/NEW	No	Low	INCR/INCR	\$474.18	\$495.72	\$21.54	\$0.00	\$0.00 WtrHtr
D03-911	DHW	EF=0.64	40 gal tank; EF>=0.63	Gas, 40 gal tank; EF<=0.594	Retail/Contrac or	ROB/NEW	No	Low	INCR/INCR	\$375.65	\$550.95	\$175.30	\$0.00	\$0.00 WtrHtr
203-711	DIIV	High Eff. Water Heater,	High Eff. Water Heater, Ga		Retail/Contrac		110	LOW	II TON/IITON	\$515.05	\$330.93	\$1/3.30	φυ.υυ	30.00 WHIII
D03-911	DHW	EF=0.64	50 gal tank; EF>=0.63	Gas, 50 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$455.73	\$765.51	\$309.77	\$0.00	\$0.00 WtrHtr
		High Eff. Water Heater,	High Eff. Water Heater, Ga	3,	Retail/Contrac	t								
D03-911	DHW	EF=0.64	40 gal tank; EF>=0.62	Gas, 40 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$375.65	\$482.72	\$107.07	\$0.00	\$0.00 WtrHtr
		High Eff. Water Heater,	High Eff. Water Heater, Ga		Retail/Contrac									
D03-911	DHW	EF=0.64	50 gal tank; EF>=0.62	Gas, 50 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$455.73	\$534.44	\$78.71	\$0.00	\$0.00 WtrHtr
		High Eff. Water Heater,	High Eff. Water Heater, Ga	,	Retail/Contrac									
D03-911	DHW	EF=0.64	40-50 gal tank; EF>=0.62	Gas, 40-50 gal tank; EF<=0.594		ROB/NEW	No	Low	INCR/INCR	\$375.65	\$479.89	\$104.24	\$0.00	\$0.00 WtrHtr
203-711	DIIV	L1 -0.04	-10-20 gai talik, 1217-0.02	Ous, +0=30 gai talik, E1'\=0.394	OI.	KOD/NE W	110	LOW	II TON/IITON	\$515.05	₽¥19.09	\$104.24	φυ.υυ	30.00 WHIII

D03-934	DHW	Faucet Aerators	Faucet Aerators	No Faucet Aerators	Retail/Contract or	et RET	No	Low	FULL	\$0.00	\$7.12	\$0.00	\$5.58	\$12.69 Aerator
D03-934	DHW	Faucet Aerators	Faucet Aerators	No Faucet Aerators	Retail/Contrac	et RET	No	High	FULL	\$0.00	\$2.14	\$0.00	\$5.58	\$7.72 Aerator
			Heat pump water heater,		Retail/Contrac	ct					•			
D03-935	DHW	Heat Pump Water Heater	EF=2.9	Electric water heater, EF=0.88	or Retail/Contrac	ROB/NEW et	No	Low	INCR/FULL	\$251.11	\$1,539.13	\$1,288.02	\$122.83	\$1,661.96 WtrHtr
D03-936	DHW	Pipe Wrap	Pipe Wrap	No Pipe Wrap	or Retail/Contrac	RET/NEW	No	Low	FULL/FULL	\$0.00	\$0.37	\$0.00	\$2.44	\$2.81 LinFt
D03-936	DHW	Pipe Wrap	Pipe Wrap Low Flow Showerhead	No Pipe Wrap	or Retail/Contrac	RET/NEW	No	High	FULL/FULL	\$0.00	\$0.36	\$0.00	\$2.44	\$2.80 LinFt
D03-937	DHW	Low Flow Showerhead	(<=2.0 gpm)	Standard showerhead (2.5 gpm)	or	RET	No	Low	FULL	\$0.00	\$22.95	\$0.00	\$15.00	\$37.95 Showerhead
D03-937	DHW	Low Flow Showerhead	Low Flow Showerhead (<=2.0 gpm)	Standard showerhead (2.5 gpm)	Retail/Contract or	et RET	No	High	FULL	\$0.00	\$8.49	\$0.00	\$15.00	\$23.49 Showerhead
D03-938	DHW	High Efficiency Water Heater	Gas, 30-75 gal tank; EF>=0.63	Gas, 30-75 gal tank; EF<=0.594	Retail/Contrac	ct ROB/NEW	No	Low	INCR/INCR	\$474.18	\$631.41	\$157.22	\$0.00	\$0.00 WtrHtr
		High Efficiency Water	Gas, 30-75 gal tank;		Retail/Contrac	ct								
D03-938	DHW	Heater High Efficiency Water	EF>=0.62	Gas, 30-75 gal tank; EF<=0.594	or Retail/Contrac	ROB/NEW ct	No	Low	INCR/INCR	\$474.18	\$495.72	\$21.54	\$0.00	\$0.00 WtrHtr
D03-938	DHW	Heater High Efficiency Water	Gas, 40 gal tank; EF>=0.63	Gas, 40 gal tank; EF<=0.594	or Retail/Contrac	ROB/NEW	No	Low	INCR/INCR	\$375.65	\$550.95	\$175.30	\$0.00	\$0.00 WtrHtr
D03-938	DHW	Heater	Gas, 50 gal tank; EF>=0.63	Gas, 50 gal tank; EF<=0.594	or	ROB/NEW	No	Low	INCR/INCR	\$455.73	\$765.51	\$309.77	\$0.00	\$0.00 WtrHtr
D03-938	DHW	High Efficiency Water Heater	Gas, 40 gal tank; EF>=0.62	Gas, 40 gal tank; EF<=0.594	Retail/Contrac or	ROB/NEW	No	Low	INCR/INCR	\$375.65	\$482.72	\$107.07	\$0.00	\$0.00 WtrHtr
D03-938	DHW	High Efficiency Water Heater	Gas, 50 gal tank; EF>=0.62	Gas, 50 gal tank; EF<=0.594	Retail/Contractor	ct ROB/NEW	No	Low	INCR/INCR	\$455.73	\$534.44	\$78.71	\$0.00	\$0.00 WtrHtr
D03-938	DHW	High Efficiency Water Heater	Gas, 40-50 gal tank; EF>=0.62	Gas, 40-50 gal tank; EF<=0.594	Retail/Contract or	ct ROB/NEW	No	Low	INCR/INCR	\$375.65	\$479.89	\$104.24	\$0.00	\$0.00 WtrHtr
	DHW	High Efficiency Electric			Retail/Contrac	ct				\$139.76	\$212.06	\$72.30		
D03-939		Water Heater High Efficiency Electric	Elec, 30 gal; EF=0.93	Elec, 30 gal; EF=0.88	or Retail/Contrac	ROB/NEW et	No	Low	INCR/INCR	\$139.76			\$0.00	\$0.00 WtrHtr
D03-939	DHW	Water Heater High Efficiency Electric	Elec, 40 gal; EF=0.93	Elec, 40 gal; EF=0.88	or Retail/Contrac	ROB/NEW ct	No	Low	INCR/INCR	\$195.43	\$267.73	\$72.30	\$0.00	\$0.00 WtrHtr
D03-939	DHW	Water Heater High Efficiency Electric	Elec, 50 gal; EF=0.93	Elec, 50 gal; EF=0.88	or Retail/Contrac	ROB/NEW	No	Low	INCR/INCR	\$251.11	\$323.41	\$72.30	\$0.00	\$0.00 WtrHtr
D03-939	DHW	Water Heater	Elec, 60 gal; EF=0.93	Elec, 60 gal; EF=0.88	or	ROB/NEW	No	Low	INCR/INCR	\$306.79	\$379.09	\$72.30	\$0.00	\$0.00 WtrHtr
D03-939	DHW	High Efficiency Electric Water Heater	Elec, 80 gal; EF=0.93	Elec, 80 gal; EF=0.88	Retail/Contract or	ct ROB/NEW	No	Low	INCR/INCR	\$418.14	\$490.45	\$72.30	\$0.00	\$0.00 WtrHtr
			Point of Use Water Heat, Gas Tankless, Elec Ignition;		Retail/Contrac	et			FULL/INCR/INC					
D03-940	DHW	Gas Tankless Water Heater		Gas Tank; EF<=0.60	or	RET/ROB/NEW	No	Low	R	\$492.96	\$863.60	\$370.64	\$250.90	\$1,114.50 WtrHtr
HVAC - CON	TROLS													
Measure ID	Category	Measure Name	Measure Description	Base Description	Delivery Channel	Application	Energy Star?	Purchase Volume	Cost Basis	Base Equipment Cost	Measure Equipment Cost	Incremental Equipment Cost 1	Labor Cost In	nstalled Cost Cost Unit
			0 1 6 6 6		. 27									
D03-071	TimeClocks	time clocks control packaged system operation	Supply fan operation matche building operation	s NA	retail/contract r	o RET/NEW	No	Low	FULL/FULL	\$0.00	\$162.08	\$0.00	\$104.02	\$266.10 Timeclock
D03-072	EMS	Suite of EMS measures	CHW & HW reset, reduced nighttime lighting levels	Central plant systems with no timeclock in OLD vintage	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$406.22	\$0.00	\$88.72	\$494.94 CtrlPoint
											* · · · · · ·		******	
D03-073	HVAC Non- Residential	Install programmable thermostats in older bldgs		Standard building operation, no thermostat setback/setup	Retail/Contrac or	RET/NEW	Yes	Low	FULL/INCR	\$32.77	\$82.48	\$49.71	\$92.29	\$174.76 Thermostat
D03-401	HVAC Residential	Programmable Thermostat	Programmable Thermostat	No night setback/setup	Retail/Contract or	ct RET/NEW	Yes	Low	FULL/INCR	\$32.77	\$56.37	\$23.60	\$16.96	\$73.33 Thermostat
HVAC - COO	LING TOWERS			-										
					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost 1	Labor Cost II	nstalled Cost Cost Unit
D03-062	HVAC Non- Residential	Convert Air-Cooled Condenser to Water-Cooled		Packaged system with air-cooled condenser	l Contractor	RET/NEW	no	Low	FULL/FULL	\$0.00	\$406.26	\$0.00	\$60.29	\$466.55 tons
	HVAC Non-	Two-Speed Tower Fans	Two-speed tower fans on all	Single Speed CT fan on all			110							
D03-063	Residential HVAC Non-	replace Single-Speed Variable-Speed Tower Fan:	central plants s Variable-speed tower fans or	central plants  Two-speed tower fans on all	Contractor	ROB/NEW		0 Low	INCR/INCR FULL/INCR/INC	\$55.90	\$58.25	\$2.35	\$0.00	\$0.00 tons
D03-064	Residential	replace Two-Speed	all central plants	central plants.	Contractor	RET/ROB/NEW		0 Low	R	\$59.44	\$67.18	\$7.74	\$0.00	\$17.34 tons

HVAC - LABOR ONL	
	Ü

HVAC - LAB	OR ONLY													
Measure ID	Category	Measure Name Base ventilation rate 25%	Measure Description	Base Description	Delivery Channel	Application	Energy Star?	Purchase Volume	Cost Basis	Base Equipment Cost	Measure Equipment Cost	Incremental Equipment Cost	Labor Cost In	stalled Cost Cost Unit
D03-055	Labor Only	higher than required	standard ventilation rate ecomizer with Econo-	ventilation rate increased by 25% degraded base econo	% Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$0.00	\$0.00	\$39.84	\$39.84 Tons
		Restore degraded		, performance, DB limit = 55, Ma										
D03-060	Labor Only	economizer performance	Max OSA = 100%	OSA = 60%	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$0.00	\$0.00	\$41.71	\$41.71 Tons
D03-000	Labor Only	economizer performance	Max OSA - 100%	OSA - 00%	Contractor	KE1/NEW	NO	LOW	FULL/FULL	\$0.00	\$0.00	\$0.00	\$41./1	341./1 TOIIS
D03-061	Labor Only	Dirty Air-cooled condenser coils are cleaned	standard equipment efficience	cooling equipment efficiency is	Contractor	RET	No	Low	FULL	\$0.00	\$0.00	\$0.00	\$35.11	\$35.11 Tons
		cons are cleaned	standard equipment efficient	cydegraded by 20%	Contractor	KEI	NO	Low	FULL	\$0.00	\$0.00	\$0.00	\$33.11	\$33.11 Tons
HVAC - MOI	BIL HOME				Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	<b>Equipment Cost</b>	Labor Cost In	stalled Cost Cost Unit
		Basic Furnace Upgrade to	Basic Furnace Upgrade to	Title 24 minimum furnace AFU	E				FULL/INCR/INC					
D03-461	Mobile Home	81% AFUE	81% AFUE	= 78%	Contractor	RET/ROB/NEW	No	Low	R	\$17.40	\$18.86	\$1.46	\$14.41	\$33.27 kBtuh
		Mobile Home Duct Sealing	Mobile Home Duct Sealing											_
			(Supply Leakage Reduced											
			from 35% of AHU flow to	Duct leakage code baseline										
D03-462	Mobile Home	15%)	15%)	matches measure baseline	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$21.43	\$0.00	\$117.31	\$138.74 1000 Sq Ft
		Mobile Home Duct Sealing	Mobile Home Duct Sealing											
			(Supply Leakage Reduced											
		from 25% of AHU flow to	from 25% of AHU flow to	Duct leakage code baseline										
D03-468	Mobile Home	15%)	15%)	matches measure baseline	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$21.43	\$0.00	\$117.31	\$138.74 1000 Sq Ft
HVAC - MO	TORS				n r			n 1		D D : 1		¥ , 1		
	<b>a</b> .		W 5	n n	Delivery	4 10 40	Energy	Purchase	G (D)	Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description Premium Efficient Motor or	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost In	stalled Cost Cost Unit
		Efficient HVAC Motor -	better for app - 5 HP ODP		Retail/Contrac	ot								
D03-086	HVAC Motors		1800 RPM	EPAct Efficiency Motors		ROB/NEW		Low	INCR/INCR	\$94.92	\$103.07	\$8.15	\$0.00	\$0.00 HP
D03-080	HVAC MOIOIS	Supply Fans	Premium Efficient Motor or	EFACT Efficiency Motors	or	KOD/INE W	yes	LOW	INCK/INCK	394.92	\$105.07	30.12	\$0.00	30.00 HF
		Efficient HVAC Motor -	better for app - 10 HP ODP		Retail/Contrac	nt								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$82.02	\$89.47	\$7.45	\$0.00	\$0.00 HP
D03-080	II VAC MOIOIS	Suppry 1 ans	Premium Efficient Motor or	El Act Efficiency Motors	OI	KOD/NE W	yes	LOW	INCIVINCI	302.02	307.47	37.40	\$0.00	30.00 111
		Efficient HVAC Motor -	better for app- 15 HP ODP		Retail/Contrac	nt								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	ves	Low	INCR/INCR	\$67.95	\$71.49	\$3.54	\$0.00	\$0.00 HP
D03-000	11 VIC MOIOIS	Suppry 1 ans	Premium Efficient Motor or	El Act Efficiency Motors	OI .	ROB/ITE W	yes	LOW	nterenter	\$07.75	\$/1.7/	95.54	30.00	30.00 111
		Efficient HVAC Motor -	better for app - 20 HP ODP		Retail/Contrac	nt								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	ves	Low	INCR/INCR	\$52.66	\$63.93	\$11.26	\$0.00	\$0.00 HP
D03-000	11 THE MOIOIS	Suppry 1 ans	Premium Efficient Motor or	El rici Efficiency Motors	OI .	ROD/INEW	yes	Low	nvelonvele	\$32.00	\$05.75	311.20	30.00	30.00 111
		Efficient HVAC Motor -	better for app - 25 HP ODP		Retail/Contrac	rt								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$51.07	\$62.41	\$11.34	\$0.00	\$0.00 HP
203 000	II TITE Motors	Suppry 1 ans	Premium Efficient Motor or	Errici Emelency Motors	0.	ROBINEW	<i>y</i> co	Lon	nvenenven	\$51.07	ψ02.11	911.5	ψ0.00	90.00 111
		Efficient HVAC Motor -	better for app - 50 HP ODP		Retail/Contrac	et								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	ves	Low	INCR/INCR	\$35.65	\$49.75	\$14.10	\$0.00	\$0.00 HP
		ouppe) i amo	Premium Efficient Motor or				,				4.7.1.4		4	
		Efficient HVAC Motor -	better for app - 100 HP ODP	•	Retail/Contrac	ct								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$42.91	\$47.82	\$4.91	\$0.00	\$0.00 HP
		***	Premium Efficient Motor or											-
		Efficient HVAC Motor -	better for app - 5 HP TEFC		Retail/Contrac	ct								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$115.67	\$127.48	\$11.81	\$0.00	\$0.00 HP
		TI	Premium Efficient Motor or									-		
		Efficient HVAC Motor -	better for app - 10 HP TEFC		Retail/Contrac	ct								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$92.40	\$104.64	\$12.24	\$0.00	\$0.00 HP
		TI	Premium Efficient Motor or							•		-		
		Efficient HVAC Motor -	better for app - 15 HP TEFC	!	Retail/Contrac	ct								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$75.32	\$91.35	\$16.03	\$0.00	\$0.00 HP
			Premium Efficient Motor or					*						
		Efficient HVAC Motor -	better for app - 20 HP TEFC	!	Retail/Contrac	ct								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	ves	Low	INCR/INCR	\$81.03	\$86.50	\$5.48	\$0.00	\$0.00 HP
		- FF-7	Premium Efficient Motor or	y			,			231.03	2.0.00	\$5.10	4	******
		Efficient HVAC Motor -	better for app - 25 HP TEFC		Retail/Contrac	et								
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$67.35	\$86.07	\$18.72	\$0.00	\$0.00 HP

			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 50 HP TEFC		Retail/Contract									
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$63.25	\$77.02	\$13.78	\$0.00	\$0.00 HP
<u> </u>			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 100 HP TEFC		Retail/Contract									
D03-086	HVAC Motors	Supply Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$85.62	\$87.75	\$2.14	\$0.00	\$0.00 HP
<u> </u>			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 5 HP ODP		Retail/Contract	ct								
D03-087	HVAC Motors	Return Fans		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$94.92	\$103.07	\$8.15	\$0.00	\$0.00 HP
			Premium Efficient Motor or											_
		Efficient HVAC Motor -	better for app - 10 HP ODP		Retail/Contract	ct								
D03-087	HVAC Motors	Return Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$82.02	\$89.47	\$7.45	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app- 15 HP ODP		Retail/Contra									
D03-087	HVAC Motors	Return Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$67.95	\$71.49	\$3.54	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 20 HP ODP		Retail/Contra									
D03-087	HVAC Motors	Return Fans		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$52.66	\$63.93	\$11.26	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 25 HP ODP		Retail/Contra									
D03-087	HVAC Motors	Return Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$51.07	\$62.41	\$11.34	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 50 HP ODP		Retail/Contract									
D03-087	HVAC Motors	Return Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$35.65	\$49.75	\$14.10	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 100 HP ODP		Retail/Contract									
D03-087	HVAC Motors	Return Fans		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$42.91	\$47.82	\$4.91	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 5 HP TEFC		Retail/Contract									
D03-087	HVAC Motors	Return Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$115.67	\$127.48	\$11.81	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 10 HP TEFC		Retail/Contra			_						
D03-087	HVAC Motors	Return Fans		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$92.40	\$104.64	\$12.24	\$0.00	\$0.00 HP
			Premium Efficient Motor or		D . 110									
D	*********	Efficient HVAC Motor -	better for app - 15 HP TEFC	DD L DOT L	Retail/Contra				n ion mion					00.00.770
D03-087	HVAC Motors	Return Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$75.32	\$91.35	\$16.03	\$0.00	\$0.00 HP
		Efficient HVAC Motor -	Premium Efficient Motor or better for app - 20 HP TEFC		Retail/Contra	-4								
D03-087	HVAC Motors	Return Fans	1800 RPM	EPAct Efficiency Motors		ROB/NEW	*****	Law	INCR/INCR	\$81.03	\$86.50	\$5.48	\$0.00	\$0.00 HP
D05-087	IT VAC IVIOLOIS	Retuin Fans	Premium Efficient Motor or	EFACT Efficiency Motors	or	KOD/INE W	yes	Low	INCR/INCR	\$61.05	\$60.50	33.40	\$0.00	30.00 HF
		Efficient HVAC Motor -	better for app - 25 HP TEFC		Retail/Contra	ct								
D03-087	HVAC Motors	Return Fans		EPAct Efficiency Motors	or	ROB/NEW	vec	Low	INCR/INCR	\$67.35	\$86.07	\$18.72	\$0.00	\$0.00 HP
D03-087	TIVAC MOIOIS	Return Fans	Premium Efficient Motor or	El Act Efficiency Wolors	OI .	KOD/NE W	yes	Low	INCIVINCI	307.33	300.07	310.72	30.00	30:00 111
		Efficient HVAC Motor -	better for app - 50 HP TEFC		Retail/Contra	ct								
D03-087	HVAC Motors	Return Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	ves	Low	INCR/INCR	\$63.25	\$77.02	\$13.78	\$0.00	\$0.00 HP
203 007	TITTE Motors	return rung	Premium Efficient Motor or	Erriet Efficiency motors	0.	ROD/IVE	,00	Lon	nterentere	403.20	\$77.02	\$13.70	\$0.00	\$0.00 111
		Efficient HVAC Motor -	better for app - 100 HP TEFC		Retail/Contra	ct								
D03-087	HVAC Motors	Return Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	ves	Low	INCR/INCR	\$85.62	\$87.75	\$2.14	\$0.00	\$0.00 HP
			Premium Efficient Motor or				,						40100	
		Efficient HVAC Motor -	better for app - 5 HP TEFC		Retail/Contract	ct								
D03-088	HVAC Motors	Clg Tower Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$115.67	\$127.48	\$11.81	\$0.00	\$0.00 HP
			Premium Efficient Motor or					*					• • • • • • • • • • • • • • • • • • • •	
		Efficient HVAC Motor -	better for app - 10 HP TEFC		Retail/Contract	ct								
D03-088	HVAC Motors	Clg Tower Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	ves	Low	INCR/INCR	\$92.40	\$104.64	\$12.24	\$0.00	\$0.00 HP
			Premium Efficient Motor or											-
		Efficient HVAC Motor -	better for app - 15 HP TEFC		Retail/Contract	ct								
D03-088	HVAC Motors	Clg Tower Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$75.32	\$91.35	\$16.03	\$0.00	\$0.00 HP
			Premium Efficient Motor or	•			-							
		Efficient HVAC Motor -	better for app - 20 HP ODP		Retail/Contract	ct								
D03-088	HVAC Motors	Clg Tower Fans		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$81.03	\$86.50	\$5.48	\$0.00	\$0.00 HP
			Premium Efficient Motor or											_
		Efficient HVAC Motor -	better for app - 25 HP TEFC		Retail/Contract	ct								
D03-088	HVAC Motors	Clg Tower Fans	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$67.35	\$86.07	\$18.72	\$0.00	\$0.00 HP
			Premium Efficient Motor or						·	·	<u></u>			
		Efficient HVAC Motor -	better for app - 50 HP TEFC		Retail/Contract									
				TOTAL COMMITTER STATE OF THE ST		ROB/NEW		T	INCR/INCR	\$63.25	\$77.02	\$13.78	\$0.00	\$0.00 HP
D03-088	HVAC Motors	Clg Tower Fans	1800 RPM	EPAct Efficiency Motors	or	KOD/INE W	yes	Low	INCK/INCK	303.23	377.02	313.76	\$0.00	50.00 111
D03-088	HVAC Motors		Premium Efficient Motor or				yes	Low	INCR/INCR	303.23	\$77.02	313.76	φο.σο	\$0.50 TH
		Efficient HVAC Motor -	Premium Efficient Motor or better for app - 100 HP TEFC	;	Retail/Contrac	ct								
D03-088	HVAC Motors		Premium Efficient Motor or				yes	Low	INCR/INCR	\$85.62	\$87.75	\$2.14	\$0.00	\$0.00 HP

			Premium Efficient Motor or											-
		Deci IDVAC Mata-			D-4-:1/C44									
D03-089	HVAC Meters	Efficient HVAC Motor - Chilled Water Loop Pumps	better for app - 5 HP ODP	EDA -+ E65 M-+	Retail/Contract	DODAIEW		T	DICD/DICD	\$94.92	\$103.07	60.15	\$0.00	\$0.00 HP
D03-089	HVAC Motors	Chilled Water Loop Pumps		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$94.92	\$103.07	\$8.15	\$0.00	\$0.00 HP
			Premium Efficient Motor or		B . 11/0									
			better for app - 10 HP ODP		Retail/Contract			_						
D03-089	HVAC Motors	Chilled Water Loop Pumps		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$82.02	\$89.47	\$7.45	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app- 15 HP ODP		Retail/Contract									
D03-089	HVAC Motors	Chilled Water Loop Pumps	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$67.95	\$71.49	\$3.54	\$0.00	\$0.00 HP
			Premium Efficient Motor or	-			-							·
		Efficient HVAC Motor -	better for app - 20 HP ODP		Retail/Contract									
D03-089	HVAC Motors	Chilled Water Loop Pumps		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$52.66	\$63.93	\$11.26	\$0.00	\$0.00 HP
203 007	TITTE Motors	ennied water zoop i umps	Premium Efficient Motor or	Di Tiet Emeleney motors	0.	TOD/TIE!	,,,,	Lon	II TOTOTI TOTO	\$52.00	403.73	011.20	\$0.00	50.00 111
		Efficient HVAC Motor -	better for app - 25 HP ODP		Retail/Contract									
D03-089	HVAC Motors	Chilled Water Loop Pumps		EPAct Efficiency Motors		ROB/NEW	*****	Low	INCR/INCR	\$51.07	\$62.41	\$11.34	\$0.00	\$0.00 HP
D03-089	HVAC MOIOIS	Cliffied Water Loop Fullips		EFACT Efficiency Motors	or	KUD/INE W	yes	Low	INCR/INCR	\$31.07	302.41	311.34	\$0.00	30.00 nr
		Ecc. HILLOW	Premium Efficient Motor or		D : 1/G : :									
		Efficient HVAC Motor -	better for app - 50 HP ODP		Retail/Contract			_						
D03-089	HVAC Motors	Chilled Water Loop Pumps		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$35.65	\$49.75	\$14.10	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
			better for app - 100 HP ODP		Retail/Contract									
D03-089	HVAC Motors	Chilled Water Loop Pumps	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$42.91	\$47.82	\$4.91	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 5 HP TEFC		Retail/Contract									
D03-089	HVAC Motors	Chilled Water Loop Pumps		EPAct Efficiency Motors		ROB/NEW	yes	Low	INCR/INCR	\$115.67	\$127.48	\$11.81	\$0.00	\$0.00 HP
			Premium Efficient Motor or				,				4-2-1110			
		Efficient HVAC Motor -	better for app - 10 HP TEFC		Retail/Contract									
D03-089	HVAC Motors	Chilled Water Loop Pumps		EPAct Efficiency Motors		ROB/NEW	ves	Low	INCR/INCR	\$92.40	\$104.64	\$12.24	\$0.00	\$0.00 HP
D03-089	HVAC MOIOIS	Cliffied Water Loop Fullips	Premium Efficient Motor or	EFACT Efficiency Motors	OI	KOD/INE W	yes	LOW	INCR/INCR	392.40	\$104.04	312.24	\$0.00	30.00 nr
		Deci IDVAC Mata-			D-4-:1/C44									
D	******		better for app - 15 HP TEFC	DR. DOT	Retail/Contract	n on a rour			nian mian					00 00 VVD
D03-089	HVAC Motors	Chilled Water Loop Pumps		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$75.32	\$91.35	\$16.03	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 20 HP TEFC		Retail/Contract									
D03-089	HVAC Motors	Chilled Water Loop Pumps	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$81.03	\$86.50	\$5.48	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 25 HP TEFC		Retail/Contract									
D03-089	HVAC Motors	Chilled Water Loop Pumps	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$67.35	\$86.07	\$18.72	\$0.00	\$0.00 HP
		• • •	Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 50 HP TEFC		Retail/Contract									
D03-089	HVAC Motors	Chilled Water Loop Pumps		EPAct Efficiency Motors		ROB/NEW	yes	Low	INCR/INCR	\$63.25	\$77.02	\$13.78	\$0.00	\$0.00 HP
D03=089	II VAC Motors	Chined Water Loop I unips	Premium Efficient Motor or	El Act Efficiency Motors	OI .	KOD/NE W	yes	LOW	INCRINCK	303.23	377.02	313.76	30.00	30.00 111
		Efficient HVAC Motor -	better for app - 100 HP TEFO	3	Retail/Contract									
D	*****					n on a initi			nuan muan	004.6				00 00 TED
D03-089	HVAC Motors	Chilled Water Loop Pumps		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$85.62	\$87.75	\$2.14	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
			better for app - 5 HP ODP		Retail/Contract									
D03-090	HVAC Motors	Hot Water Loop Pumps	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$94.92	\$103.07	\$8.15	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 10 HP ODP		Retail/Contract									
D03-090	HVAC Motors	Hot Water Loop Pumps	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$82.02	\$89.47	\$7.45	\$0.00	\$0.00 HP
-		• •	Premium Efficient Motor or	-										
		Efficient HVAC Motor -	better for app- 15 HP ODP		Retail/Contract									
D03-090	HVAC Motors	Hot Water Loop Pumps	1800 RPM	EPAct Efficiency Motors		ROB/NEW	yes	Low	INCR/INCR	\$67.95	\$71.49	\$3.54	\$0.00	\$0.00 HP
303 070		water Loop Lamps	Premium Efficient Motor or		**		,00			407.20	4.4.12			V III
		Efficient HVAC Motor -	better for app - 20 HP ODP		Retail/Contract									
D02 000	HVAC M-+		1800 RPM	EDA at Efficien M-+		DOD NIEW	*****	Low	INICD/INICD	952.66	862.02	\$11.26	\$0.00	\$0.00 HP
D03-090	HVAC Motors	Hot Water Loop Pumps		EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$52.66	\$63.93	\$11.26	\$0.00	30.00 HP
		Ecc. : HILLIAM	Premium Efficient Motor or		D : 1/G :									
		Efficient HVAC Motor -	better for app - 25 HP ODP		Retail/Contract			_						
D03-090	HVAC Motors	Hot Water Loop Pumps	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$51.07	\$62.41	\$11.34	\$0.00	\$0.00 HP
			Premium Efficient Motor or											
		Efficient HVAC Motor -	better for app - 50 HP ODP		Retail/Contract									
D03-090	HVAC Motors	Hot Water Loop Pumps	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$35.65	\$49.75	\$14.10	\$0.00	\$0.00 HP
			Premium Efficient Motor or	-										
		Efficient HVAC Motor -	better for app - 100 HP ODP		Retail/Contract									
D03-090	HVAC Motors	Hot Water Loop Pumps	1800 RPM	EPAct Efficiency Motors		ROB/NEW	yes	Low	INCR/INCR	\$42.91	\$47.82	\$4.91	\$0.00	\$0.00 HP
			Premium Efficient Motor or				,	****		·		w*		
		Efficient HVAC Motor -	better for app - 5 HP TEFC		Retail/Contract									
D03-090	HVAC Motors	Hot Water Loop Pumps	1800 RPM	EPAct Efficiency Motors		ROB/NEW	vac	Low	INCR/INCR	\$115.67	\$127.48	\$11.81	\$0.00	\$0.00 HP
103-090	11 VAC MOIOIS	110t water Loop rumps	Premium Efficient Motor or	ET ACT ETHICIETICS MOTORS	or	KOD/NE W	yes	LUW	IIVCA/IIVCA	\$11J.U/	914/.40	J11.01	φυ.UU	30.00 HF
		Eeg.:+ IDVAC M.:			D-4-:1/C4 :									
D02 000	III/ACM	Efficient HVAC Motor -	better for app - 10 HP TEFC	EDA (FOT : M.)	Retail/Contract	DOD ALEW		*	DIOD /DIOD	602.40	6104.64	612.24	60.00	60 00 HD
D03-090	HVAC Motors	Hot Water Loop Pumps	1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$92.40	\$104.64	\$12.24	\$0.00	\$0.00 HP

# Appendix B: Measure Cost Data

-			Premium Efficient Motor or										
		Efficient HVAC Motor -	better for app - 15 HP TEFC	Retail/	Contract								
D03-090	HVAC Motors	Hot Water Loop Pumps		iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$75.32	\$91.35	\$16.03	\$0.00	\$0.00 HP
D03-070	11 THE MOIOIS	Trot water Eoop I umps	Premium Efficient Motor or	icitcy Motors or	RODITET	yes	Low	nveichveit	\$15.52	371.33	310.03	30.00	30.00 111
		Efficient HVAC Motor -	better for app - 20 HP TEFC	Retail/	Contract								
D03-090	HVAC Motors	Hot Water Loop Pumps		iency Motors or	ROB/NEW	ves	Low	INCR/INCR	\$81.03	\$86.50	\$5.48	\$0.00	\$0.00 HP
D03-090	II VAC MOIOIS	Tiot water Loop I unips	Premium Efficient Motor or	iency wotors or	KOD/NE W	yes	Low	INCIOINCE	361.03	380.30	33.40	30.00	30.00 111
		Efficient HVAC Motor -	better for app - 25 HP TEFC	Retail/	Contract								
D03-090	HVAC Motors	Hot Water Loop Pumps		iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$67.35	\$86.07	\$18.72	\$0.00	\$0.00 HP
D03-090	II VAC MOIOIS	Tiot water Loop I unips	Premium Efficient Motor or	iency wotors or	KOD/NE W	yes	Low	INCIOINCE	307.33	300.07	310.72	30.00	30.00 111
		Efficient HVAC Motor -	better for app - 50 HP TEFC	Retail/	Contract								
D03-090	HVAC Motors	Hot Water Loop Pumps		iency Motors or	ROB/NEW	ves	Low	INCR/INCR	\$63.25	\$77.02	\$13.78	\$0.00	\$0.00 HP
D03=090	TIVAC MOIOIS	Tiot water Loop I unips	Premium Efficient Motor or	iency wotors or	KOD/NEW	yes	Low	INCR/INCR	\$03.23	377.02	313.76	30.00	30.00 111
		Efficient HVAC Motor -	better for app - 100 HP TEFC	Retail/	Contract								
D03-090	HVAC Motors	Hot Water Loop Pumps		iency Motors or	ROB/NEW	ves	Low	INCR/INCR	\$85.62	\$87.75	\$2.14	\$0.00	\$0.00 HP
203 070	11 111C Motors	Tree water heep ramps	Premium Efficient Motor or	iency motors	ROBITE	yes	Lon	nterenten	\$05.02	\$67.75	92.11	φο.σσ	\$0.00 III
		Efficient Motor - Cond.	better for app - 5 HP ODP	Retail/	Contract								
D03-091	HVAC Motors	Water Loop Pumps		iency Motors or	ROB/NEW	ves	Low	INCR/INCR	\$94.92	\$103.07	\$8.15	\$0.00	\$0.00 HP
			Premium Efficient Motor or	,		,			** =				
		Efficient Motor - Cond.	better for app - 10 HP ODP	Retail/	Contract								
D03-091	HVAC Motors	Water Loop Pumps		iency Motors or	ROB/NEW	ves	Low	INCR/INCR	\$82.02	\$89.47	\$7.45	\$0.00	\$0.00 HP
			Premium Efficient Motor or	, 01		,			**	******			
		Efficient Motor - Cond.	better for app- 15 HP ODP	Retail/	Contract								
D03-091	HVAC Motors	Water Loop Pumps		iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$67.95	\$71.49	\$3.54	\$0.00	\$0.00 HP
			Premium Efficient Motor or	,		,				4,1,1,		40100	
		Efficient Motor - Cond.	better for app - 20 HP ODP	Retail/	Contract								
D03-091	HVAC Motors	Water Loop Pumps		iency Motors or	ROB/NEW	ves	Low	INCR/INCR	\$52.66	\$63.93	\$11.26	\$0.00	\$0.00 HP
			Premium Efficient Motor or	,		,			44-144	******	*****	40100	
		Efficient Motor - Cond.	better for app - 25 HP ODP	Retail/	Contract								
D03-091	HVAC Motors	Water Loop Pumps	1800 RPM EPAct Effic	iency Motors or	ROB/NEW	ves	Low	INCR/INCR	\$51.07	\$62.41	\$11.34	\$0.00	\$0.00 HP
			Premium Efficient Motor or			-							
		Efficient Motor - Cond.	better for app - 50 HP ODP	Retail/0	Contract								
D03-091	HVAC Motors	Water Loop Pumps	1800 RPM EPAct Effic	iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$35.65	\$49.75	\$14.10	\$0.00	\$0.00 HP
			Premium Efficient Motor or										
		Efficient Motor - Cond.	better for app - 100 HP ODP	Retail/	Contract								
D03-091	HVAC Motors	Water Loop Pumps	1800 RPM EPAct Effic	iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$42.91	\$47.82	\$4.91	\$0.00	\$0.00 HP
			Premium Efficient Motor or										_
		Efficient Motor - Cond.	better for app - 5 HP TEFC	Retail/	Contract								
D03-091	HVAC Motors	Water Loop Pumps		iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$115.67	\$127.48	\$11.81	\$0.00	\$0.00 HP
			Premium Efficient Motor or										
		Efficient Motor - Cond.	better for app - 10 HP TEFC	Retail/	Contract								
D03-091	HVAC Motors	Water Loop Pumps		iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$92.40	\$104.64	\$12.24	\$0.00	\$0.00 HP
			Premium Efficient Motor or										
		Efficient Motor - Cond.	better for app - 15 HP TEFC		Contract								
D03-091	HVAC Motors	Water Loop Pumps		iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$75.32	\$91.35	\$16.03	\$0.00	\$0.00 HP
			Premium Efficient Motor or		_								
		Efficient Motor - Cond.	better for app - 20 HP TEFC	Retail/									
D03-091	HVAC Motors	Water Loop Pumps		iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$81.03	\$86.50	\$5.48	\$0.00	\$0.00 HP
			Premium Efficient Motor or		_								
		Efficient Motor - Cond.	better for app - 25 HP TEFC		Contract		_						
D03-091	HVAC Motors	Water Loop Pumps		iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$67.35	\$86.07	\$18.72	\$0.00	\$0.00 HP
			Premium Efficient Motor or		_								
		Efficient Motor - Cond.	better for app - 50 HP TEFC		Contract		_						
D03-091	HVAC Motors	Water Loop Pumps		iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$63.25	\$77.02	\$13.78	\$0.00	\$0.00 HP
		DOT: W. C.	Premium Efficient Motor or	W . 194	G								
200 001		Efficient Motor - Cond.	better for app - 100 HP TEFC		Contract			n con much	00# 68	000.00			00 00 TVD
D03-091	HVAC Motors	Water Loop Pumps	1800 RPM EPAct Effic	iency Motors or	ROB/NEW	yes	Low	INCR/INCR	\$85.62	\$87.75	\$2.14	\$0.00	\$0.00 HP

#### HVAC - NON-RESIDENTIAL - AIR CURTAIN

					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	<b>Equipment Cost</b>	Labor Cost Installed Cost	Cost Unit
				T24 code baseline for door										
	HVAC Non-		Infiltration due to doors	infiltration matches prototype										
D03-015	Residential	Air Curtain	reduced by 50%	level	Not priced	RET/NEW			FULL/FULL		Not priced			SqFt

# Appendix B: Measure Cost Data

#### HVAC - NON-RESIDENTIAL - CHILLERS

	RESIDENTIAL -				Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis		Equipment Cost		Labor Cost	Installed Cost Cost Unit
Measure ID	Category	wicasure rame	Measure Description	Buse Description	Chamer	Application	Star.	v oranic	Cost Busis	Cost	Equipment Cost	Equipment Cost	Labor Cost	Instanca Cost Cint
	HVAC Non-	Centrifugal chillers (< 150	Water cooled centrifugal	Cent chlr, kW/ton based on										
D03-040	Residential	tons) with improved kW/to	n chiller (0.560 kW/ton)	vintage, water cooled condenser	Contractor	ROB/NEW	0	Low	INCR/INCR	\$468.69	\$614.21	\$145.52	\$0.00	\$0.00 tons
		Reciprocating air-cooled	Air cooled package											
	HVAC Non-	chillers with improved	reciprocating chiller (1.008	Air cooled packaged recip chille	r,									
D03-041	Residential	kW/ton	kW/ton)	1.260 kW/ton	Contractor	ROB/NEW	0	Low	INCR/INCR	\$448.95	\$488.89	\$39.94	\$0.00	\$0.00 tons
		VSD Centrifugal Chiller (<	Water cooled VSD											
	HVAC Non-	150 tons) w/Load control	centrifugal chiller (0.560	Water cooled VSD cent chiller,										
D03-042	Residential	tower	kW/ton), load control tower	0.700 kw/ton	Contractor	ROB/NEW	0	Low	INCR/INCR	\$646.16	\$712.25	\$66.09	\$0.00	\$0.00 tons
	HVAC Non-	Gas Absorption Central	Gas absorption chiller (direct											
D03-043	Residential	Chiller (direct fired)	fired) (0.0071 EIR, 1.0 HIR)	Centrifugal chiller 0.576 kW/tor	Contractor	ROB/NEW	0	Low	INCR/INCR	\$260.33	\$637.04	\$376.71	\$0.00	\$0.00 tons
	HVAC Non-	Air-cooled screw chiller	Air cooled screw chiller	Air cooled packaged screw										
D03-114	Residential	with improved kw/ton	(1.008 kW/ton)	chiller, 1.260 kW/tom	Contractor	ROB/NEW	0	Low	INCR/INCR	\$445.90	\$488.24	\$42.34	\$0.00	\$0.00 tons
		Reciprocating water-cooled	I											
	HVAC Non-	chillers with improved	Water cooled reciprocating	Water Cooled Recip Chiller,										
D03-115	Residential	kW/ton	chiller (0.672 kW/ton)	0.837 kW/ton	Contractor	ROB/NEW	0	Low	INCR/INCR	\$462.59	\$478.86	\$16.27	\$0.00	\$0.00 tons

		0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1												
	HVAC Non-	Centrifugal chillers (150- 299 tons) with improved	Water cooled centrifugal	Water cooled cent chiller, 0.634										
D03-116	Residential	kW/ton	chiller (0.507 kW/ton)	kw/ton	Contractor	ROB/NEW		0 Low	INCR/INCR	\$338.77	\$432.61	\$93.84	\$0.00	\$0.00 tons
	HVAC Non-	Centrifugal chillers (>= 30		Water cooled cent chiller, 0.576										
D03-117	Residential	tons) with improved kW/to		kw/ton	Contractor	ROB/NEW		0 Low	INCR/INCR	\$267.71	\$333.29	\$65.58	\$0.00	\$0.00 tons
	HVAC Non-	Water-cooled screw chiller	1 Water cooled screw chiller	Water cooled screw chiller, 0.79	00									
D03-118	Residential	(< 150 tons) with improved kw/ton	(0.632 kW/ton)	kw/ton	Contractor	ROB/NEW		0 Low	INCR/INCR	\$443.39	\$492.44	\$49.05	\$0.00	\$0.00 tons
203 110	reordentar	Water-cooled screw chiller		ATT COL	Contractor	ROB/INEW		o Lon	nicionici	\$113.35	\$1,72.11	\$17.00	\$0.00	90.00 10115
	HVAC Non-	(150-299 tons) with	Water cooled screw chiller	Water cooled screw chiller, 0.71										
D03-119	Residential	improved kw/ton	(0.574 kW/ton)	kw/ton	Contractor	ROB/NEW		0 Low	INCR/INCR	\$346.94	\$372.42	\$25.47	\$0.00	\$0.00 tons
	HVAC Non-	Water-cooled screw chiller (>= 300 tons) with		Water cooled screw chiller, 0.63	20									
D03-120	Residential	improved kw/ton	Water cooled screw chiller (0.511 kW/ton)	kw/ton	Contractor	ROB/NEW		0 Low	INCR/INCR	\$275.84	\$287.24	\$11.40	\$0.00	\$0.00 tons
1003-120	residential	improved kw/ton	(0.511 k W/toll)	KW/tOII	Contractor	ROD/INEW		0 Low	пченнек	\$275.64	\$207.24	311.40	\$0.00	50.00 10113
		VSD Centrifugal Chiller	Water cooled VSD											
	HVAC Non-	(150-299 tons) w/Load	centrifugal chiller (0.507	Water cooled cent chiller, 0.634										
D03-121	Residential	control tower	kW/ton), load control tower	kw/ton	Contractor	ROB/NEW		0 Low	INCR/INCR	\$416.07	\$493.15	\$77.07	\$0.00	\$0.00 tons
		VSD Centrifugal Chiller	Water cooled VSD											
	HVAC Non-	(>= 300 tons) w/Load	centrifugal chiller (0.461	Water cooled cent chiller, 0.576										
D03-122	Residential	control tower	kW/ton), load control tower		Contractor	ROB/NEW		0 Low	INCR/INCR	\$290.25	\$373.33	\$83.08	\$0.00	\$0.00 tons
HVAC - NON	-RESIDENTIAL - I	EVAP COOLERS									.,			
Measure ID	Category	Measure Name	Measure Description	Base Description	Delivery Channel	Application	Energy Star?	Purchase Volume	Cost Basis	Base Equipment Cost	Measure Equipment Cost	Incremental	Labor Cost	Installed Cost Cost Unit
Measure ID	Category	Measure Name	indirect evap cooling for	Central system: Chlr type, eff.	Chamiei	Application	star:	volume	Cost Dasis	Cost	Equipment Cost	Equipment Cost	Labor Cost	Ilistaneu Cost Cost Cint
	HVAC Non-	Make-up Air Indirect	make-up air only, 65%	and cond type based on										
D03-053	Residential	Evaporative cooling	effectiveness	bldg/vintage	Contractor	NEW	No	Low	FULL	\$0.00	\$533.59	\$0.00	\$49.15	\$582.74 \$/ton
			indirect evap cooling for											
202.054	HVAC Non-	Make-up Air Indirect	make-up air only, 65%			N. France								0.001.00.00
D03-054	Residential HVAC Non-	Evaporative cooling	effectiveness direct evap replaces DX	no evaporative cooling packaged DX as defined by	Contractor	NEW	No	Low	FULL	\$0.00	\$515.74	\$0.00	\$49.15	\$564.88 \$/ton
D03-074	Residential	Direct Evaporative Coolers		building type/vintage	Not available						Not available			
		High eff. packaged system		Z J F										
	HVAC Non-	with evap cooled cond (<							FULL/INCR/INC					
D03-082	Residential	65k)	Package Air Conditioner	T24 minimum: A/C EER = 12.1	Contractor	RET/ROB/NEW	no	Low	R	\$573.07	\$740.93	\$167.86	\$229.97	\$970.90 tons
	HVAC Non-	High eff. packaged system with evap cooled cond (>=	14 EEP Water Cooled						FULL/INCR/INC					
D03-083	Residential	65k)	Package Air Conditioner	T24 minimum: A/C EER = 11.5	Contractor	RET/ROB/NEW	no	Low	R	\$1,225.00	\$1,437.50	\$212.50	\$127.86	\$1,565.36 tons
											41,101100			7-,00000
HVAC - NON	RESIDENTIAL - 1	FURNACES												
			W 5 1.0	n n	Delivery		Energy	Purchase	G (P)	Base Equipment Cost	Measure	Incremental		T . H 10 . O . T .
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost	Installed Cost Cost Unit
	HVAC Non-	High efficiency gas furnace	e packaged system with 94	packaged system with 80 AFUE	l.									
D03-065	Residential	replace std efficiency	AFUE furnace	furnace	Contractor	ROB/NEW	Yes	Low	INCR/INCR	\$0.00	Not Available	\$0.00	\$0.00	\$0.00 Furnace
HVAC - NON	-RESIDENTIAL - I	RESET			D.P.		r	n 1		D E		*		
Measure ID	Category	Measure Name	Measure Description	Base Description	Delivery Channel	Application	Energy Star?	Purchase Volume	Cost Basis	Base Equipment Cost	Measure Equipment Cost	Incremental	Labor Cost	Installed Cost Cost Unit
Wieasure ID	Category	Measure Maine	Chilled water loop	Dase Description	Chaimer	Application	Stat :	Volume	Cost Dasis	Cost	Equipment Cost	Equipment Cost	Labor Cost	instance Cost Cint
	HVAC Non-	Chilled Water Loop	temperature set to 'Load	Constant chilled water										
D03-044	Residential	temperature control	Reset'	temperature	Contractor	RET	No	Low	FULL	\$0.00	\$350.79	\$0.00	\$330.55	\$681.34 Control
	HVAC Non-	Hot Water Loop	Hot water loop temperature											
D03-045	Residential	temperature control	set to 'Load Reset'	Constant hot water temperature	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$503.55	\$0.00	\$330.55	\$834.10 Control
D02 046	HVAC Non-	Replace 3-way valves in	2-way valves, with single	3-way valves in chilled water	Contractor	DET/NEW	No	Low	EIIII /EIII I	60.00	\$6.38	\$0.00	62.20	60 77 CDM
D03-046	Residential HVAC Non-	CHW loop with 2-way Variable speed drive for	speed pump add variable speed pump to	loop 2-way valves, with single speed	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$6.38	\$0.00	\$2.39	\$8.77 GPM
D03-047	Residential	chilled water loop	chilled water loop	drive	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$149.14	\$0.00	\$63.15	\$212.29 HP
	HVAC Non-	Replace 3-way valves in	2-way valves, with single							• • • • • • • • • • • • • • • • • • • •			•	
D03-048	Residential	HW loop with 2-way	speed pump	3-way valves in hot water loop	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$10.01	\$0.00	\$7.79	\$17.79 GPM
D02-040	HVAC Non-		ot add variable speed pump to	2-way valves, with single speed	Contra :	DETAILS	N.	T	EIII I /EIII I	60.00	6140 * *	00.00	00015	6212 20 HB
D03-049	Residential	water loop	hot water loop	drive	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$149.14	\$0.00	\$63.15	\$212.29 HP

HVAC - NON-RESIDENTIAL.	

				De	elivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description Cl	hannel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost In	stalled Cost Cost Unit
			11.29 EER (based on											
	HVAC Non-	High eff. packaged termin	nal vintage) package terminal						FULL/INCR/INC					
D03-084	Residential	air-conditioner (< 7k)	A/C	PTAC w/EER based on vintage Co	ontractor	RET/ROB/NEW	No	Low	R	\$472.0	6 \$577.5	2 \$105.46	\$318.70	\$896.22 PTAC
			10.27 EER (based on											
	HVAC Non-	High eff. packaged termin	nal vintage) package terminal						FULL/INCR/INC					
D03-099	Residential	air-conditioner (7-15k)	A/C	PTAC w/EER based on vintage Co	ontractor	RET/ROB/NEW	No	Low	R	\$741.8	1 \$907.5	3 \$165.72	\$132.50	\$1,040.03 PTAC
	HVAC Non-	High eff. packaged termin	nal 9.25 EER (based on vintag	e)					FULL/INCR/INC					
D03-100	Residential	air-conditioner (> 15k)	package terminal A/C	PTAC w/EER based on vintage Co	ontractor	RET/ROB/NEW	No	Low	R	\$1,011.5	6 \$1,237.5	4 \$225.99	\$172.00	\$1,409.54 PTAC

#### HVAC - NON-RESIDENTIAL - PACKAGED TERMINAL HEAT PUMP (PTHP)

					Delivery		Energy	Purchase		<b>Base Equipment</b>	Measure	Incremental			
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost	Installed Cost	Cost Unit
			11.17 EER / 3.3 COP (based												
	HVAC Non-	High eff. packaged termin	nal on vintage) package terminal	PTHP w/EER & COP based on					FULL/INCR/INC						
D03-085	Residential	heat pump (< 7k)	HP	vintage	Contractor	RET/ROB/NEW	No	Low	R	\$589.12	\$720.73	\$131.61	\$318.70	\$1,039.43	PTHP
			10.15 EER / 3.1 COP (based												
	HVAC Non-	High eff. packaged termin	nal on vintage) package terminal	PTHP w/EER & COP based on					FULL/INCR/INC						
D03-101	Residential	heat pump (7-15k)	HP	vintage	Contractor	RET/ROB/NEW	No	Low	R	\$925.75	\$1,132.57	\$206.82	\$402.60	\$1,535.17	PTHP
			9.13 EER / 3.0 COP (based												
	HVAC Non-	High eff. packaged termin	nal on vintage) package terminal	PTHP w/EER & COP based on					FULL/INCR/INC						
D03-102	Residential	heat pump (> 15k)	HP	vintage	Contractor	RET/ROB/NEW	No	Low	R	\$1,262.39	\$1,544.41	\$282.02	\$402.60	\$1,947.01	PTHP

#### HVAC - NON-RESIDENTIAL - PACKAGED AC AND PACKAGED HP

		FACKAGED AC AND FACI			Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost I	nstalled Cost Cost Unit
	HVAC Non-	High eff. packaged unitary		A/C EER based on vintage, no					FULL/INCR/INC					
D03-078	Residential	system A/C (< 65k, single	Package Air Conditioner		Control	RET/ROB/NEW	Yes	T	R R	\$642.05	\$817.86	\$175.81	\$459.88	\$1,277.74 Ton
D03-078	Residentiai	phase)	Package Air Conditioner	economizer	Contractor	RE1/ROB/NEW	res	Low	K	\$042.03	\$817.80	\$1/3.81	\$439.88	\$1,277.74 100
		High eff. packaged unitary												
	HVAC Non-	system A/C (< 65k, 13	13 SEER three phase package	ge A/C EER based on vintage, no					FULL/INCR/INC					
D03-110	Residential	SEER, 3 phase before 2008	8) A/C	economizer	Contractor	RET/ROB/NEW	Yes	Low	R	\$642.05	\$790.40	\$148.36	\$459.88	\$1,250.29 Ton
	INVACN	High eff. packaged unitary		A G EED L					FILL I WICD WIG					
D03-109	HVAC Non- Residential	system A/C (< 65k, 12 SEER, 3 phase before 2008		ge A/C EER based on vintage, no	Control	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$642.05	\$746.45	\$104.40	\$459.88	\$1,206.34 Ton
D03-109	Residentiai	SEER, 3 phase before 2008	8) A/C	economizer	Contractor	RE1/ROB/NEW	res	Low	K	\$642.03	\$740.43	\$104.40	\$459.88	\$1,200.34 100
	HVAC Non-	High eff. packaged unitary	11 EER Package Air	A/C EER based on vintage, eco	onc				FULL/INCR/INC					
D03-079	Residential	system A/C (65-134k)	Conditioner	based on vintage	Contractor	RET/ROB/NEW	Yes	Low	R	\$608.25	\$757.38	\$149.13	\$224.54	\$981.92 Ton
	HVAC Non-	High eff. packaged unitary		A/C EER based on vintage, eco					FULL/INCR/INC					
D03-103	Residential	system A/C (135-239k)	Conditioner	based on vintage	Contractor	RET/ROB/NEW	Yes	Low	R	\$674.88	\$785.77	\$110.89	\$187.71	\$973.48 Ton
	HVAC Non-	High eff. packaged unitary	10.0 EED Doolsoon Air						FULL/INCR/INC					
D03-104	Residential	system A/C (240-759k)	Conditioner	A/C EER based on vintage	Contractor	RET/ROB/NEW	Yes	Low	R	\$534.50	\$649.63	\$115.13	\$185.71	\$835.34 Ton
D03-104	Residential	3y3tem 70 C (240-737K)	Conditioner	TWO LERC based on vintage	Contractor	RE1/ROB/NEW	1 03	Low	K	9554.50	3047.03	\$115.15	\$105.71	3033.34 1011
	HVAC Non-	High eff. packaged unitary	10.0 EER Package Air						FULL/INCR/INC					
D03-105	Residential	system A/C (>= 760k)	Conditioner	A/C EER based on vintage	Contractor	RET/ROB/NEW	Yes	Low	R	\$456.77	\$555.15	\$98.39	\$111.43	\$666.59 Ton
			14 SEER(12.19 EER)/8.6											
D	HVAC Non-	system HP (< 65k, single	HSPF(3.52 COP) Package	Heat Pump SEER & HSPF base		nem non a rest			FULL/INCR/INC				0.450.00	04 455 04 M
D03-080	Residential	phase)	A/C Heat Pump	on vintage, no economizer	Contractor	RET/ROB/NEW	Yes	Low	R	\$785.75	\$995.13	\$209.38	\$459.88	\$1,455.01 Ton
		High eff_nackaged unitary	13 SEER / 7.7 HSPF three											
	HVAC Non-	system HP (< 65k, 13	phase package A/C Heat	Heat Pump SEER & HSPF base	ed				FULL/INCR/INC					
D03-113	Residential	SEER, 3 phase before 2008		on vintage, no economizer	Contractor	RET/ROB/NEW	Yes	Low	R	\$802.25	\$959.29	\$157.04	\$459.88	\$1,419.17 Ton
			12 SEER / 7.4 HSPF three											
	HVAC Non-	system HP (< 65k, 12	phase package A/C Heat	Heat Pump SEER & HSPF base				_	FULL/INCR/INC					
D03-112	Residential	SEER, 3 phase before 2008	8) Pump	on vintage, no economizer	Contractor	RET/ROB/NEW	Yes	Low	R	\$802.25	\$906.94	\$104.69	\$459.88	\$1,366.82 Ton
	HVAC Non-	High eff packaged unitary	11 EER/3.4 COP Package	Heat Pump EER & COP based	on				FULL/INCR/INC					
D03-081	Residential	system HP (65-134k)	A/C Heat Pump	vintage, econo based on vintage		RET/ROB/NEW	Yes	Low	R	\$837.81	\$1,020.24	\$182.43	\$224.54	\$1,244.78 Ton
		5,512 (05 15 IK)		ge, bubea on manage						\$037.01	31,020.21	\$102.13		,=·····- 1011
	HVAC Non-	High eff. packaged unitary	10.8 EER/3.4 COP Package	Heat Pump EER & COP based	on				FULL/INCR/INC					
D03-106	Residential	system HP (135-239k)	A/C Heat Pump	vintage, econo based on vintage	e Contractor	RET/ROB/NEW	Yes	Low	R	\$949.56	\$1,075.00	\$125.44	\$187.71	\$1,262.71 Ton

D03-107 Re				Heat Pump EER & COP based o					FULL/INCR/INC					
-	Residential	system HP (240-759k)	A/C Heat Pump	vintage, econo based on vintage	Contractor	RET/ROB/NEW	Yes	Low	R	\$696.25	\$826.08	\$129.83	\$185.71	\$1,011.79 Ton
	IVAC Non- Residential	High eff. packaged unitary system HP (>= 760k)	9.7 EER/3.3 COP Package A/C Heat Pump	Heat Pump EER & COP based o vintage, econo based on vintage		RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$595.00	\$705.94	\$110.95	\$111.43	\$817.38 Ton
HVAC NON DI	ECIDENTIAL C	SPLIT AC & HP - 10 AND 13	CEED DACE											
HVAC - NON-KI	ESIDENTIAL - S	I LII AC & III - 10 AND 13	SEER BASE		Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	<b>Equipment Cost</b>	Equipment Cost 1	Labor Cost	Installed Cost Cost Unit
		High eff. packaged split	14 SEER (12.15 EER) Split- System Air Conditioner, 2 to	n										
Н	IVAC Non-	system A/C (< 65k, single		10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-076 Re	Residential	phase)	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$371.85	\$802.16	\$430.32	\$604.18	\$1,406.34 tons
		Title off and and anti-	14 SEER (12.15 EER) Split-											
н	IVAC Non-	High eff. packaged split system A/C (< 65k, single	System Air Conditioner, 2.5 ton (30,000 Btu) condenser	10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
	Residential	phase)	and matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$330.39	\$706.17	\$375.77	\$483.34	\$1,189.51 tons
		77.1 00 1 1 1.	14 SEER (12.15 EER) Split-											
ш	IVAC Non-	High eff. packaged split system A/C (< 65k, single	System Air Conditioner, 3 to	n 10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
	Residential	phase)	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$279.72	\$642.17	\$362.45	\$402.78	\$1,044.95 tons
		•	14 SEER (12.15 EER) Split-							*			4.02.00	43,01.000
		High eff. packaged split	System Air Conditioner, 3.5	40 GEORGIA SERVICIO SE VICIO										
	IVAC Non- Residential	system A/C (< 65k, single phase)	ton (42,000 Btu) condenser and matched cased coil	10 SEER(8.7 EER) Split-System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$297.76	\$596.46	\$298.70	\$345.24	\$941.70 tons
D03-070 R	concentiar	phase)	14 SEER (12.15 EER) Split-	All Conditioner	Contractor	RE1/ROB/INEW	103	Low	K	\$277.70	\$570.40	\$2,76.70	9545.24	\$541.70 tons
		High eff. packaged split	System Air Conditioner, 4 to											
	IVAC Non- Residential	system A/C (< 65k, single phase)	(48,000 Btu) condenser and matched cased coil	10 SEER(8.7 EER) Split-System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$287.19	\$562.17	\$274.99	\$302.09	\$864.26 tons
D03-070 KG	cesidentiai	phase)	14 SEER (12.15 EER) Split-	All Collultioner	Contractor	KE1/KOB/NEW	1 CS	Low	K	\$207.19	\$302.17	3274.99	\$302.09	3004.20 tons
		High eff. packaged split	System Air Conditioner, 5 to											
	IVAC Non-	system A/C (< 65k, single		10 SEER(8.7 EER) Split-System				_	FULL/INCR/INC					
D03-076 R6	Residential	phase)	matched cased coil 14 SEER (12.15 EER) Split-	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$233.49	\$514.18	\$280.68	\$241.67	\$755.85 tons
		High eff. packaged split		nT24 minimum: 13 SEER(11.09										
	IVAC Non-	system A/C (< 65k, single	(24,000 Btu) condenser and						FULL/INCR/INC					
D03-076 R6	Residential	phase)	matched cased coil 14 SEER (12.15 EER) Split-	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$663.23	\$802.16	\$138.93	\$353.93	\$1,156.09 tons
		High eff. packaged split		T24 minimum: 13 SEER(11.09										
	IVAC Non-	system A/C (< 65k, single	ton (30,000 Btu) condenser	EER) Split System Air					FULL/INCR/INC					
D03-076 Re	Residential	phase)	and matched cased coil 14 SEER (12.15 EER) Split-	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$595.02	\$706.17	\$111.14	\$283.14	\$989.31 tons
		High eff. packaged split		n T24 minimum: 13 SEER(11.09										
Н	IVAC Non-		(36,000 Btu) condenser and						FULL/INCR/INC					
D03-076 Re	Residential	phase)	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$549.55	\$642.17	\$92.62	\$235.95	\$878.12 tons
		High eff. packaged split	14 SEER (12.15 EER) Split-	T24 minimum: 13 SEER(11.09										
H	IVAC Non-	system A/C (< 65k, single	ton (42,000 Btu) condenser	EER) Split System Air					FULL/INCR/INC					
D03-076 Re	Residential	phase)	and matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$517.07	\$596.46	\$79.39	\$202.24	\$798.70 tons
		Title off and a death	14 SEER (12.15 EER) Split-	T24 in in 12 CEED/11 00										
н	IVAC Non-	High eff. packaged split system A/C (< 65k, single	(48,000 Btu) condenser and	nT24 minimum: 13 SEER(11.09 EER) Split System Air					FULL/INCR/INC					
	Residential	phase)	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$492.71	\$562.17	\$69.46	\$176.96	\$739.14 tons
			14 SEER (12.15 EER) Split-											
п	IVAC Non-	High eff. packaged split system A/C (< 65k, single	System Air Conditioner, 5 to (60,000 Btu) condenser and	nT24 minimum: 13 SEER(11.09					FULL/INCR/INC					
	Residential	phase)	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$458.60	\$514.18	\$55.57	\$141.57	\$655.75 tons
		• •	14 SEER (12.19 EER) / 8.6					•		Ţ			/	
**	BU CN	High eff. packaged split	HSPF (3.52 COP) A/C Heat						FILL I DIOD 2010					
	IVAC Non- Residential	system HP (< 65k, single phase)	Pump, 2 ton (24,000 Btu) heat pump	HSPF(3.0 COP) Split-System Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$419.48	\$904.24	\$484.76	\$604.18	\$1,508.41 tons
203-011 R	Contential	риазс)	14 SEER (12.19 EER) / 8.6	ricat i ump	Contractor	RE1/ROD/NEW	103	LUW	Λ	3417.48	3904.24	3404./0	JUU4.18	\$1,500.41 IOHS
		High eff. packaged split	HSPF (3.52 COP) A/C Heat											
	IVAC Non-	system HP (< 65k, single	Pump, 3 ton (36,000 Btu)	HSPF(3.0 COP) Split-System	Contro	DET/DODAIEW	Vac	Low	FULL/INCR/INC R	62/2 10	\$728.78	\$365.60	\$402.70	£1 121 57 +
D03-0// K6	Residential	phase)	heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	I.	\$363.18	\$/28./8	\$305.00	\$402.78	\$1,131.56 tons

			14 OFFR (12 10 FFR) (2 4											
		High eff. packaged split	14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat	10 SEER/8 7 EED\/6 9										
	HVAC Non-	system HP (< 65k, single	Pump, 4 ton (48,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-077	Residential	phase)	heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R R	\$335.04	\$641.05	\$306.01	\$302.09	\$943.14 tons
203-011	residential	primoc)	14 SEER (12.19 EER) / 8.6		Contractor	ALT/ROD/INEW	103	LUW	**	Ψ	U-11.03	\$500.01	9302.07	97TJ.1T 10H3
		High eff. packaged split	HSPF (3.52 COP) A/C Heat	10 SEER(8.7 EER)/6.8										
	HVAC Non-	system HP (< 65k, single	Pump, 5 ton (60,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-077	Residential	phase)	heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$318.15	\$588.41	\$270.26	\$241.67	\$830.08 tons
		TT: 1 00 1 1 1:	14 SEER (12.19 EER) / 8.6	T24 :: 12 CEED/11 07										
	HVACN	High eff. packaged split		T24 minimum: 13 SEER(11.07					ELIL LANCEANG					
	HVAC Non- Residential	system HP (< 65k, single phase)	Pump, 2 ton (24,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C Heat pump	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$775.78	\$904.24	\$128.46	\$353.93	\$1,258.16 tons
D03-077	Residential	pilase)	heat pump 14 SEER (12.19 EER) / 8.6	неат ришр	Contractor	KE1/KOD/NEW	1 05	LOW	K	\$113.16	3904.24	\$120.40	\$333.93	\$1,236.10 10118
		High eff. packaged split		T24 minimum: 13 SEER(11.07										
	HVAC Non-	system HP (< 65k, single	Pump, 3 ton (36,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-077	Residential	phase)	heat pump	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$630.84	\$728.78	\$97.94	\$235.95	\$964.73 tons
			14 SEER (12.19 EER) / 8.6											
	*****	High eff. packaged split		T24 minimum: 13 SEER(11.07					DITT I DIOD DIO					
	HVAC Non-	system HP (< 65k, single	Pump, 4 ton (48,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C	a	DET TO DAIEN	**		FULL/INCR/INC	6550.20	0641.05	602.67	0176.06	6010.01
D03-077	Residential	phase)	heat pump 14 SEER (12.19 EER) / 8.6	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$558.38	\$641.05	\$82.67	\$176.96	\$818.01 tons
		High eff. packaged split		T24 minimum: 13 SEER(11.07										
	HVAC Non-	system HP (< 65k, single	Pump, 5 ton (60,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-077	Residential	phase)	heat pump	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$514.90	\$588.41	\$73.52	\$141.57	\$729.98 tons
		High eff. packaged split		• •										
	HVAC Non-			T24 minimum: 10 SEER(9.17					FULL/INCR/INC					
D03-108	Residential	before 2008)	system A/C	EER) Three Phase Split A/C	Contractor	RET/ROB/NEW	Yes	Low	R	\$279.72	\$398.61	\$118.88	\$402.78	\$801.39 tons
	III/A C N	High eff. packaged split	12 SEER / 7.4 HSPF three	12 SEER(10.40 EER)/7.7					FILL I WICD WIG					
D03-111	HVAC Non-	before 2008)		HSPF(3.20 COP) Three Phase	Ct	DET/DOD/MEW	V	Low	FULL/INCR/INC R	6272 10	\$549.68	6107.50	6207.25	6757 02 +
D03-111	Residential	before 2008)	pump	Split A/C Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	K	\$363.18	\$349.08	\$186.50	\$207.35	\$757.03 tons
TTT 1 C 21C	RESIDENTIAL - SY	VETEME												
HVAC - NON-														
HVAC - NON-	-KESIDENTIAL - S	ISTEMS			Delivery		Energy	Purchase	Ва	ase Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Delivery Channel	Application	Energy Star?	Purchase Volume	Ba Cost Basis				abor Cost I	nstalled Cost Cost Unit
Measure ID	Category HVAC Non-	Measure Name VAV box retrofit on	damper controlled VAV with	1	Channel		Star?	Volume	Cost Basis	Cost E	Equipment Cost	Equipment Cost L		
Measure ID	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system	damper controlled VAV with 30% min-cfm-ratio	Constant Volume air flow	•	Application RET/NEW	C.						abor Cost I	nstalled Cost Cost Unit \$0.59 CFM
Measure ID	Category HVAC Non- Residential HVAC Non-	Measure Name VAV box retrofit on constant volume system Convert VAVS system to	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU	Constant Volume air flow damper controlled VAV with	Channel	RET/NEW	Star?	Volume	Cost Basis FULL/FULL	Cost E \$0.00	Equipment Cost \$0.34	Equipment Cost L \$0.00	\$0.24	\$0.59 CFM
Measure ID  D03-050  D03-052	Category HVAC Non- Residential HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system	Constant Volume air flow	Channel		Star?	Volume	Cost Basis	Cost E	Equipment Cost	Equipment Cost L		
Measure ID  D03-050  D03-052	Category HVAC Non- Residential HVAC Non- Residential HVAC Non-	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system Heat recovery from exhaust	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system t 70% heat recovery	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio	Channel Contractor Contractor	RET/NEW RET/NEW	Star? No	Low Low	Cost Basis  FULL/FULL  FULL/FULL	\$0.00 S0.00	\$0.34 \$0.99	\$0.00 S0.00	\$0.24 \$0.20	\$0.59 CFM \$1.19 CFM
Measure ID  D03-050  D03-052  D03-056	Category HVAC Non- Residential HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system	Constant Volume air flow damper controlled VAV with	Channel	RET/NEW	Star?	Volume	Cost Basis FULL/FULL	Cost E \$0.00	Equipment Cost \$0.34	Equipment Cost L \$0.00	\$0.24	\$0.59 CFM
Measure ID  D03-050  D03-052  D03-056	Category HVAC Non- Residential HVAC Non- Residential HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system Heat recovery from exhaust hoods	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system t 70% heat recovery effectiveness	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio	Channel Contractor Contractor	RET/NEW RET/NEW	Star? No	Low Low	Cost Basis  FULL/FULL  FULL/FULL	\$0.00 S0.00	\$0.34 \$0.99	\$0.00 S0.00	\$0.24 \$0.20	\$0.59 CFM \$1.19 CFM
Measure ID  D03-050  D03-052  D03-056  D03-057	Category HVAC Non- Residential HVAC Non- Residential HVAC Non- Residential HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system to 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery	Contractor Contractor Contractor	RET/NEW RET/NEW	Star? No No No	Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL	\$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70	\$0.00 \$0.00 \$0.00	\$0.24 \$0.20 \$0.29	\$0.59 CFM \$1.19 CFM \$1.99 CFM
Measure ID           D03-050           D03-052           D03-056           D03-057	Category HVAC Non- Residential HVAC Non-	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIUI system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery Packaged system	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 170% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68,	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery	Contractor  Contractor  Contractor  Contractor	RET/NEW RET/NEW RET/NEW	No No No No	Low Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL	\$0.00 S0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78	Equipment Cost L  \$0.00  \$0.00  \$0.00  \$0.00	\$0.24 \$0.20 \$0.29 \$0.33	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM
Measure ID  D03-050  D03-052  D03-056  D03-057	Category HVAC Non- Residential HVAC Non- Residential HVAC Non- Residential HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 1 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100%	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery	Contractor Contractor Contractor	RET/NEW RET/NEW	Star? No No No	Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL	\$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70	\$0.00 \$0.00 \$0.00	\$0.24 \$0.20 \$0.29	\$0.59 CFM \$1.19 CFM \$1.99 CFM
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery Packaged system Economizer retrofit	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 170% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery No Economizer	Contractor  Contractor  Contractor  Contractor	RET/NEW RET/NEW RET/NEW	No No No No	Low Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL	\$0.00 S0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78	Equipment Cost L  \$0.00  \$0.00  \$0.00  \$0.00	\$0.24 \$0.20 \$0.29 \$0.33	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system to PUU system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery Packaged system Economizer retrofit Central HVAC system	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 170% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Consequence of the cono Lockout=NO, DB limit = 68, DB limit = 68	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery no exhaust heat recovery	Contractor Contractor Contractor Contractor Contractor	RET/NEW RET/NEW RET/NEW RET/NEW	No No No No	Low Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL	\$0.00 S0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78	Equipment Cost L  \$0.00  \$0.00  \$0.00  \$0.00	\$0.24 \$0.20 \$0.29 \$0.33	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery  Packaged system Economizer retrofit  Central HVAC system Economizer retrofit	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 170% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery No Economizer  T24 baseline matches prototype	Contractor Contractor Contractor Contractor Contractor	RET/NEW RET/NEW RET/NEW RET/NEW	No No No No	Low Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL	\$0.00 S0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78	Equipment Cost L  \$0.00  \$0.00  \$0.00  \$0.00	\$0.24 \$0.20 \$0.29 \$0.33	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058  D03-059	Category HVAC Non- Residential HVAC Non- HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery Packaged system Economizer retrofit Central HVAC system Economizer retrofit Variable Frequency Drive	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 170% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100%	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery No Economizer  T24 baseline matches prototype damper controlled VAV with	Contractor Contractor Contractor Contractor Contractor  Contractor  Not available	RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW	No No No No	Low Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL	\$0.00 S0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76	Equipment Cost L  \$0.00  \$0.00  \$0.00  \$0.00	\$0.24 \$0.20 \$0.29 \$0.33	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery  Packaged system Economizer retrofit  Central HVAC system Economizer retrofit	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 170% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Consequence of the cono Lockout=NO, DB limit = 68, DB limit = 68	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery No Economizer  T24 baseline matches prototype damper controlled VAV with	Contractor Contractor Contractor Contractor Contractor	RET/NEW RET/NEW RET/NEW RET/NEW	No No No No No No	Low Low Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL	\$0.00 \$0.00 \$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78	Sq.uipment Cost	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058  D03-059  D03-051	Category HVAC Non- Residential HVAC Non- HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery  Packaged system Economizer retrofit  Central HVAC system Economizer retrofit Variable Frequency Drive motors use on VAV fans	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 170% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100%	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery No Economizer  T24 baseline matches prototype damper controlled VAV with	Contractor Contractor Contractor Contractor Contractor  Contractor  Not available	RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW	No No No No No No	Low Low Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL	\$0.00 \$0.00 \$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76	Sq.uipment Cost	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058  D03-059  D03-051  D03-098	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIU system Heat recovery from exhaust hoods Poakaged system Economizer retrofit Central HVAC system Economizer retrofit Variable Frequency Drive motors use on VAV fans Add water economizer heat exchanger to CW Loop	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 1 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100% VFD with 30% min-cfm-ratio	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery No Economizer  T24 baseline matches prototype damper controlled VAV with	Contractor Contractor Contractor Contractor Contractor  Contractor  Not available	RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW	No No No No No No	Low Low Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL	\$0.00 \$0.00 \$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76	Sq.uipment Cost	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058  D03-059  D03-051	Category HVAC Non- Residential HVAC Non-	Measure Name VAV box retrofit on constant volume system Convert VAV's system to PIU system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery Packaged system Economizer retrofit Central HVAC system Economizer retrofit Variable Frequency Drive motors use on VAV fans Add water economizer heat exchanger to CW Loop Variable flow hydronic	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system to 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100% VFD with 30% min-cfm-rational to the control of	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery no exhaust heat recovery  No Economizer  T24 baseline matches prototype damper controlled VAV with 30% min-cfm-ratio	Contractor	RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW	No	Low Low Low Low Low Low Low	Cost Basis  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL  FULL/FULL	S0.00 S0.00 S0.00 S0.00 S0.00 S0.00 S0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76 Not available \$155.96	\$0.00 S0.00 \$0.00	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34 \$65.93	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons tons \$221.88 HP
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058  D03-059  D03-051  D03-098  D03-070	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIUI system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery Packaged system Economizer retrofit Central HVAC system Economizer retrofit variable Frequency Drive motors use on VAV fans Add water economizer heat exchanger to CW Loop Variable flow hydronic water loop	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 170% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add comizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100% VFD with 30% min-cfm-ratio Non integrated evaporator precooler heat exchanger 2-way valves, with VSD pumping	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery no exhaust heat recovery  No Economizer  T24 baseline matches prototype damper controlled VAV with o 30% min-cfm-ratio  No water economizer  constant flow hydronic water loo	Contractor	RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW	Star?  No  No  No  No  No  No  No  No	Low Low Low Low Low Low	Cost Basis FULL/FULL	\$0.00 \$0.00 \$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76	S0.00   S0.0	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons  tons \$221.88 HP
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058  D03-059  D03-051  D03-070	Category HVAC Non- Residential HVAC Non-	Measure Name VAV box retrofit on constant volume system to PUI system Heat recovery from exhaust hoods Postaged system Economizer retrofit Central HVAC system Economizer retrofit Variable Frequency Drive motors use on VAV fans Add water economizer heat exchanger to CW Loop Variable flow hydronic water loop High efficiency WLHP	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 1 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100%  VFD with 30% min-cfm-ratio Non integrated evaporator precooler heat exchanger 2-way valves, with VSD pumping WHHP system with 14.0 EEI	Constant Volume air flow damper controlled VAV with 30% min-efm-ratio no exhaust heat recovery no exhaust heat recovery  No Economizer  T24 baseline matches prototype damper controlled VAV with 0 30% min-efm-ratio  No water economizer constant flow hydronic water look	Contractor Occuractor Contractor Contractor Contractor	RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW	No	Low Low Low Low Low Low Low Low	Cost Basis FULL/FULL	\$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76 Not available \$155.96	SQ 00   SQ 0	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34 \$65.93 see Note	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons tons \$221.88 HP \$462.69 tons \$26.14 GPM
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058  D03-059  D03-051  D03-098  D03-070	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIUI system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery Packaged system Economizer retrofit Central HVAC system Economizer retrofit variable Frequency Drive motors use on VAV fans Add water economizer heat exchanger to CW Loop Variable flow hydronic water loop	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 170% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add comizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100% VFD with 30% min-cfm-ratio Non integrated evaporator precooler heat exchanger 2-way valves, with VSD pumping	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery no exhaust heat recovery  No Economizer  T24 baseline matches prototype damper controlled VAV with o 30% min-cfm-ratio  No water economizer  constant flow hydronic water loo	Contractor Occuractor Contractor Contractor Contractor	RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW	No	Low Low Low Low Low Low Low	Cost Basis FULL/FULL	S0.00 S0.00 S0.00 S0.00 S0.00 S0.00 S0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76 Not available \$155.96	\$0.00 S0.00 \$0.00	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34 \$65.93	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons tons \$221.88 HP
Measure ID	Category HVAC Non- Residential HVAC Non-	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIUI system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery  Packaged system Economizer retrofit  Central HVAC system Economizer retrofit  Central HVAC system Economizer retrofit Add water economizer heat exchanger to CW Loop Variable Frequency Drive motors use on VAV fans  Add water economizer heat exchanger to CW Loop Variable flow hydronic water loop High efficiency WLHP system for Large Office	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 1 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100%  VFD with 30% min-cfm-ratio Non integrated evaporator precooler heat exchanger 2-way valves, with VSD pumping WHHP system with 14.0 EEI	Constant Volume air flow damper controlled VAV with 30% min-efm-ratio no exhaust heat recovery no exhaust heat recovery  No Economizer  T24 baseline matches prototype damper controlled VAV with 0 30% min-efm-ratio  No water economizer constant flow hydronic water look	Contractor Occuractor Contractor Contractor Contractor	RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW	No	Low Low Low Low Low Low Low Low	Cost Basis FULL/FULL	\$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76 Not available \$155.96	SQ 00   SQ 0	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34 \$65.93 see Note	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons tons \$221.88 HP \$462.69 tons \$26.14 GPM
Measure ID	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIUI system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery  Packaged system Economizer retrofit  Central HVAC system Economizer retrofit  Central HVAC system Economizer retrofit Add water economizer heat exchanger to CW Loop Variable Frequency Drive motors use on VAV fans  Add water economizer heat exchanger to CW Loop Variable flow hydronic water loop High efficiency WLHP system for Large Office	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 1 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100%  VFD with 30% min-cfm-ratio Non integrated evaporator precooler heat exchanger 2-way valves, with VSD pumping WHHP system with 14.0 EEI	Constant Volume air flow damper controlled VAV with 30% min-efm-ratio no exhaust heat recovery no exhaust heat recovery  No Economizer  T24 baseline matches prototype damper controlled VAV with 0 30% min-efm-ratio  No water economizer constant flow hydronic water look	Contractor Occuractor Contractor Contractor Contractor	RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW	No	Low Low Low Low Low Low Low Low	Cost Basis  FULL/FULL	\$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76 Not available \$155.96	SQ 00   SQ 0	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34 \$65.93 see Note	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons tons \$221.88 HP \$462.69 tons \$26.14 GPM
Measure ID  D03-050  D03-052  D03-056  D03-057  D03-058  D03-059  D03-051  D03-098  D03-070  D03-069	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAVS system to PIUI system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery  Packaged system Economizer retrofit  Central HVAC system Economizer retrofit  Central HVAC system Economizer retrofit Add water economizer heat exchanger to CW Loop Variable Frequency Drive motors use on VAV fans  Add water economizer heat exchanger to CW Loop Variable flow hydronic water loop High efficiency WLHP system for Large Office	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 1 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100%  VFD with 30% min-cfm-ratio Non integrated evaporator precooler heat exchanger 2-way valves, with VSD pumping WHHP system with 14.0 EEI	Constant Volume air flow damper controlled VAV with 30% min-efm-ratio no exhaust heat recovery no exhaust heat recovery  No Economizer  T24 baseline matches prototype damper controlled VAV with 0 30% min-efm-ratio  No water economizer constant flow hydronic water loo  WLHP system with COP = 3.0	Channel Contractor Contractor Contractor Contractor  Contractor  Contractor  Not available Contractor  Contractor  Contractor  Contractor  Contractor  Delivery Channel	RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW RET/NEW	No	Low	Cost Basis  FULL/FULL  FULL/FULL	\$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76 Not available \$155.96 \$16.65 \$740.93	\$0.00 So.00	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34 \$65.93 se Note \$9.48 \$229.97	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons tons \$221.88 HP \$462.69 tons \$26.14 GPM
Measure ID	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAV's system to PIU system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery Packaged system Economizer retrofit Central HVAC system Economizer retrofit Variable Frequency Drive motors use on VAV fans Add water economizer heat exchanger to CW Loop Variable flow hydronic water loop High efficiency WLHP system for Large Office XOOLERS Measure Name	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system to 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100% VFD with 30% min-cfm-ration 100% VFD with 30% min-cfm-ration 100% VFD with 30% min-cfm-ration 100% Won integrated evaporator precooler heat exchanger 2-way valves, with VSD pumping Wi.HP system with 14.0 EEI / 4.6 COP	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery no exhaust heat recovery  No Economizer  T24 baseline matches prototype damper controlled VAV with 0 30% min-cfm-ratio  No water economizer  constant flow hydronic water loo R WLHP system with COP = 3.0  Base Description 10 SEER(8.7 EER) Split-System	Channel Contractor Contractor Contractor Contractor  Contractor  Not available Contractor  Contractor	RET/NEW Application	No No No No No No No Energy Star?	Low	Cost Basis  FULL/FULL  FULL/FULL	\$0.00   \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76  Not available \$155.96  \$16.65 \$740.93	SQ 00   SQ 0	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34 \$65.93 se Note \$9.48 \$229.97	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons  tons \$221.88 HP \$462.69 tons \$26.14 GPM \$970.90 tons
Measure ID	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAV's system to PUI system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery  Packaged system Economizer retrofit  Central HVAC system Economizer retrofit  Variable Frequency Drive motors use on VAV fans  Add water economizer heat exchanger to CW Loop Variable flow hydronic water loop High efficiency WLHP system for Large Office  COOLERS  Measure Name  Direct Evaporative Cooler	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system 1 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add comizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100% VFD with 30% min-cfm-ratio Non integrated evaporator precooler heat exchanger 2-way valves, with VSD pumping WLHP system with 14.0 EEF / 4.6 COP	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery no exhaust heat recovery  No Economizer  T24 baseline matches prototype damper controlled VAV with 30% min-cfm-ratio  No water economizer  constant flow hydronic water loo  WLHP system with COP = 3.0  Base Description 10 SEER(8.7 EER) Split-System Air Conditioner	Contractor  Contractor  Contractor  Contractor  Contractor  Contractor  Not available  Contractor	RET/NEW	No No No No No No No No Energy	Low	Cost Basis  FULL/FULL  FULL/FULL	\$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76 Not available \$155.96 \$16.65 \$740.93	\$0.00 So.00	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34 \$65.93 see Note \$9.48 \$229.97	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons  tons \$221.88 HP \$462.69 tons \$26.14 GPM \$970.90 tons
Measure ID	Category HVAC Non- Residential	Measure Name VAV box retrofit on constant volume system Convert VAV's system to PUI system Heat recovery from exhaust hoods rotary air-to-air enthalpy heat recovery  Packaged system Economizer retrofit  Central HVAC system Economizer retrofit  Variable Frequency Drive motors use on VAV fans  Add water economizer heat exchanger to CW Loop Variable flow hydronic water loop High efficiency WLHP system for Large Office  COOLERS  Measure Name  Direct Evaporative Cooler	damper controlled VAV with 30% min-cfm-ratio Convert VAVS sytem to PIU system to 70% heat recovery effectiveness 70% sensible and latent recovery effectiveness Add econo with Econo Lockout=NO, DB limit = 68, Max OSA = 100% Add ecomizer with Econo Lockout=NO, DB limit = 68, Max OSA = 100% VFD with 30% min-cfm-ration 100% VFD with 30% min-cfm-ration 100% VFD with 30% min-cfm-ration 100% Won integrated evaporator precooler heat exchanger 2-way valves, with VSD pumping Wi.HP system with 14.0 EEI / 4.6 COP	Constant Volume air flow damper controlled VAV with 30% min-cfm-ratio no exhaust heat recovery no exhaust heat recovery  No Economizer  T24 baseline matches prototype damper controlled VAV with 0 30% min-cfm-ratio  No water economizer  constant flow hydronic water loo R WLHP system with COP = 3.0  Base Description 10 SEER(8.7 EER) Split-System	Contractor  Contractor  Contractor  Contractor  Contractor  Contractor  Not available  Contractor	RET/NEW Application	No No No No No No No Energy Star?	Low	Cost Basis  FULL/FULL  FULL/FULL	\$0.00   \$0.00	\$0.34 \$0.99 \$1.70 \$1.78 \$126.76  Not available \$155.96  \$16.65 \$740.93	SQ 00   SQ 0	\$0.24 \$0.20 \$0.29 \$0.33 \$43.34 \$65.93 se Note \$9.48 \$229.97	\$0.59 CFM \$1.19 CFM \$1.99 CFM \$2.11 CFM \$170.11 tons  tons \$221.88 HP \$462.69 tons \$26.14 GPM \$970.90 tons

# Appendix B: Measure Cost Data

HVAC - RESIDENTIAL - FURNACES

	a .	., .,			Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description Condensing 90 AFUE (1.11	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	<b>Equipment Cost</b>	Equipment Cost	Labor Cost In	stalled Cost Cost Unit
		Condensing 90 AFUE (1.1	1 HIR) Furnace, 60,000 Btu						FULL/INCR/INC					
D03-410	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$9.57	\$21.53	\$11.96	\$19.98	\$41.51 kBtuh
		Condensing 90 AFIJE (1.1	Condensing 90 AFUE (1.11 1 HIR) Furnace, 70,000 Btu						FULL/INCR/INC					
D03-410	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$8.65	\$18.37	\$9.72	\$17.12	\$35.49 kBtuh
			Condensing 90 AFUE (1.11											
D02 410	INVACE IL CI		1 HIR) Furnace, 80,000 Btu	00 AFIJE(1 22 JHP) E	0	DET/DODAIEW	N/		FULL/INCR/INC	67.06	616.20	60.24	614.00	621 10 ID: 1
D03-410	HVAC Residential	HIR) Furnace	single stage Condensing 90 AFUE (1.11	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$7.96	\$16.20	\$8.24	\$14.98	\$31.18 kBtuh
			1 HIR) Furnace, 90,000 Btu						FULL/INCR/INC					
D03-410	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$7.42	\$14.69	\$7.27	\$13.32	\$28.01 kBtuh
		Condensing 90 AFUE (1.1	Condensing 90 AFUE (1.11 1 HIR) Furnace, 100,000 Btu						FULL/INCR/INC					
D03-410	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.99	\$13.65	\$6.66	\$11.99	\$25.63 kBtuh
		a 1 : 00 1 mm (1 )	Condensing 90 AFUE (1.11											
D03-410	HVAC Residential	Condensing 90 AFUE (1.1 HIR) Furnace	1 HIR) Furnace, 110,000 Btu single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$6.64	\$12.94	\$6.31	\$10.90	\$23.84 kBtuh
D03-410	II v AC Residential	TITK) I umacc	Condensing 90 AFUE (1.11		Contractor	RE1/ROB/NEW	103	Low	K	30.04	312.94	30.31	\$10.50	323.04 KDtuli
			1 HIR) Furnace, 115,000 Btu						FULL/INCR/INC					
D03-410	HVAC Residential	HIR) Furnace	single stage Condensing 90 AFUE (1.11	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.48	\$12.69	\$6.21	\$10.42	\$23.11 kBtuh
		Condensing 90 AFUE (1.1	1 HIR) Furnace, 120,000 Btu						FULL/INCR/INC					
D03-410	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.34	\$12.49	\$6.15	\$9.99	\$22.48 kBtuh
		Condension 00 AFIJE (1.1	Condensing 90 AFUE (1.11						FULL/INCR/INC					
D03-410	HVAC Residential	HIR) Furnace	1 HIR) Furnace, 125,000 Btu single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R R	\$6.21	\$12.34	\$6.13	\$9.51	\$21.85 kBtuh
			Condensing 90 AFUE (1.11										47.101	V=1100 1111111
D			1 HIR) Furnace, 140,000 Btu	00 174774 00 1477		nemmon a resul			FULL/INCR/INC	0.5.00		0.00	00.56	000 (017)
D03-410	HVAC Residential	HIR) Furnace	single stage Condensing 92 AFUE (1.11	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$5.88	\$12.13	\$6.25	\$8.56	\$20.69 kBtuh
		Condensing 92 AFUE (1.0	8 HIR) Furnace, 60,000 Btu						FULL/INCR/INC					
D03-411	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$9.57	\$22.50	\$12.93	\$19.98	\$42.48 kBtuh
		Condensing 92 AFUE (1.0	Condensing 92 AFUE (1.11 8 HIR) Furnace, 70,000 Btu						FULL/INCR/INC					
D03-411	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$8.65	\$19.34	\$10.69	\$17.12	\$36.46 kBtuh
		G 1 : 01 ITTE	Condensing 92 AFUE (1.11											
D03-411	HVAC Residential	Condensing 92 AFUE (1.0 HIR) Furnace	8 HIR) Furnace, 80,000 Btu single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$7.96	\$17.17	\$9.21	\$14.98	\$32.15 kBtuh
D03-411	HVAC Residential	riik) ruinace	Condensing 92 AFUE (1.11		Contractor	KE1/KOD/NEW	1 05	Low	K	\$7.90	\$17.17	39.21	\$14.90	\$32.13 KBtuii
			8 HIR) Furnace, 90,000 Btu						FULL/INCR/INC					
D03-411	HVAC Residential	HIR) Furnace	single stage Condensing 92 AFUE (1.11	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$7.42	\$15.66	\$8.24	\$13.32	\$28.98 kBtuh
		Condensing 92 AFUE (1.0	8 HIR) Furnace, 100,000 Btu						FULL/INCR/INC					
D03-411	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.99	\$14.62	\$7.63	\$11.99	\$26.61 kBtuh
		Condension 02 AFIJE (1.0	Condensing 92 AFUE (1.11						FULL/INCR/INC					
D03-411	HVAC Residential	HIR) Furnace	8 HIR) Furnace, 110,000 Btu single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R R	\$6.64	\$13.92	\$7.28	\$10.90	\$24.81 kBtuh
			Condensing 92 AFUE (1.11									471-0	44400	V= 1101 1111111
D			8 HIR) Furnace, 115,000 Btu	00 174774 00 1477		nemmon a resul			FULL/INCR/INC	0.0	0.0.0	0.7.40	040.40	004.001.001
D03-411	HVAC Residential	HIR) Furnace	single stage Condensing 92 AFUE (1.11	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.48	\$13.66	\$7.18	\$10.42	\$24.08 kBtuh
		Condensing 92 AFUE (1.0	8 HIR) Furnace, 120,000 Btu						FULL/INCR/INC					
D03-411	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.34	\$13.46	\$7.12	\$9.99	\$23.45 kBtuh
		Condensing 92 AFIJE (1.0	Condensing 92 AFUE (1.11 8 HIR) Furnace, 125,000 Btu						FULL/INCR/INC					
D03-411	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.21	\$13.31	\$7.10	\$9.51	\$22.83 kBtuh
			Condensing 92 AFUE (1.11											
D03-411	HVAC Residential	Condensing 92 AFUE (1.0 HIR) Furnace	8 HIR) Furnace, 140,000 Btu	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$5.88	\$13.10	\$7.22	\$8.56	\$21.66 kBtuh
1703-411	11 VAC KESIGERIIAI	iiik) rumace	single stage Condensing 94 AFUE (1.11	ov AFUE(1.23 HIK) FUITIBCE	Contractor	AE I/AUB/NEW	1 08	Low	IX.	\$3.88	\$13.10	\$1.22	38.30	\$21.00 KBIUII
			6 HIR) Furnace, 60,000 Btu						FULL/INCR/INC					
D03-412	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$9.57	\$23.48	\$13.90	\$19.98	\$43.45 kBtuh

		G 1 : 04 - FT TD (4 of	Condensing 94 AFUE (1.11						T					
D02 412	much it is		06 HIR) Furnace, 70,000 Btu	00 4 EUE (1 22 1410) E		DET/DODAIEW	**		FULL/INCR/INC	60.65	620.21	011.66	617.10	627 44 I D. I
D03-412	HVAC Residential	HIR) Furnace	single stage Condensing 94 AFUE (1.11	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$8.65	\$20.31	\$11.66	\$17.12	\$37.44 kBtuh
		Condensing 94 AFIJE (1.0	06 HIR) Furnace, 80,000 Btu						FULL/INCR/INC					
D03-412	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$7.96	\$18.14	\$10.18	\$14.98	\$33.13 kBtuh
D03-412	11 vite residential	THIC) I dilidee	Condensing 94 AFUE (1.11	60 711 CE(1:25 1111C) 1 unace	Contractor	RE1/ROB/NEW	1 03	Low	K	\$7.70	\$10.14	\$10.10	\$14.70	333.13 KBtun
		Condensing 94 AFUE (1.0	06 HIR) Furnace, 90,000 Btu						FULL/INCR/INC					
D03-412	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$7.42	\$16.64	\$9.22	\$13.32	\$29.95 kBtuh
			Condensing 94 AFUE (1.11	-										
			06 HIR) Furnace,100,000 Btu						FULL/INCR/INC					
D03-412	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.99	\$15.59	\$8.60	\$11.99	\$27.58 kBtuh
			Condensing 94 AFUE (1.11											
200 110			06 HIR) Furnace, 110,000 Btu	00 1 57 57 1 40 1 1 1 1		DEPENDENCE A SERVI			FULL/INCR/INC				***	000 00 1 00 1
D03-412	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.64	\$14.89	\$8.25	\$10.90	\$25.79 kBtuh
		Condonsing 04 AFIJE (1.0	Condensing 94 AFUE (1.11 06 HIR) Furnace, 115,000 Btu						FULL/INCR/INC					
D03-412	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.48	\$14.64	\$8.15	\$10.42	\$25.06 kBtuh
D03-412	TIVAC Residential	THR) Furnace	Condensing 94 AFUE (1.11	80 AF OL(1.23 THK) Fulliace	Contractor	KE1/KOD/NEW	103	LOW	K	30.46	314.04	30.13	\$10.42	323.00 KBtuli
		Condensing 94 AFUE (1.0	06 HIR) Furnace, 120,000 Btu						FULL/INCR/INC					
D03-412	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.34	\$14.44	\$8.09	\$9.99	\$24.43 kBtuh
			Condensing 94 AFUE (1.11	,										
		Condensing 94 AFUE (1.0	06 HIR) Furnace, 125,000 Btu						FULL/INCR/INC					
D03-412	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.21	\$14.29	\$8.07	\$9.51	\$23.80 kBtuh
			Condensing 94 AFUE (1.11											
			06 HIR) Furnace, 140,000 Btu		_			_	FULL/INCR/INC					
D03-412	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$5.88	\$14.08	\$8.19	\$8.56	\$22.64 kBtuh
		Condension OC AFIJE (1.0	Condensing 96 AFUE (1.11 33 HIR) Furnace, 60,000 Btu						FULL/INCR/INC					
D03-413	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R R	\$9.57	\$24.45	\$14.88	\$19.98	\$44.43 kBtuh
D03-413	HVAC Residential	riik) ruillace	Condensing 96 AFUE (1.11	80 AFUE(1.23 HIK) Fulliace	Contractor	KE I/KOD/NE W	i es	LOW	K	39.37	324.43	\$14.00	\$19.90	344.43 KBtuii
		Condensing 96 AFIJE (1.0	3 HIR) Furnace, 70,000 Btu						FULL/INCR/INC					
D03-413	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$8.65	\$21.29	\$12.63	\$17.12	\$38.41 kBtuh
		,	Condensing 96 AFUE (1.11											
		Condensing 96 AFUE (1.0	3 HIR) Furnace, 80,000 Btu						FULL/INCR/INC					
D03-413	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$7.96	\$19.12	\$11.16	\$14.98	\$34.10 kBtuh
			Condensing 96 AFUE (1.11											
			3 HIR) Furnace, 90,000 Btu						FULL/INCR/INC					
D03-413	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$7.42	\$17.61	\$10.19	\$13.32	\$30.93 kBtuh
		a 1 : 00 1 PT ID (1 0	Condensing 96 AFUE (1.11						T					
200 110			3 HIR) Furnace,100,000 Btu	00 1 57 57 1 40 1 1 1 1		DEPENDENCE AND ALTERNATION AND			FULL/INCR/INC			00.00		000 551 70. 1
D03-413	HVAC Residential	HIR) Furnace	Single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.99	\$16.57	\$9.58	\$11.99	\$28.55 kBtuh
		Condensing 96 AFIJE (1.0	Condensing 96 AFUE (1.11 33 HIR) Furnace, 110,000 Btu						FULL/INCR/INC					
D03-413	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.64	\$15.86	\$9.23	\$10.90	\$26.76 kBtuh
D03-413	II v AC Residential	THR) Furnace	Condensing 96 AFUE (1.11	80 AT CE(1.23 THK) Turnace	Contractor	KET/KOD/NEW	103	LOW	K	30.04	\$15.00	37.23	\$10.90	320.70 KBtuli
		Condensing 96 AFUE (1.0	3 HIR) Furnace, 115,000 Btu						FULL/INCR/INC					
D03-413	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.48	\$15.61	\$9.12	\$10.42	\$26.03 kBtuh
			Condensing 96 AFUE (1.11											
		Condensing 96 AFUE (1.0	3 HIR) Furnace, 120,000 Btu						FULL/INCR/INC					
D03-413	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.34	\$15.41	\$9.07	\$9.99	\$25.40 kBtuh
			Condensing 96 AFUE (1.11					·				·		
			3 HIR) Furnace, 125,000 Btu		_			_	FULL/INCR/INC					
D03-413	HVAC Residential	HIR) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	R	\$6.21	\$15.26	\$9.05	\$9.51	\$24.77 kBtuh
		Condensing Of A FITE (1.0	Condensing 96 AFUE (1.11						ELILI /DICD/DIC					
D02 412	III/ACDidid-	Condensing 96 AFUE (1.0 HIR) Furnace	3 HIR) Furnace, 140,000 Btu	90 AFLIE(1 22 HIB) F-	Control	DET/DODAIEW	Yes	T	FULL/INCR/INC R	\$5.88	\$15.05	\$9.17	\$8.56	622 (1 l-D+-l-
D03-413	HVAC Residential	HIK) Furnace	single stage	80 AFUE(1.23 HIR) Furnace	Contractor	RET/ROB/NEW	Yes	Low	K	\$5.88	\$15.05	\$9.17	\$8.56	\$23.61 kBtuh
HVAC - RESI	DENTIAL - REEDIA	GERANT CHARGE AND	DUCT SEALING											
IIVAC - RESI	DEATIME - KEFKI	GERANT CHARGE AND	DOCT SEALING		Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis				abor Cost I	Installed Cost Cost Unit
	ca.egor,	Typical Refrigerant Charg				Pricetton	J		5 <b>24</b> 040		1 mpm Coot	ampania con L		con cuit
		Adjustment (< ±20% rated												
D03-408	HVAC Residential	charge)	refrigerant charge)	Clg Eff Decreased by 15%	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$10.36	\$0.00	\$28.00	\$38.36 tons
-		High Refrigerant Charge	Standard Cooling	-										
		Adjustment (>= ±20% rate	ed Performance (proper	Clg Eff Decreased by 15% &										
D03-409	HVAC Residential			Clg Eff Decreased by 15% & Supply Duct Leakage 20%	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$17.87	\$0.00	\$28.47	\$46.33 tons

		Typical Refrigerant Charge	e Standard Cooling											
		Adjustment (< ±20% rated	Performance, reduced duct	Cooling Performance degraded,										
D03-459	HVAC Residential	charge) + Duct Sealing	loss	standard duct loss	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$27.03	\$0.00	\$119.24	\$146.27 tons
		High Refrigerant Charge	Standard Cooling											
			d Performance, reduced duct	Cooling Performance degraded,										
D03-460	HVAC Residential	charge) + Duct Sealing	loss	standard duct loss	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$34.53	\$0.00	\$119.71	\$154.24 tons
-			ge Duct Sealing (Total Leakage											
D02 410			U Reduced from 40% of AHU			DETAILEN	N		CITT CITT	60.00	016.67	60.00	601.24	6107.01 T
D03-418	Labor Only	flow to 12%) Duct Sealing (Total Leakage	flow to 12%) ge Duct Sealing (Total Leakage	20/16/4% of AHU flow	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$16.67	\$0.00	\$91.24	\$107.91 Tons
			U Reduced from 24% of AHU	Supply/return/OA leakage										
D03-458	Labor Only	flow to 12%)	flow to 12%)	12/9.6/2.4% of AHU flow	Contractor	RET/NEW	No	Low	FULL/FULL	\$0.00	\$16.67	\$0.00	\$91.24	\$107.91 Tons
INVAC DEC	IDENTIAL CDITE	AC 8 HD 10 AND 12 SEE	D DACE											
HVAC - KES	IDENTIAL - SPLIT	AC & HP - 10 AND 13 SEE	K BASE		Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost			Labor Cost	Installed Cost Cost Unit
			13 SEER (11.09 EER) Split											
		12 CEED (11 00 EED) Coli	System Air Conditioner, 2 to	n 10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-402	HVAC Residential		matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$371.85	\$663.23	\$291.39	\$604.18	\$1,267.41 tons
505 102	11 11 TO RESIDENTIAL	System : In Conditioner	13 SEER (11.09 EER) Split	7 Conditioner	Conductor	ILL I/ICOD/ILL II	100	2011		9371.03	9003.23	9271.37	9001.10	ψ1,207.11 tollo
			System Air Conditioner, 2.5											
			it ton (30,000 Btu) condenser	10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-402	HVAC Residential	System Air Conditioner	and matched cased coil 13 SEER (11.09 EER) Split	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$330.39	\$595.02	\$264.63	\$483.34	\$1,078.36 tons
			System Air Conditioner, 3 to	n										
		13 SEER (11.09 EER) Spli		10 SEER(8.7 EER) Split-System	1				FULL/INCR/INC					
D03-402	HVAC Residential	System Air Conditioner	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$279.72	\$549.55	\$269.83	\$402.78	\$952.33 tons
			13 SEER (11.09 EER) Split											
		12 SEED (11 00 EED) Sali	System Air Conditioner, 3.5 it ton (42,000 Btu) condenser	10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-402	HVAC Residential	System Air Conditioner	and matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$297.76	\$517.07	\$219.31	\$345.24	\$862.31 tons
		.,	13 SEER (11.09 EER) Split											
			System Air Conditioner, 4 to											
D02 402	HVAC Desidential			10 SEER(8.7 EER) Split-System		DET/DODAIEW	V	T	FULL/INCR/INC	6207.10	6402.71	6205 52	6202.00	6704.00 +
D03-402	HVAC Residential	System Air Conditioner	matched cased coil 13 SEER (11.09 EER) Split	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$287.19	\$492.71	\$205.52	\$302.09	\$794.80 tons
			System Air Conditioner, 5 to	n										
			it (60,000 Btu) condenser and	10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-402	HVAC Residential	System Air Conditioner	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$233.49	\$458.60	\$225.11	\$241.67	\$700.27 tons
			14 SEER (11.99 EER) Split- System Air Conditioner, 2 to	n										
		14 SEER (11 99 EER) Spli	it-(24,000 Btu) condenser and	10 SEER(8.7 EER) Split-System	1				FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$371.85	\$802.16	\$430.32	\$604.18	\$1,406.34 tons
			14 SEER (11.99 EER) Split-											
		14 CEED (11 00 EED) C 1	System Air Conditioner, 2.5	10 CEED (0 T EED) C E. C					ELII I MICD MIC					
D03-403	HVAC Residential	System Air Conditioner	it-ton (30,000 Btu) condenser and matched cased coil	10 SEER(8.7 EER) Split-System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$330.39	\$706.17	\$375.77	\$483.34	\$1,189.51 tons
D03-403	11 vite residential	System 7th Conditioner	14 SEER (11.99 EER) Split-	7th Conditioner	Contractor	KE I/KOB/IVE W	103	Low	R	4550.57	\$700.17	\$313.11	ψ <del>-103.31</del>	\$1,107.51 tons
			System Air Conditioner, 3 to											
				10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	matched cased coil 14 SEER (11.99 EER) Split-	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$279.72	\$642.17	\$362.45	\$402.78	\$1,044.95 tons
			System Air Conditioner, 3.5											
		14 SEER (11.99 EER) Spli	it-ton (42,000 Btu) condenser	10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	and matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$297.76	\$596.46	\$298.70	\$345.24	\$941.70 tons
			14 SEER (11.99 EER) Split-											
		14 SEER (11 90 EED) SAG	System Air Conditioner, 4 to it-(48,000 Btu) condenser and	n 10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R R	\$287.19	\$562.17	\$274.99	\$302.09	\$864.26 tons
202 703	residential	2,5tem / in Conditioner	14 SEER (11.99 EER) Split-	· · · · · · · · · · · · · · · · · · ·	Jonadoloi	ALT, ROD/INLW		2011		ψ207.17	9302.17	Ψ217.22	4502.09	500 i.20 tons
			System Air Conditioner, 5 to	n										
D.02.402			it-(60,000 Btu) condenser and	10 SEER(8.7 EER) Split-System		promo op a re	**		FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	matched cased coil 15 SEER (12.72 EER) Split-	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$233.49	\$514.18	\$280.68	\$241.67	\$755.85 tons
			System Air Conditioner, 2 to	n										
		15 SEER (12.72 EER) Spli		10 SEER(8.7 EER) Split-System	1				FULL/INCR/INC					
D03-404	HVAC Residential	System Air Conditioner	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$371.85	\$941.09	\$569.25	\$604.18	\$1,545.27 tons

			15 SEER (12.72 EER) Split-											
			System Air Conditioner, 2.5											
		15 SEER (12.72 EER) Split-t		10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-404	HVAC Residential		and matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$330.39	\$817.31	\$486.92	\$483.34	\$1,300.65 tons
			15 SEER (12.72 EER) Split-											
			System Air Conditioner, 3 to											
		15 SEER (12.72 EER) Split-(	(36,000 Btu) condenser and	10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-404	HVAC Residential		matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$279.72	\$734.79	\$455.07	\$402.78	\$1,137.57 tons
			15 SEER (12.72 EER) Split-											
			System Air Conditioner, 3.5	10 CEED (0 7 EED) C 1: C					FILL ADJODADIO					
D02 404	INVACE II CI	15 SEER (12.72 EER) Split-t		10 SEER(8.7 EER) Split-System		DETRODATEN	37	*	FULL/INCR/INC	6207.76	0.75.04	6270.00	6245.24	01.021.00
D03-404	HVAC Residential		and matched cased coil 15 SEER (12.72 EER) Split-	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$297.76	\$675.84	\$378.08	\$345.24	\$1,021.09 tons
			System Air Conditioner, 4 to	1										
				10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-404	HVAC Residential		matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$287.19	\$631.64	\$344.45	\$302.09	\$933.72 tons
			15 SEER (12.72 EER) Split-								• • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • • • •		
		5	System Air Conditioner, 5 to	1										
		15 SEER (12.72 EER) Split-(	(60,000 Btu) condenser and	10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-404	HVAC Residential		matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$233.49	\$569.75	\$336.25	\$241.67	\$811.42 tons
			16 SEER (11.61 EER) Split											
			System Air Conditioner, 2 to						THE THEOREM					
D02 462	HIVA C Desidential	16 SEER (11.61 EER) Split (		10 SEER(8.7 EER) Split-System		DET/DODAIEW	V	T	FULL/INCR/INC R	6271.05	61 000 03	6700 17	0004.10	£1 (04.10 t
D03-463	HVAC Residential		matched cased coil 16 SEER (11.61 EER) Split	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	K	\$371.85	\$1,080.02	\$708.17	\$604.18	\$1,684.19 tons
			System Air Conditioner, 2.5											
		16 SEER (11.61 EER) Split 1		10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-463	HVAC Residential		and matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$330.39	\$928.45	\$598.06	\$483.34	\$1,411.79 tons
			16 SEER (11.61 EER) Split											
			System Air Conditioner, 3 to											
		16 SEER (11.61 EER) Split (	(36,000 Btu) condenser and	10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-463	HVAC Residential		matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$279.72	\$827.41	\$547.68	\$402.78	\$1,230.19 tons
			16 SEER (11.61 EER) Split											
			System Air Conditioner, 3.5	10 CEED (0 7 EED) C 1: C					FILL ADJODADIO					
D03-463	HIVA C Desidential	16 SEER (11.61 EER) Split 1	ton (42,000 Btu) condenser and matched cased coil	10 SEER(8.7 EER) Split-System Air Conditioner	Contractor	DET/DODAIEW	Yes	T	FULL/INCR/INC R	\$297.76	\$755.23	\$457.47	\$345.24	61 100 40 +
D03-463	HVAC Residential		16 SEER (11.61 EER) Split	Air Conditioner	Contractor	RET/ROB/NEW	res	Low	K	\$297.76	\$/33.23	\$457.47	\$343.24	\$1,100.48 tons
			System Air Conditioner, 4 to	1										
		16 SEER (11.61 EER) Split (		10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-463	HVAC Residential		matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$287.19	\$701.10	\$413.91	\$302.09	\$1,003.19 tons
		-	16 SEER (11.61 EER) Split											
			System Air Conditioner, 5 to	1										
		16 SEER (11.61 EER) Split (		10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-463	HVAC Residential	System Air Conditioner	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$233.49	\$625.32	\$391.83	\$241.67	\$866.99 tons
			17 SEER (12.28 EER) Split-											
			System Air Conditioner, 2 to						FULL /INCD/INC					
D02 464	HVAC Decidential	17 SEER (12.28 EER) Split-(		10 SEER(8.7 EER) Split-System		DET/DOD/NEW	Vac	Low	FULL/INCR/INC R	6271 05	61 210 05	\$847.10	\$604.19	\$1,823.12 tons
D03-464	HVAC Residential		matched cased coil 17 SEER (12.28 EER) Split-	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	ĸ	\$371.85	\$1,218.95	3047.10	\$604.18	\$1,023.12 IOHS
			System Air Conditioner, 2.5											
		17 SEER (12.28 EER) Split-1		10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-464	HVAC Residential		and matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$330.39	\$1,039.59	\$709.20	\$483.34	\$1,522.93 tons
			17 SEER (12.28 EER) Split-								,			
			System Air Conditioner, 3 to											
				10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-464	HVAC Residential		matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$279.72	\$920.03	\$640.30	\$402.78	\$1,322.81 tons
			17 SEER (12.28 EER) Split-											
			System Air Conditioner, 3.5	10 CEED/0 7 EED\ C-12 C.					ELIL I /INCD /INC					
D03-464	HVAC Residential	17 SEER (12.28 EER) Split-t System Air Conditioner	and matched cased coil	10 SEER(8.7 EER) Split-System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$297.76	\$834.62	\$536.86	\$345.24	\$1,179.86 tons
1005-404	11 VAC RESIDERITAL		17 SEER (12.28 EER) Split-	All Collultioner	Contractor	KE1/KUD/NEW	1 08	LOW	IX.	\$297.70	\$034.02	\$330.00	9543.24	91,1/7.00 WIIS
			System Air Conditioner, 4 to	1										
		17 SEER (12.28 EER) Split-(	•	10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-464	HVAC Residential		matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$287.19	\$770.57	\$483.38	\$302.09	\$1,072.65 tons
			17 SEER (12.28 EER) Split-											
			System Air Conditioner, 5 to											
		17 SEER (12.28 EER) Split-(		10 SEER(8.7 EER) Split-System					FULL/INCR/INC					
D03-464	HVAC Residential	System Air Conditioner	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$233.49	\$680.89	\$447.40	\$241.67	\$922.56 tons

			18 SEER (13.37 EER) Split-											
			System Air Conditioner, 2 to											
		18 SEER (13.37 EER) Spl		10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-465	HVAC Residential	System Air Conditioner	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$371.85	\$1,357.87	\$986.03	\$604.18	\$1,962.05 tons
-			18 SEER (13.37 EER) Split-											
			System Air Conditioner, 2.5											
		18 SEER (13.37 EER) Spl	it-ton (30,000 Btu) condenser		ı				FULL/INCR/INC					
D03-465	HVAC Residential	System Air Conditioner	and matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$330.39	\$1,150.74	\$820.34	\$483.34	\$1,634.08 tons
			18 SEER (13.37 EER) Split-											
		10 CEED (12 27 EED) C-1	System Air Conditioner, 3 to						FULL/INCR/INC					
D03-465	HVAC Residential		it-(36,000 Btu) condenser and matched cased coil	10 SEER(8.7 EER) Split-System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R R	\$279.72	\$1,012.64	\$732.92	\$402.78	\$1,415.43 tons
D03-403	HVAC Residential	System Air Conditioner	18 SEER (13.37 EER) Split-		Contractor	KE1/KOD/NEW	1 05	LOW	N.	3219.12	31,012.04	\$132.92	3402.76	\$1,413.43 tolls
			System Air Conditioner, 3.5											
		18 SEER (13.37 EER) Spl	it-ton (42,000 Btu) condenser	10 SEER(8.7 EER) Split-System	ı				FULL/INCR/INC					
D03-465	HVAC Residential	System Air Conditioner	and matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$297.76	\$914.01	\$616.25	\$345.24	\$1,259.25 tons
-			18 SEER (13.37 EER) Split-											
			System Air Conditioner, 4 to	n										
			it-(48,000 Btu) condenser and						FULL/INCR/INC					
D03-465	HVAC Residential	System Air Conditioner	matched cased coil	Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$287.19	\$840.03	\$552.84	\$302.09	\$1,142.12 tons
			18 SEER (13.37 EER) Split-											
		10 CEED (12 27 EED) C-1	System Air Conditioner, 5 to						FULL/INCR/INC					
D03-465	HVAC Residential	System Air Conditioner	it-(60,000 Btu) condenser and matched cased coil	10 SEER(8.7 EER) Split-System Air Conditioner	Contractor	RET/ROB/NEW	Vac	Low	R R	\$233.49	\$736.46	\$502.97	\$241.67	\$978.13 tons
D03-465	HVAC Residential	System Air Conditioner	13 SEER (11.09 EER) Split	Air Conditioner	Contractor	KE I/KOB/NE W	Yes	Low	K	\$233.49	\$/30.40	\$302.97	\$241.07	\$9/8.13 tons
				on T24 minimum: 13 SEER(11.09										
		13 SEER (10 EER) Split-	(36,000 Btu) condenser and						FULL/INCR/INC					
D03-402	HVAC Residential	System Air Conditioner	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$549.55	\$549.55 \$	-	\$235.95	\$785.50 tons
-			14 SEER (11.99 EER) Split-											
				on T24 minimum: 13 SEER(11.09										
			it-(24,000 Btu) condenser and						FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$663.23	\$802.16	\$138.93	\$353.93	\$1,156.09 tons
			14 SEER (11.99 EER) Split-	T24 :: 12 CEED/11 00										
		14 CEED (11 00 EED) C-1	it-ton (30,000 Btu) condenser	T24 minimum: 13 SEER(11.09					FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R R	\$595.02	\$706.17	\$111.14	\$283.14	\$989.31 tons
D03-403	II VAC Residentiai	System Air Conditioner	14 SEER (11.99 EER) Split-	Conditioner	Contractor	KE1/KOD/NEW	1 03	LOW	K	\$393.02	\$700.17	\$111.14	3203.14	3707.31 tons
				on T24 minimum: 13 SEER(11.09										
		14 SEER (11.99 EER) Spl	it-(36,000 Btu) condenser and						FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$549.55	\$642.17	\$92.62	\$235.95	\$878.12 tons
			14 SEER (11.99 EER) Split-											
				T24 minimum: 13 SEER(11.09										
			it-ton (42,000 Btu) condenser	EER) Split System Air					FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	and matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$517.07	\$596.46	\$79.39	\$202.24	\$798.70 tons
			14 SEER (11.99 EER) Split-	T24 i i 12 SEED (11 00										
		14 CEED (11 00 EED) Col	it-(48,000 Btu) condenser and	on T24 minimum: 13 SEER(11.09					FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$492.71	\$562.17	\$69.46	\$176.96	\$739.14 tons
D03-403	II VAC Residential	System Air Conditioner	14 SEER (11.99 EER) Split-	Conditioner	Contractor	KE1/KOD/NEW	103	Low	K	3492.71	\$302.17	307.40	\$170.90	3739.14 tons
				on T24 minimum: 13 SEER(11.09										
		14 SEER (11.99 EER) Spl	it-(60,000 Btu) condenser and						FULL/INCR/INC					
D03-403	HVAC Residential	System Air Conditioner	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$458.60	\$514.18	\$55.57	\$141.57	\$655.75 tons
			15 SEER (12.72 EER) Split-											
				on T24 minimum: 13 SEER(11.09										
			it-(24,000 Btu) condenser and						FULL/INCR/INC					
D03-404	HVAC Residential	System Air Conditioner	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$663.23	\$941.09	\$277.86	\$353.93	\$1,295.02 tons
			15 SEER (12.72 EER) Split-	T24 minimum, 12 CEEB/11 00										
		15 CEED (12 72 EED) Call	it-ton (30,000 Btu) condenser	T24 minimum: 13 SEER(11.09					FULL/INCR/INC					
D03-404	HVAC Residential	System Air Conditioner	and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R R	\$595.02	\$817.31	\$222.28	\$283.14	\$1,100.45 tons
203-404	11 + AC Residential	System All Conditioner	15 SEER (12.72 EER) Split-	Conditioner	Contractor	RET/ROD/NEW	1 05	LUW	11	\$373.02	3017.31	\$444.40	φ403.14	φ1,100.45 t0115
				on T24 minimum: 13 SEER(11.09										
		15 SEER (12.72 EER) Spl	it-(36,000 Btu) condenser and						FULL/INCR/INC					
D03-404	HVAC Residential	System Air Conditioner	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$549.55	\$734.79	\$185.24	\$235.95	\$970.74 tons
			15 SEER (12.72 EER) Split-											
			System Air Conditioner, 3.5											
			it-ton (42,000 Btu) condenser	EER) Split System Air	_			_	FULL/INCR/INC					
D03-404	HVAC Residential	System Air Conditioner	and matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$517.07	\$675.84	\$158.77	\$202.24	\$878.09 tons

			15 SEER (12.72 EER) Split-											
		44 CDDD (44 54 DDD) C 1		T24 minimum: 13 SEER(11.09					THE MICH MIC					
D03-404	UVAC Pacidential	15 SEER (12.72 EER) Split System Air Conditioner	- (48,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$492.71	\$631.64	\$138.93	\$176.96	\$808.60 tons
D03-404	11 V/IC Residential	System 7th Conditioner	15 SEER (12.72 EER) Split-	Conditioner	Contractor	RE1/ROB/IVEW	103	Low	R	\$472.71	\$051.04	\$150.75	\$170.70	3000.00 10113
		44 CDDD (44 54 DDD) C 1		T24 minimum: 13 SEER(11.09					THE MICH MIC					
D03-404	HVAC Residential	15 SEER (12.72 EER) Split System Air Conditioner	- (60,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$458.60	\$569.75	\$111.14	\$141.57	\$711.32 tons
D03=404	II v AC Residential	System Air Conditioner	16 SEER (11.61 EER) Split	Conditioner	Contractor	RE1/ROB/NEW	103	Low	K	3438.00	\$309.73	3111.14	\$141.57	3/11.32 tons
				nT24 minimum: 13 SEER(11.09										
D03-463	HVAC Residential	16 SEER (11.61 EER) Split System Air Conditioner	(24,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$663.23	\$1,080.02	\$416.78	\$353.93	\$1,433.94 tons
D03-403	II VAC Residentiai	System All Conditioner	16 SEER (11.61 EER) Split	Conditioner	Contractor	KE1/KOB/NEW	103	Low	K	3003.23	\$1,080.02	3410.78	\$333.93	\$1,433.94 tons
				T24 minimum: 13 SEER(11.09										
D03-463	HVAC Residential	16 SEER (11.61 EER) Split System Air Conditioner	ton (30,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$595.02	\$928.45	\$333.43	\$283.14	\$1,211.59 tons
D03=403	II VAC Residentiai	System All Conditioner	16 SEER (11.61 EER) Split	Conditioner	Contractor	KE1/KOB/NEW	103	Low	K	\$393.02	3720.43	\$555.45	\$263.14	\$1,211.39 tons
				nT24 minimum: 13 SEER(11.09										
D03-463	HVAC Residential	16 SEER (11.61 EER) Split System Air Conditioner	(36,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$549.55	\$827.41	\$277.86	\$235.95	\$1,063.36 tons
D03=403	II v AC Residential	System Air Conditioner	16 SEER (11.61 EER) Split	Conditioner	Contractor	RE1/ROB/NEW	103	Low	K	\$349.33	3027.41	3277.80	\$233.93	\$1,005.50 tons
				T24 minimum: 13 SEER(11.09										
D03-463	HVAC Residential	16 SEER (11.61 EER) Split System Air Conditioner	ton (42,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$517.07	\$755.23	\$238.16	\$202.24	\$957.48 tons
D03=403	II VAC Residentiai	System All Conditioner	16 SEER (11.61 EER) Split	Conditioner	Contractor	KE1/KOB/NEW	103	Low	K	\$517.07	\$133.23	\$236.10	\$202.24	3737.48 tons
				nT24 minimum: 13 SEER(11.09										
D03-463	HVAC Residential	16 SEER (11.61 EER) Split System Air Conditioner	(48,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$492.71	\$701.10	\$208.39	\$176.96	\$878.06 tons
D03=403	II v AC Residential	System Air Conditioner	16 SEER (11.61 EER) Split	Conditioner	Contractor	RE1/ROB/NEW	103	Low	K	3492.71	\$701.10	\$208.39	\$170.90	3878.00 tons
				nT24 minimum: 13 SEER(11.09										
D03-463	HVAC Residential	16 SEER (11.61 EER) Split System Air Conditioner	(60,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$458.60	\$625.32	\$166.71	\$141.57	\$766.89 tons
D03-403	HVAC Residential	System All Conditioner	17 SEER (12.28 EER) Split-	Conditioner	Contractor	KE1/KOB/NEW	1 05	Low	K	\$456.00	\$023.32	\$100.71	\$141.57	3700.69 tolls
				nT24 minimum: 13 SEER(11.09										
D03-464	HVAC Residential	17 SEER (12.28 EER) Split System Air Conditioner	- (24,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$663.23	\$1,218.95	\$555.71	\$353.93	\$1,572.87 tons
D03=404	II v AC Residential	System Air Conditioner	17 SEER (12.28 EER) Split-	Conditioner	Contractor	RE1/ROB/NEW	103	Low	K	\$003.23	\$1,210.93	3333.71	\$555.75	\$1,572.67 tons
		45 CDDD (45 50 DDD) C 1		T24 minimum: 13 SEER(11.09					THE MICH MIC					
D03-464	HVAC Residential	17 SEER (12.28 EER) Split System Air Conditioner	- ton (30,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$595.02	\$1,039.59	\$444.57	\$283.14	\$1,322.73 tons
203 101	111110 Residential	System 7 III Conditioner	17 SEER (12.28 EER) Split-	Conditioner	Contractor	REI/ROB/REW	100	Lo.		9575.02	Q1,007.07	\$111.07	Q200.11	91,322.73 10115
		45 CDDD (45 50 DDD) C 1		T24 minimum: 13 SEER(11.09					THE MICH MIC					
D03-464	HVAC Residential	17 SEER (12.28 EER) Split System Air Conditioner	- (36,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$549.55	\$920.03	\$370.47	\$235.95	\$1,155.98 tons
D03-404	11 V/1C Residential	System Air Conditioner	17 SEER (12.28 EER) Split-	Conditioner	Contractor	RET/ROB/INEW	103	Low	K	\$547.55	\$720.05	\$570.47	9233.73	\$1,155.76 tons
		45 CDDD (48 80 DDD) C 11		T24 minimum: 13 SEER(11.09					THE MICH MIC					
D03-464	HVAC Residential	17 SEER (12.28 EER) Split System Air Conditioner	- ton (42,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$517.07	\$834.62	\$317.55	\$202.24	\$1,036.86 tons
202 101	11 / TE RESIDENTIAL	Joseph File Conditioner	17 SEER (12.28 EER) Split-		- muucioi		100	2011		ψυ11.01	9031.02	4511.55		,
		17 CEED (12 20 EED) C 11		T24 minimum: 13 SEER(11.09					ELII I /INCD /INC					
D03-464	HVAC Residential	System Air Conditioner	- (48,000 Btu) condenser and matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$492.71	\$770.57	\$277.86	\$176.96	\$947.53 tons
			17 SEER (12.28 EER) Split-							*=	41174			
		17 CEED (12 20 EED) C-13	System Air Conditioner, 5 to (60,000 Btu) condenser and	T24 minimum: 13 SEER(11.09					FULL/INCR/INC					
D03-464	HVAC Residential	System Air Conditioner	matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R R	\$458.60	\$680.89	\$222.28	\$141.57	\$822.46 tons
			18 SEER (13.37 EER) Split-							******	******			
		10 CEED (12 27 EED) C-13		T24 minimum: 13 SEER(11.09					FULL/INCR/INC					
D03-465	HVAC Residential	System Air Conditioner	- (24,000 Btu) condenser and matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R R	\$663.23	\$1,357.87	\$694.64	\$353.93	\$1,711.80 tons
		2 22 22 22 22 22 22 22 22 22 22 22 22 2	18 SEER (13.37 EER) Split-					*		******				
		10 CEED (12 27 EED) C 11		T24 minimum: 13 SEER(11.09					ELII I /INCD /INC					
D03-465	HVAC Residential	System Air Conditioner	- ton (30,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$595.02	\$1,150.74	\$555.71	\$283.14	\$1.433.88 tons
			18 SEER (13.37 EER) Split-							******	,			. ,
		10 CEED (12 27 EED) C-13		T24 minimum: 13 SEER(11.09					ELIL L/INCD/INC					
D03-465	HVAC Residential	System Air Conditioner	- (36,000 Btu) condenser and matched cased coil	EER) Split System Air Conditioner	Contractor	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$549.55	\$1,012.64	\$463.09	\$235.95	\$1,248.59 tons
		-,								******	~-,	4.00.00		. ,

		18 SEER (13.37 EER) Split											
			T24 minimum: 13 SEER(11.09										
		18 SEER (13.37 EER) Split-ton (42,000 Btu) condenser	,					FULL/INCR/INC					
D03-465	HVAC Residential	System Air Conditioner and matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R R	\$517.07	\$914.01	\$396.94	\$202.24	\$1,116.25 tons
D03-403	II VAC Residentiai	18 SEER (13.37 EER) Split		Contractor	KE1/KOB/NEW	103	LOW	K	\$517.07	3914.01	3370.74	3202.24	\$1,110.25 tons
			on T24 minimum: 13 SEER(11.09										
		18 SEER (13.37 EER) Split-(48,000 Btu) condenser and						FULL/INCR/INC					
D03-465	HVAC Residential	System Air Conditioner matched cased coil	Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$492.71	\$840.03	\$347.32	\$176.96	\$1,016.99 tons
B03 103	11 11 TO INCOMENTAL	18 SEER (13.37 EER) Split		Contractor	RET/ROB/ITE	105	Lon-		ψ1,72.71	\$0.10.05	9317.32	\$170.50	91,010.55 10115
			on T24 minimum: 13 SEER(11.09										
		18 SEER (13.37 EER) Split-(60,000 Btu) condenser and						FULL/INCR/INC					
D03-465	HVAC Residential		Conditioner	Contractor	RET/ROB/NEW	Yes	Low	R	\$458.60	\$736.46	\$277.86	\$141.57	\$878.03 tons
		13 SEER (11.07 EER) / 8.1											
		13 SEER (11.07 EER) / 8.1 HSPF (3.28 COP) A/C Heat	10 SEER(8.7 EER)/6.8										
		HSPF (3.28 COP) A/C Heat pump, 2 ton (24,000 Btu) he	eatHSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-414	HVAC Residential	pump pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$419.48	\$775.78	\$356.30	\$604.18	\$1,379.96 tons
-		13 SEER (11.07 EER) / 8.1											
		13 SEER (11.07 EER) / 8.1 HSPF (3.28 COP) A/C Heat											
		HSPF (3.28 COP) A/C Heat pump. 3 ton (36,000 Btu) he						FULL/INCR/INC					
D03-414	HVAC Residential	pump pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$363.18	\$630.84	\$267.66	\$402.78	\$1,033.63 tons
		13 SEER (11.07 EER) / 8.1											
		13 SEER (11.07 EER) / 8.1 HSPF (3.28 COP) A/C Heat											
		HSPF (3.28 COP) A/C Heat pump, 4 ton (48,000 Btu) he						FULL/INCR/INC					
D03-414	HVAC Residential	pump pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$335.04	\$558.38	\$223.34	\$302.09	\$860.46 tons
		13 SEER (11.07 EER) / 8.1											
		13 SEER (11.07 EER) / 8.1 HSPF (3.28 COP) A/C Hear											
202 111		HSPF (3.28 COP) A/C Heat pump, 5 ton (60,000 Btu) he			n rom n on a row.			FULL/INCR/INC		0.54.4.00	0406 ##		
D03-414	HVAC Residential	pump pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$318.15	\$514.90	\$196.75	\$241.67	\$756.57 tons
		14 SEER (12.19 EER) / 8.6	10 CEED (0.7 EED) (6.0										
		14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Hear						ELILL /INCD /INC					
D02 415	III/ACD II (II	HSPF (3.52 COP) A/C Heat Pump, 2 ton (24,000 Btu)	HSPF(3.0 COP) Split-System		DET/DODAIEW	**	*	FULL/INCR/INC	6410.40	600424	6404.76	0.004.10	61 500 41 .
D03-415	HVAC Residential	Pump heat pump 14 SEER (12.19 EER) / 8.6	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$419.48	\$904.24	\$484.76	\$604.18	\$1,508.41 tons
		14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat	10 CEED/0 7 EED)/6 0										
		HSPF (3.52 COP) A/C Heat Pump, 3 ton (36,000 Btu)						FULL/INCR/INC					
D03-415	HVAC Residential	Pump heat pump	HSPF(3.0 COP) Split-System Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$363.18	\$728.78	\$365.60	\$402.78	\$1,131.56 tons
D03-413	n vac residentiai	14 SEER (12.19 EER) / 8.6	пеас гишр	Contractor	KE I/KUD/INE W	1 05	LOW	K	\$303.16	\$120.10	\$303.00	\$402.78	\$1,131.30 tons
		14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat	10 SEER(8 7 EER)/6 8										
		HSPF (3.52 COP) A/C Heat Pump, 4 ton (48,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-415	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$335.04	\$641.05	\$306.01	\$302.09	\$943.14 tons
D03-413	11 vite residential	14 SEER (12.19 EER) / 8.6	ricat i amp	Contractor	RE1/ROB/ITEW	103	LOW	K	Ψ.Ο.Ο.Τ	\$041.05	\$500.01	\$302.07	3743.14 tons
		14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat	10 SEER(8.7 EER)/6.8										
		HSPF (3.52 COP) A/C Heat Pump, 5 ton (60,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-415	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$318.15	\$588.41	\$270.26	\$241.67	\$830.08 tons
		15 SEER (12.70 EER) / 8.8									•		
		15 SEER (12.70 EER) / 8.8 HSPF (3.74 COP) A/C Heat	10 SEER(8.7 EER)/6.8										
		HSPF (3.74 COP) A/C Heat Pump, 2 ton (24,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-416	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$419.48	\$1,032.70	\$613.22	\$604.18	\$1,636.87 tons
		15 SEER (12.70 EER) / 8.8	•										
		15 SEER (12.70 EER) / 8.8 HSPF (3.74 COP) A/C Hear	10 SEER(8.7 EER)/6.8										
		HSPF (3.74 COP) A/C Heat Pump, 3 ton (36,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-416	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$363.18	\$826.72	\$463.53	\$402.78	\$1,229.50 tons
		15 SEER (12.70 EER) / 8.8											
		15 SEER (12.70 EER) / 8.8 HSPF (3.74 COP) A/C Heat											
		HSPF (3.74 COP) A/C Heat Pump, 4 ton (48,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-416	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$335.04	\$723.73	\$388.69	\$302.09	\$1,025.81 tons
		15 SEER (12.70 EER) / 8.8			<del></del>			<del></del>		<del></del>			
		15 SEER (12.70 EER) / 8.8 HSPF (3.74 COP) A/C Heat											
		HSPF (3.74 COP) A/C Heat Pump, 5 ton (60,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-416	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$318.15	\$661.93	\$343.78	\$241.67	\$903.60 tons
		16 SEER (12.06 EER) / 8.4											
		16 SEER (12.06 EER) / 8.4 HSPF (3.48 COP) A/C Heat											
		HSPF (3.48 COP) A/C Heat Pump, 2 ton (24,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-466	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$419.48	\$1,161.15	\$741.68	\$604.18	\$1,765.33 tons
		16 SEER (12.06 EER) / 8.4			<del></del>			<del></del>		<del></del>			
		16 SEER (12.06 EER) / 8.4 HSPF (3.48 COP) A/C Heat											
		HSPF (3.48 COP) A/C Heat Pump, 3 ton (36,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-466	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$363.18	\$924.65	\$561.47	\$402.78	\$1,327.44 tons

		16 SEER (12.06 EER) / 8.4											
		16 SEER (12.06 EER) / 8.4 HSPF (3.48 COP) A/C Heat	10 SEER(8.7 EER)/6.8										
		HSPF (3.48 COP) A/C Heat Pump, 4 ton (48,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-466	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$335.04	\$806.40	\$471.36	\$302.09	\$1,108.49 tons
		16 SEER (12.06 EER) / 8.4											
		16 SEER (12.06 EER) / 8.4 HSPF (3.48 COP) A/C Heat											
		HSPF (3.48 COP) A/C Heat Pump, 5 ton (60,000 Btu)	HSPF(3.0 COP) Split-System	_				FULL/INCR/INC					
D03-466	HVAC Residential	Pump heat pump 17 SEER (12.52 EER) / 8.6	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$318.15	\$735.45	\$417.30	\$241.67	\$977.12 tons
		17 SEER (12.52 EER) / 8.6 HSPF (3.26 COP) A/C Heat	10 SEED/9 7 EED)/6 9										
		HSPF (3.26 COP) A/C Heat Pump, 2 ton (24,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-467	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$419.48	\$1,289.61	\$870.13	\$604.18	\$1,893.79 tons
		17 SEER (12.52 EER) / 8.6							4.1.7.1.0	4.,			4.1,0.011.
		17 SEER (12.52 EER) / 8.6 HSPF (3.26 COP) A/C Heat	10 SEER(8.7 EER)/6.8										
		HSPF (3.26 COP) A/C Heat Pump, 3 ton (36,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-467	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$363.18	\$1,022.59	\$659.40	\$402.78	\$1,425.37 tons
		17 SEER (12.52 EER) / 8.6	40 0000 (0 5 000) (6 0										
		17 SEER (12.52 EER) / 8.6 HSPF (3.26 COP) A/C Heat						FILL I WICD WIC					
D03-467	HVAC Residential	HSPF (3.26 COP) A/C Heat Pump, 4 ton (48,000 Btu)	HSPF(3.0 COP) Split-System		DET/DODAIEW	**		FULL/INCR/INC R	6225.04	6000.00	\$554.04	6202.00	01 101 16 (
D03-407	n vac kesidelitiai	Pump heat pump 17 SEER (12.52 EER) / 8.6	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	K	\$335.04	\$889.08	\$334.04	\$302.09	\$1,191.16 tons
		17 SEER (12.52 EER) / 8.6 HSPF (3.26 COP) A/C Heat	10 SEER(8.7 EER)/6.8										
		HSPF (3.26 COP) A/C Heat Pump, 5 ton (60,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-467	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$318.15	\$808.97	\$490.82	\$241.67	\$1,050.64 tons
		18 SEER (12.88 EER) / 8.5	-										
		18 SEER (12.8 EER) / 9.2 HSPF (3.32 COP) A/C Heat											
		HSPF (3.66 COP) A/C Heat Pump, 2 ton (24,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-417	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$419.48	\$1,418.07	\$998.59	\$604.18	\$2,022.25 tons
		18 SEER (12.88 EER) / 8.5 18 SEER (12.8 EER) / 9.2 HSPF (3.32 COP) A/C Heat	10 SEED/9 7 EED/6 9										
		HSPF (3.66 COP) A/C Heat Pump, 3 ton (36,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-417	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$363.18	\$1,120.52	\$757.34	\$402.78	\$1,523.31 tons
D03=417	TIVAC Residential	18 SEER (12.88 EER) / 8.5	ricat i ump	Contractor	KE1/KOD/NEW	103	Low	K	3303.16	\$1,120.32	3737.34	3402.76	\$1,323.31 tons
		18 SEER (12.8 EER) / 9.2 HSPF (3.32 COP) A/C Heat	10 SEER(8.7 EER)/6.8										
		HSPF (3.66 COP) A/C Heat Pump, 4 ton (48,000 Btu)	HSPF(3.0 COP) Split-System					FULL/INCR/INC					
D03-417	HVAC Residential	Pump heat pump	Heat Pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$335.04	\$971.75	\$636.71	\$302.09	\$1,273.84 tons
		18 SEER (12.88 EER) / 8.5											
		18 SEER (12.8 EER) / 9.2 HSPF (3.32 COP) A/C Heat						FILL I WICD WIC					
D02 417	HVAC Desidential	HSPF (3.66 COP) A/C Heat Pump, 5 ton (60,000 Btu)	HSPF(3.0 COP) Split-System	Control	RET/ROB/NEW	V	T	FULL/INCR/INC R	6210.15	\$882.49	\$564.34	\$241.67	61 124 16 4
D03-417	HVAC Residential	Pump heat pump 13 SEER (11.07 EER) / 8.1	Heat Pump	Contractor	KE1/KOB/NEW	Yes	Low	K	\$318.15	\$882.49	\$304.34	\$241.07	\$1,124.16 tons
		13 SEER (11.07 EER) / 8.1 HSPF (3.28 COP) A/C Heat	T24 minimum: 13 SEER(11.07										
		HSPF (3.28 COP) A/C Heat pump. 3 ton (36,000 Btu) he						FULL/INCR/INC					
D03-414	HVAC Residential	pump pump	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$630.84	\$630.84 \$	-	\$235.95	\$866.79 tons
		14 SEER (12.19 EER) / 8.6											
		14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat											
		HSPF (3.52 COP) A/C Heat Pump, 2 ton (24,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-415	HVAC Residential	Pump heat pump	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$775.78	\$904.24	\$128.46	\$353.93	\$1,258.16 tons
		14 SEER (12.19 EER) / 8.6 14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat	T24 minimum: 13 SEER(11 07										
		HSPF (3.52 COP) A/C Heat Pump, 3 ton (36,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-415	HVAC Residential	Pump heat pump	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$630.84	\$728.78	\$97.94	\$235.95	\$964.73 tons
		14 SEER (12.19 EER) / 8.6	Family		A Market Street Co. and 11				******			. ======	
		14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat	T24 minimum: 13 SEER(11.07										
		HSPF (3.52 COP) A/C Heat Pump, 4 ton (48,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-415	HVAC Residential	Pump heat pump	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$558.38	\$641.05	\$82.67	\$176.96	\$818.01 tons
		14 SEER (12.19 EER) / 8.6	T24										
		14 SEER (12.19 EER) / 8.6 HSPF (3.52 COP) A/C Heat HSPF (3.52 COP) A/C Heat Pump, 5 ton (60,000 Btu)	124 minimum: 13 SEER(11.0/ EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-415	HVAC Residential	Pump heat pump	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R R	\$514.90	\$588.41	\$73.52	\$141.57	\$729.98 tons
1005-415	11 + AC Residelitial	15 SEER (12.70 EER) / 8.8	rreat pump	Contractor	KEI/KOD/NEW	1 05	LOW	IX.	\$J14.7U	3300.41	913.32	ψ1*1.J/	φ147.70 t0HS
		15 SEER (12.70 EER) / 8.8 HSPF (3.74 COP) A/C Heat	T24 minimum: 13 SEER(11.07										
		HSPF (3.74 COP) A/C Heat Pump, 2 ton (24,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-416	HVAC Residential	Pump heat pump	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$775.78	\$1,032.70	\$256.92	\$353.93	\$1,386.62 tons
<u></u>		15 SEER (12.70 EER) / 8.8						<u></u>		<u> </u>			
		15 SEER (12.70 EER) / 8.8 HSPF (3.74 COP) A/C Heat	,					mm - m					
D02 416	INVACE II II	HSPF (3.74 COP) A/C Heat Pump, 3 ton (36,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C		DETERODATE:	**		FULL/INCR/INC	6620.04	6026 72	6105.65	6225.05	61.062.67
D03-416	HVAC Residential	Pump heat pump	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$630.84	\$826.72	\$195.87	\$235.95	\$1,062.67 tons

# Appendix B: Measure Cost Data

		44.0000	(14 H) EED) (0.0											
			(12.70 EER) / 8.8											
		15 SEER (12.70 EER) / 8.8 HSPF (3.7		T24 minimum: 13 SEER(11.07										
		HSPF (3.74 COP) A/C Heat Pump, 4 to	ton (48,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-416	HVAC Residential	Pump heat pump	p	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$558.38	\$723.73	\$165.35	\$176.96	\$900.69 tons
		15 SEER (	(12.70 EER) / 8.8											
		15 SEER (12.70 EER) / 8.8 HSPF (3.7	74 COP) A/C Heat	T24 minimum: 13 SEER(11.07										
		HSPF (3.74 COP) A/C Heat Pump, 5 to	ton (60,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-416	HVAC Residential	Pump heat pump		Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$514.90	\$661.93	\$147.04	\$141.57	\$803.50 tons
•		16 SEER (	(12.06 EER) / 8.4	• •										
		16 SEER (12.06 EER) / 8.4 HSPF (3.4	48 COP) A/C Heat	T24 minimum: 13 SEER(11.07										
		HSPF (3.48 COP) A/C Heat Pump, 2 to	ton (24,000 Btu)	EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-466	HVAC Residential	Pump heat pump		Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$775.78	\$1,161.15	\$385.37	\$353.93	\$1.515.08 tons
			(12.06 EER) / 8.4	,							**,******		400000	4.,6.44.00
		16 SEER (12.06 EER) / 8.4 HSPF (3.4	48 COP) A/C Heat	T24 minimum: 13 SEER(11.07										
		HSPF (3.48 COP) A/C Heat Pump, 3 to		EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-466	HVAC Residential	Pump heat pump		Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$630.84	\$924.65	\$293.81	\$235.95	\$1,160.60 tons
			(12.06 EER) / 8.4	Table Parish							**=****			71,100100
		16 SEER (12.06 EER) / 8.4 HSPF (3.4	48 COP) A/C Heat	T24 minimum: 13 SEER(11.07										
		HSPF (3.48 COP) A/C Heat Pump, 4 to		EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-466	HVAC Residential	Pump heat pump		Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$558.38	\$806.40	\$248.02	\$176.96	\$983.36 tons
B03 100	11 11 10 Iteolaemiai		(12.06 EER) / 8.4	reat pump	Contractor	RE1/ROB/NEW	103	Low	K	\$550.50	\$600.40	\$240.02	\$170.70	3703.30 tons
		16 SEER (12.06 EER) / 8.4 HSPF (3.4		T24 minimum: 13 SEER(11.07										
		HSPF (3.48 COP) A/C Heat Pump, 5 to		EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-466	HVAC Residential	Pump heat pump		Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$514.90	\$735.45	\$220.56	\$141.57	\$877.02 tons
D03=400	II VAC Residential		(12.52 EER) / 8.6	ricat pump	Contractor	KE1/KOB/NEW	103	Low	K	3314.90	3/33.43	3220.50	3141.37	3077.02 10115
		17 SEER (12.52 EER) / 8.6 HSPF (3.2		T24 minimum: 13 SEER(11.07										
		HSPF (3.26 COP) A/C Heat Pump, 2 to		EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-467	HVAC Residential	Pump heat pump		Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$775.78	\$1,289.61	\$513.83	\$353.93	\$1,643.54 tons
D03=407	II VAC Residential		(12.52 EER) / 8.6	ricat pump	Contractor	KE1/KOB/NEW	103	Low	K	\$115.16	\$1,209.01	\$313.63	\$333.93	31,043.34 tons
		17 SEER (12.52 EER) / 8.6 HSPF (3.2		T24 minimum: 13 SEER(11.07										
		HSPF (3.26 COP) A/C Heat Pump, 3 to		EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-467	HVAC Residential	Pump heat pump		Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$630.84	\$1,022.59	\$391.74	\$235.95	\$1,258.54 tons
D05-407	HVAC Kesidelitiai		(12.52 EER) / 8.6	rieat pullip	Contractor	KE1/KOD/NEW	1 05	LOW	K	\$030.64	\$1,022.39	\$391.74	\$233.93	\$1,236.34 10118
		17 SEER (12.52 EER) / 8.6 HSPF (3.2		T24 minimum: 13 SEER(11.07										
		HSPF (3.26 COP) A/C Heat Pump, 4 to		EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D03-467	HVAC Residential	Pump heat pump		Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R R	\$558.38	\$889.08	\$330.70	\$176.96	\$1.066.04 tons
D03-407	HVAC Kesidelitiai		(12.52 EER) / 8.6	ricat pump	Contractor	KE I/KOD/NE W	1 05	Low	K	\$330.30	3009.00	\$550.70	\$170.90	\$1,000.04 tons
		17 SEER (12.52 EER) / 8.6 HSPF (3.2		T24 minimum: 13 SEER(11.07										
		HSPF (3.26 COP) A/C Heat Pump, 5 to		EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D02 467	III/ACD CL CL					DET/DODAIEW	37			0514.00	6000.07	6204.07	6141.57	6050.54
D03-467	HVAC Residential	Pump heat pump	(12.88 EER) / 8.5	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$514.90	\$808.97	\$294.07	\$141.57	\$950.54 tons
		18 SEER (12.8 EER) / 9.2 HSPF (3.3	, ,	T24 minimum: 13 SEER(11 07										
		HSPF (3.66 COP) A/C Heat Pump, 2 to		EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D02 417	HVAC Desidential				Ctt	DET/DODAIEW	V	T	R R	6775 70	61 410 07	6642.20	6252.02	61 772 00 +
D03-417	HVAC Residential	Pump heat pump	(12.88 EER) / 8.5	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	K	\$775.78	\$1,418.07	\$642.29	\$353.93	\$1,772.00 tons
				T24 minimum: 12 SEED(11 07										
		18 SEER (12.8 EER) / 9.2 HSPF (3.3 HSPF (3.66 COP) A/C Heat Pump, 3 to		T24 minimum: 13 SEER(11.07 EER)/8.1 HSPF(3.28 COP) A/C					FULL/INCR/INC					
D02 417	HVAC Desidential			, , , , , ,	Ctt	DET/DODAIEW	V	T		6(20.04	61 120 52	6400.60	6225.05	01 256 47 +
D03-417	HVAC Residential	Pump heat pump		Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$630.84	\$1,120.52	\$489.68	\$235.95	\$1,356.47 tons
		18 SEER (12.8 EER) / 9.2 HSPF (3.3	(12.88 EER) / 8.5	T24 minimum: 13 SEER(11.07										
									ELII I MICH MIC					
D02 417	IIII CD II II	HSPF (3.66 COP) A/C Heat Pump, 4 to		EER)/8.1 HSPF(3.28 COP) A/C	<b>a</b>	DET TO OD A IET	37		FULL/INCR/INC	0550.20	6071 75	6412.25	6176.06	01 140 71 .
D03-417	HVAC Residential	Pump heat pump	p (12.88 EER) / 8.5	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$558.38	\$971.75	\$413.37	\$176.96	\$1,148.71 tons
				T24 :: 12 CEED ::: 07										
		18 SEER (12.8 EER) / 9.2 HSPF (3.3		T24 minimum: 13 SEER(11.07					ELIL I TOLON TOLO					
D.02.44#		HSPF (3.66 COP) A/C Heat Pump, 5 to		EER)/8.1 HSPF(3.28 COP) A/C		nemmon a re			FULL/INCR/INC	0.514.00	0000 10			04.004.00
D03-417	HVAC Residential	Pump heat pump	p	Heat pump	Contractor	RET/ROB/NEW	Yes	Low	R	\$514.90	\$882.49	\$367.59	\$141.57	\$1,024.06 tons

HVAC	DECIDENTIAL	WHOLE HOUSE FANS

HVAC - RESII	DENTIAL - WHOL	E HOUSE FANS												
					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost	Installed Cost Cost Unit
			Whole House Fan (CFM											
D03-441	HVAC Residential	Whole House Fans	<4000)	No Night Ventilation/Economi	zerretail	RET/NEW	No	low	FULL/FULL	\$0.00	\$450.91	\$0.00	\$244.12	\$695.03 Fan
			Whole House Fan (CFM											
D03-441	HVAC Residential	Whole House Fans	4000-6000)	No Night Ventilation/Economi	zerretail	RET/NEW	No	low	FULL/FULL	\$0.00	\$243.17	\$0.00	\$269.72	\$512.89 Fan
			Whole House Fan (CFM											
D03-441	HVAC Residential	Whole House Fans	6000-8000)	No Night Ventilation/Economi	zerretail	RET/NEW	No	low	FULL/FULL	\$0.00	\$400.56	\$0.00	\$295.32	\$695.88 Fan
			Whole House Fan (CFM											
D03-441	HVAC Residential	Whole House Fans	>8000)	No Night Ventilation/Economi	zerretail	RET/NEW	No	low	FULL/FULL	\$0.00	\$409.65	\$0.00	\$320.92	\$730.57 Fan
INSULATION														
INSULATION					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	C-4	Measure Name			•									
	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost	Installed Cost Cost Unit
wicasure ID	Category	Measure Name	Measure Description	Base Description	Channel Retail/Contract	Application et	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost	Installed Cost Cost Unit
	Insulation	Ceiling R-19 Insulation	Measure Description Ceiling R-19 Insulation	R-0 Ceiling Insulation			Star?	Volume High	FULL	\$0.00	Equipment Cost \$0.38	Equipment Cost		Installed Cost Cost Unit \$0.62 SqFt
			•	•	Retail/Contrac	RET	2			2	4-1	1.1		
D03-419		Ceiling R-19 Insulation	Ceiling R-19 Insulation	•	Retail/Contractor	RET	2			2	4-1	1.1	\$0.24	\$0.62 SqFt
D03-419	Insulation	Ceiling R-19 Insulation Ceiling R-0 to R-30	Ceiling R-19 Insulation Ceiling R-0 to R-30	R-0 Ceiling Insulation	Retail/Contractor Retail/Contractor	et RET et RET	No	High	FULL	\$0.00	\$0.38	\$0.00	\$0.24	\$0.62 SqFt
D03-419 D03-420	Insulation	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts	R-0 Ceiling Insulation	Retail/Contractor  Retail/Contractor	et RET et RET	No	High	FULL	\$0.00	\$0.38	\$0.00	\$0.24 \$0.19	\$0.62 SqFt \$0.76 SqFt
D03-419 D03-420	Insulation Insulation	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38	R-0 Ceiling Insulation R-0 Ceiling Insulation	Retail/Contractor Retail/Contractor Retail/Contractor	et RET et RET et RET et RET	No No	High High	FULL	\$0.00	\$0.38 \$0.56	\$0.00	\$0.24 \$0.19	\$0.62 SqFt \$0.76 SqFt
D03-419 D03-420 D03-421	Insulation Insulation	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38 Insulation-Batts	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38 Insulation-Batts	R-0 Ceiling Insulation R-0 Ceiling Insulation	Retail/Contractor Retail/Contractor Retail/Contractor	et RET et RET et RET et RET	No No	High High	FULL	\$0.00	\$0.38 \$0.56	\$0.00	\$0.24 \$0.19 \$0.16	\$0.62 SqFt \$0.76 SqFt \$0.86 SqFt
D03-419 D03-420 D03-421	Insulation Insulation Insulation	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38 Insulation-Batts Ceiling Vintage to R-30	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38 Insulation-Batts Ceiling Vintage to R-30	R-0 Ceiling Insulation R-0 Ceiling Insulation R-0 Ceiling Insulation	Retail/Contractor Retail/Contractor Retail/Contractor Retail/Contractor	RET  RET  RET  RET  RET  RET  RET/NEW	No No	High High High	FULL FULL FULL	\$0.00 \$0.00 \$0.00	\$0.38 \$0.56 \$0.70	\$0.00 \$0.00	\$0.24 \$0.19 \$0.16	\$0.62 SqFt \$0.76 SqFt \$0.86 SqFt
D03-419 D03-420 D03-421 D03-422	Insulation Insulation Insulation	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38 Insulation-Batts Ceiling Vintage to R-30 Insulation-Batts	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38 Insulation-Batts Ceiling Vintage to R-30 Insulation-Batts	R-0 Ceiling Insulation R-0 Ceiling Insulation R-0 Ceiling Insulation	Retail/Contractor Retail/Contractor Retail/Contractor Retail/Contractor Retail/Contractor	RET  RET  RET  RET  RET  RET  RET/NEW	No No	High High High	FULL FULL FULL	\$0.00 \$0.00 \$0.00	\$0.38 \$0.56 \$0.70	\$0.00 \$0.00	\$0.24 \$0.19 \$0.16 \$0.19	\$0.62 SqFt \$0.76 SqFt \$0.86 SqFt \$0.76 SqFt
D03-419 D03-420 D03-421 D03-422	Insulation Insulation Insulation	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38 Insulation-Batts Ceiling Vintage to R-30 Insulation-Batts Ceiling Vintage to R-38	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38 Insulation-Batts Ceiling Vintage to R-30 Insulation-Batts Ceiling Vintage to R-38	R-0 Ceiling Insulation  R-0 Ceiling Insulation  R-0 Ceiling Insulation  R-10 Ceiling Insulation	Retail/Contractor Retail/Contractor Retail/Contractor Retail/Contractor Retail/Contractor Retail/Contractor	RET  RET  RET  RET  RET  RET/NEW  RET/NEW	No No No	High High High	FULL FULL FULL FULL/INCR	\$0.00 \$0.00 \$0.00 \$0.38	\$0.38 \$0.56 \$0.70 \$0.56	\$0.00 \$0.00 \$0.00	\$0.24 \$0.19 \$0.16 \$0.19	\$0.62 SqFt \$0.76 SqFt \$0.86 SqFt \$0.76 SqFt
D03-419 D03-420 D03-421 D03-422 D03-423	Insulation Insulation Insulation	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38 Insulation-Batts Ceiling Vintage to R-30 Insulation-Batts Ceiling Vintage to R-38 Insulation-Batts	Ceiling R-19 Insulation Ceiling R-0 to R-30 Insulation-Batts Ceiling R-0 to R-38 Insulation-Batts Ceiling Vintage to R-30 Insulation-Batts Ceiling Vintage to R-38 Insulation-Batts	R-0 Ceiling Insulation  R-0 Ceiling Insulation  R-0 Ceiling Insulation  R-10 Ceiling Insulation	Retail/Contractor Retail/Contractor Retail/Contractor Retail/Contractor Retail/Contractor Retail/Contractor	RET ALL RET/NEW	No No No	High High High	FULL FULL FULL FULL/INCR	\$0.00 \$0.00 \$0.00 \$0.38	\$0.38 \$0.56 \$0.70 \$0.56	\$0.00 \$0.00 \$0.00	\$0.24 \$0.19 \$0.16 \$0.19	\$0.62 SqFt  \$0.76 SqFt  \$0.86 SqFt  \$0.76 SqFt  \$0.76 SqFt

Retail/Contract

RET

RET/NEW

RET/NEW

RET/NEW

RET/NEW

RET/NEW

RET/NEW

		Wall 2x4 R-15 Insulation-	Wall 2x4 R-15 Insulation-	
D03-429	Insulation	Batts	Batts	2x4 Wall w/R-13 Insulation
		Wall 2x6 R-19 Insulation-	Wall 2x6 R-19 Insulation-	
D03-430	Insulation	Batts	Batts	2x4 Wall w/R-13 Insulation
		Wall 2x6 R-21 Insulation-	Wall 2x6 R-21 Insulation-	
D03-431	Insulation	Batts	Batts	2x4 Wall w/R-13 Insulation
		Wall 2x6 R-19 Insulation-	Wall 2x6 R-19 Insulation-	
D03-432	Insulation	Batts	Batts	2x4 Wall w/R-15 Insulation
		Wall 2x6 R-21 Insulation-	Wall 2x6 R-21 Insulation-	

Floor R-0 to R-19 Insulation Floor R-0 to R-19 Insulation

Floor R-0 to R-30 Insulation Floor R-0 to R-30 Insulation

Batts

Batts

Batts

Batts

level

2005 levels

Wall 2x6 R-21 Insulation- Wall 2x6 R-21 Insulation-

Floor R-13 Insulation-Batts Floor R-13 Insulation-Batts R-0 Floor Insulation

Floor R-19 to R-30 Insulation

vintages increased to 'new'

Floor insulation raised to

R-0 Floor Insulation

R-0 Floor Insulation

R-19 Floor Insulation

2x4 Wall w/R-15 Insulation

and climate zone

T24 minimum floor insulation

Ceiling R-value based on vintage Retail/Contract

Batts	Batts	2x6 Wall w/R-19 Insulation	or	RET/NEW	No	High	FULL/INCR	\$0.38	\$0.41	\$0.03	\$0.27	\$0.68 SqFt
Wall 2x4 R-13 Batts + R	-5 Wall 2x4 R-13 Batts + R-5		Retail/Co	ntract								
Rigid	Rigid	2x4 Wall w/R-13 Insulation	or	RET/NEW	No	High	FULL/INCR	\$0.27	\$0.72	\$0.45	\$0.65	\$1.37 SqFt
Wall 2x6 R-19 Batts + R	-5 Wall 2x6 R-19 Batts + R-5		Retail/Co	ntract								
Rigid	Rigid	2x6 Wall w/R-19 Insulation	or	RET/NEW	No	High	FULL/INCR	\$0.38	\$0.82	\$0.45	\$0.74	\$1.56 SqFt
Wall 2x6 R-21 Batts + R	-5 Wall 2x6 R-21 Batts + R-5		Retail/Co	ntract								
Rigid	Rigid	2x6 Wall w/R-21 Insulation	or	RET/NEW	No	High	FULL/INCR	\$0.41	\$0.86	\$0.45	\$0.98	\$1.84 SqFt
Wall Blow-In R-13			Retail/Co	ntract								
Insulation	Wall Blow-In R-13 Insulat	ion 2x4 Wall w/out Insulation	or	RET	No	High	FULL	\$0.00	\$0.15	\$0.00	\$1.17	\$1.32 SqFt
Older building ceiling/ro	of Ceiling R-value for oldest											

FULL

FULL

FULL

FULL/INCR

FULL/INCR

FULL/INCR

FULL/INCR

FULL/INCR

FULL/INCR

FULL

FULL

High

No

No

No

No

\$0.27

\$0.38

\$0.56

\$0.56

\$0.31

\$0.38

\$0.41

\$0.38

\$0.41

\$376.23

\$0.27

\$0.00

\$0.00

\$0.00

\$0.19

\$0.03

\$0.10

\$0.14

\$0.07

\$0.10

\$0.00

\$0.00

\$0.42

\$0.51

\$0.78

\$0.78

\$0.30

\$0.27

\$0.28

\$0.27

\$239.83

\$0.42

\$0.69 SqFt

\$0.89 SqFt

\$1.34 SqFt

\$1.34 SqFt

\$0.61 SqFt

\$0.65 SqFt

\$0.68 SqFt

\$0.65 SqFt

\$0.68 SaFt

\$616.06 1000 SqFt

\$0.69 SqFt

\$0.00

\$0.00

\$0.00

\$0.38

\$0.27

\$0.27

\$0.27

\$0.31

\$0.31

\$0.00

\$0.00

## Insulation INSULATION - DUCT INSULATION

D03-425

D03-426

D03-427

D03-428

D03-433

D03-434

D03-435

D03-436

D03-437

D03-438

D03-013

D03-123

Insulation

Batts

Batts

Batts

insulation up to current

standards

Floor Insulation

Floor R-19 to R-30

Insulation-Batts

					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental			
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor	r Cost Installed	Cost Cost Unit
			Old vintage increases duct												
		Increased duct insulation in	n insulation to R-4.2, 78-91	Duct insulation level a function	oi										
D03-075	Duct Insulation	older vintages	vintage to R-8	Vintage/System type	Retail	RET	No	Low	FULL	\$0.0	0 \$0.0	i8 \$0	0.00	\$2.40	\$3.08 SqFt

INSULATIO	N - TANK WRAP														
Measure ID	Category	Measure Name	Measure Description	Base Description	Delivery Channel	Application	Energy Star?	Purchase Volume	Cost Basis	Base Equipment Cost	Measure Equipment Cost	Incremental Equipment Cost	Labor Cost	Installed Cost	Cost Unit
Measure ID	Category		•	•	Chamie	Application	Star:	voiume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost	Histalieu Cost	Cost Cint
D03-014	DHW	Insulation added to poorly insulated DHW tanks		Approximately R-6 tank e insulation, based on tank size	Retail	RET/NEW	No	Low	FULL/INCR	\$16.10	\$28.92	\$12.8	\$45.29	\$74.21	Tank
		ilisulated DITW talks	insulation, based on tank siz	e misulation, based on tank size	Retail	KE1/NEW	140	Low	TOLL/INCK	\$10.10	320.72	312.0	343.29	3/4.21	Talik
LIGHTING -	BALLASTS				Delivery		Energy	Purchase		Base Equipment	Measure	Incremental			
Measure ID	Category	Measure Name	Measure Description Four ft. 2 lamp fixture, balla	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost		Equipment Cost	Labor Cost	Installed Cost	Cost Unit
D02 052	LTC	Premium T8 El Ballast	factor of less than or equal to 0.77	T8 32W El Ballast	Retail/Contrac	et ROB/NEW	No	T	INCR/INCR	\$19.23	622.42	64.14	\$0.00	60.00	Fixture
D03-852	LTG	Premium 18 El Ballast	Four ft. 2 lamp fixture, balla		or	KOB/NEW	NO	Low	INCR/INCR	\$19.23	\$23.42	\$4.19	\$0.00	\$0.00	rixture
D03-852	LTC	D TO EI D. II	factor of less than or equal to 0.77	T8 32W El Ballast	Retail/Contrac	et ROB/NEW	No	TT: -b	INCR/INCR	\$15.54	\$18.93	\$3.39	\$0.00	60.00	Fixture
D03-852	LTG	Premium T8 El Ballast T8 32W Dimming El	0.77	18 32W EI Ballast	Of	KOB/NEW	NO	High	INCR/INCR	\$13.34	\$18.93	\$3.3	\$0.00	\$0.00	rixture
D03-853	LTG	Ballast	Four ft. 2 lamp fixture	T12 34W Mag ES Ballast	Contractor	RET/NEW	No	Low	FULL/INCR	\$16.54	\$72.89	\$56.34	\$16.96	\$89.85	Fixture
D03-853	LTG	T8 32W Dimming El Ballast	Four ft. 2 lamp fixture	T12 34W Mag ES Ballast	Contractor	RET/NEW	No	High	FULL/INCR	\$13.96	\$61.49	\$47.53	\$16.96	\$78.45	Fixture
LIGHTING	TAMBE		•					-							
LIGHTING	LAMIS				Delivery		Energy	Purchase		Base Equipment	Measure	Incremental			
Measure ID	Category	Measure Name	Measure Description 7-13 Watt < 800 Lumens -	Base Description	Channel Retail/Contrac	Application	Star?	Volume	Cost Basis FULL/INCR/INC	Cost	<b>Equipment Cost</b>	<b>Equipment Cost</b>	Labor Cost	Installed Cost	Cost Unit
D03-801	LTG	7-13 Watt integral CFL	screw-in	40W Incandescent	or	RET/ROB/NEW	Yes	Low	R R	\$0.57	\$4.98	\$4.40	\$3.77	\$8.18	Lamp
D03-801	LTG	7 12 W-# internal CEI	7-13 Watt < 800 Lumens -	40W/ I	Retail/Contrac		V	TT: -b	FULL/INCR/INC	\$0.57	\$4.17	62.7	62.77	67.27	T
D03-801	LIG	7-13 Watt integral CFL	screw-in 13 Watt ≥800 Lumens -	40W Incandescent	or Retail/Contrac	RET/ROB/NEW	Yes	High	FULL/INCR/INC		\$4.17	\$3.60	\$3.77	\$7.37	Lamp
D03-802	LTG	13 Watt integral CFL	screw-in	60W Incandescent	or D-t-:1/Ct	RET/ROB/NEW	Yes	Low	R FULL/INCR/INC	\$0.61	\$4.87	\$4.20	\$3.77	\$8.04	Lamp
D03-802	LTG	13 Watt integral CFL	13 Watt ≥800 Lumens - screw-in	60W Incandescent	Retail/Contrac or	RET/ROB/NEW	Yes	High	R R	\$0.61	\$4.08	\$3.4	7 \$3.77	\$7.25	Lamp
D03-803	LTC		14 W/		Retail/Contrac		V		FULL/INCR/INC	\$0.61	65.25	\$4.64	62.77	60.41	T
D03-803	LTG	14 Watt integral CFL	14 Watt - screw-in	60W Incandescent	or Retail/Contrac	RET/ROB/NEW	Yes	Low	FULL/INCR/INC		\$5.25	34.04	\$3.77	\$8.41	Lamp
D03-803	LTG	14 Watt integral CFL	14 Watt - screw-in	60W Incandescent	or D-t-:1/Ct	RET/ROB/NEW	Yes	High	R FULL/INCR/INC	\$0.61	\$4.39	\$3.79	\$3.77	\$7.56	Lamp
D03-804	LTG	15 Watt integral CFL	15 Watt - screw-in	60W Incandescent	Retail/Contrac or	RET/ROB/NEW	Yes	Low	R R	\$0.61	\$5.62	\$5.0	\$3.77	\$8.79	Lamp
D03-804	LTC	16 W-44 :   CEI	15 W-#	(OW I	Retail/Contrac		V	TT: -b	FULL/INCR/INC R	\$0.61	64.71	\$4.10	62.77	67.07	T
D03-804	LTG	15 Watt integral CFL	15 Watt - screw-in	60W Incandescent	or Retail/Contrac	RET/ROB/NEW	Yes	High	FULL/INCR/INC		\$4.71	\$4.10	\$3.77	\$7.87	Lamp
D03-805	LTG	16 Watt integral CFL	16 Watt - screw-in	60W Incandescent	or Retail/Contrac	RET/ROB/NEW	Yes	Low	R FULL/INCR/INC	\$0.61	\$6.00	\$5.39	\$3.77	\$9.16	Lamp
D03-805	LTG	16 Watt integral CFL	16 Watt - screw-in	60W Incandescent	or	RET/ROB/NEW	Yes	High	R R	\$0.61	\$5.02	\$4.4	\$3.77	\$8.19	Lamp
D02.006	LTC	10 W 1 CFI	18 Watt < 1,100 Lumens -	CONVI	Retail/Contrac		W		FULL/INCR/INC		06.71	061	62.77	60.01	
D03-806	LTG	18 Watt integral CFL	screw-in 18 Watt < 1,100 Lumens -	60W Incandescent	or Retail/Contrac	RET/ROB/NEW	Yes	Low	FULL/INCR/INC	\$0.61	\$6.74	\$6.14	\$3.77	\$9.91	Lamp
D03-806	LTG	18 Watt integral CFL	screw-in 18 Watt ≥1,100 Lumens -	60W Incandescent	or Retail/Contrac	RET/ROB/NEW	Yes	High	R FULL/INCR/INC	\$0.61	\$5.65	\$5.04	\$3.77	\$8.82	Lamp
D03-807	LTG	18 Watt integral CFL	screw-in	75W Incandescent	or	RET/ROB/NEW	Yes	Low	R	\$0.61	\$6.37	\$5.77	\$3.77	\$9.54	Lamp
D03-807	LTG	18 Watt integral CFL	18 Watt ≥1,100 Lumens - screw-in	75W Incandescent	Retail/Contrac or	RET/ROB/NEW	Yes	High	FULL/INCR/INC R	\$0.61	\$5.34	\$4.73	\$3.77	\$9.50	Lamp
D03-807		16 wait integral CFL	19 Watt ≥1,100 Lumens -	/3 w incandescent	Retail/Contrac		1 05	nigii	FULL/INCR/INC	2		34.7.		\$6.50	Lamp
D03-808	LTG	19 Watt integral CFL	screw-in 19 Watt ≥1,100 Lumens -	75W Incandescent	or Retail/Contrac	RET/ROB/NEW	Yes	Low	R FULL/INCR/INC	\$0.61	\$6.73	\$6.12	\$3.77	\$9.89	Lamp
D03-808	LTG	19 Watt integral CFL	screw-in	75W Incandescent	or	RET/ROB/NEW	Yes	High	R	\$0.61	\$5.63	\$5.03	\$3.77	\$8.80	Lamp
D03-809	LTG	20 Watt integral CFL	20 Watt - screw-in	75W Incandescent	Retail/Contrac	RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$0.61	\$7.08	\$6.4	\$3.77	\$10.25	Lomn
-					Retail/Contrac	rt		Low	FULL/INCR/INC	2					
D03-809	LTG	20 Watt integral CFL	20 Watt - screw-in	75W Incandescent	or Retail/Contrac	RET/ROB/NEW	Yes	High	R FULL/INCR/INC	\$0.61	\$5.93	\$5.32	2 \$3.77	\$9.10	Lamp
D03-810	LTG	23 Watt integral CFL	23 Watt - screw-in	100W Incandescent	or	RET/ROB/NEW	Yes	Low	R	\$0.61	\$6.66	\$6.03	\$3.77	\$9.82	Lamp
D03-810	LTG	23 Watt integral CFL	23 Watt - screw-in	100W Incandescent	Retail/Contractor	RET/ROB/NEW	Yes	High	FULL/INCR/INC	\$0.61	\$5.58	\$4.9	7 \$3.77	\$8.74	Lamn
			25 Watt < 1,600 Lumens -		Retail/Contrac	et		, 11g1i	FULL/INCR/INC	2					•
D03-811	LTG	25 Watt integral CFL	screw-in 25 Watt <1,600 Lumens -	75W Incandescent	or Retail/Contrac	RET/ROB/NEW	Yes	Low	R FULL/INCR/INC	\$0.61	\$8.85	\$8.24	\$3.77	\$12.02	Lamp
D03-811	LTG	25 Watt integral CFL	screw-in	75W Incandescent	or	RET/ROB/NEW	Yes	High	R	\$0.61	\$7.41	\$6.8	\$3.77	\$10.58	Lamp

			25 Watt ≥1,600 Lumens -		D-4-il/Ct	-4			FULL/INCR/INC					
D03-812	LTG	25 Watt integral CFL	screw-in	100W Incandescent	Retail/Contra or	RET/ROB/NEW	Yes	Low	R R	\$0.61	\$7.24	\$6.63	\$3.77	\$10.40 Lamp
D03-812	LTG	25 Watt integral CFL	25 Watt ≥1,600 Lumens - screw-in	100W Incandescent	Retail/Contra or	ct RET/ROB/NEW	Yes	High	FULL/INCR/INC R	\$0.61	\$6.06	\$5.45	\$3.77	\$9.23 Lamp
		_	26 Watt <1,600 Lumens -		Retail/Contra	ct			FULL/INCR/INC					
D03-813	LTG	26 Watt integral CFL	screw-in 26 Watt <1,600 Lumens -	75W Incandescent	or Retail/Contra	RET/ROB/NEW	Yes	Low	R FULL/INCR/INC	\$0.61	\$9.21	\$8.60	\$3.77	\$12.37 Lamp
D03-813	LTG	26 Watt integral CFL	screw-in 26 Watt ≥1,600 Lumens -	75W Incandescent	or Retail/Contra	RET/ROB/NEW	Yes	High	R FULL/INCR/INC	\$0.61	\$7.71	\$7.10	\$3.77	\$10.88 Lamp
D03-814	LTG	26 Watt integral CFL	screw-in	100W Incandescent	or	RET/ROB/NEW	Yes	Low	R	\$0.61	\$7.52	\$6.92	\$3.77	\$10.69 Lamp
D03-814	LTG	26 Watt integral CFL	26 Watt ≥1,600 Lumens - screw-in	100W Incandescent	Retail/Contra or	ct RET/ROB/NEW	Yes	High	FULL/INCR/INC R	\$0.61	\$6.30	\$5.69	\$3.77	\$9.47 Lamp
D03-815	LTG			100W Incandescent	Retail/Contra	ct			FULL/INCR/INC R	\$0.61		\$7.50		•
		28 Watt integral CFL	28 Watt - screw-in		or Retail/Contra	RET/ROB/NEW ect	Yes	Low	FULL/INCR/INC		\$8.10		\$3.77	\$11.27 Lamp
D03-815	LTG	28 Watt integral CFL	28 Watt - screw-in	100W Incandescent	or Retail/Contra	RET/ROB/NEW	Yes	High	R FULL/INCR/INC	\$0.61	\$6.79	\$6.18	\$3.77	\$9.95 Lamp
D03-816	LTG	32 Watt integral CFL	32 Watt - screw-in	100W Incandescent	or Retail/Contra	RET/ROB/NEW	Yes	Low	R FULL/INCR/INC	\$0.61	\$9.26	\$8.65	\$3.77	\$12.43 Lamp
D03-816	LTG	32 Watt integral CFL	32 Watt - screw-in	100W Incandescent	or	RET/ROB/NEW	Yes	High	R	\$0.61	\$7.76	\$7.15	\$3.77	\$10.92 Lamp
D03-817	LTG	36 Watt integral CFL	36 Watt - screw-in	150W Incandescent	Retail/Contra or	ct RET/ROB/NEW	Yes	Low	FULL/INCR/INC R	\$2.22	\$9.19	\$6.97	\$3.77	\$10.75 Lamp
					Retail/Contra	ct			FULL/INCR/INC R					•
D03-817	LTG	36 Watt integral CFL	36 Watt - screw-in	150W Incandescent	or Retail/Contra		Yes	High	FULL/INCR/INC	\$2.22	\$7.70	\$5.48	\$3.77	\$9.26 Lamp
D03-818	LTG	50 Watt integral CFL	50 Watt - screw-in	150W Incandescent	or Retail/Contra	RET/ROB/NEW ct	Yes	Low	R FULL/INCR/INC	\$2.22	\$12.77	\$10.55	\$3.77	\$14.32 Lamp
D03-818	LTG	50 Watt integral CFL	50 Watt - screw-in	150W Incandescent	or	RET/ROB/NEW	Yes	High	R	\$2.22	\$10.69	\$8.48	\$3.77	\$12.25 Lamp
D03-819	LTG	13 Watt Modular CFL	13 Watt < 800 Lumens - pin based	40W Incandescent	Retail/Contra or	RET	Yes	Low	FULL	\$0.00	\$17.88	\$0.00	\$27.14	\$45.02 Lamp
D03-819	LTG	13 Watt Modular CFL	13 Watt < 800 Lumens - pin based	40W Incandescent	Retail/Contra	ct RET	Yes	High	FULL	\$0.00	\$17.43	\$0.00	\$27.14	\$44.56 Lamp
			13 Watt ≥800 Lumens - pin		Retail/Contra	ct								
D03-820	LTG	13 Watt Modular CFL	based 13 Watt ≥800 Lumens - pin	60W Incandescent	or Retail/Contra	RET ct	Yes	Low	FULL	\$0.00	\$17.88	\$0.00	\$27.14	\$45.02 Lamp
D03-820	LTG	13 Watt Modular CFL	based	60W Incandescent	or Retail/Contra	RET	Yes	High	FULL	\$0.00	\$17.43	\$0.00	\$27.14	\$44.56 Lamp
D03-821	LTG	14 Watt Modular CFL	14 Watt - pin based	60W Incandescent	or Retail/Contra	RET	Yes	Low	FULL	\$0.00	\$18.38	\$0.00	\$27.14	\$45.51 Lamp
D03-821	LTG	14 Watt Modular CFL	14 Watt - pin based	60W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$17.91	\$0.00	\$27.14	\$45.04 Lamp
D03-822	LTG	15 Watt Modular CFL	15 Watt - pin based	60W Incandescent	Retail/Contra or	et RET	Yes	Low	FULL	\$0.00	\$18.87	\$0.00	\$27.14	\$46.01 Lamp
-					Retail/Contra	ct								
D03-822	LTG	15 Watt Modular CFL	15 Watt - pin based	60W Incandescent	or Retail/Contra	RET	Yes	High	FULL	\$0.00	\$18.39	\$0.00	\$27.14	\$45.53 Lamp
D03-823	LTG	16 Watt Modular CFL	16 Watt - pin based	60W Incandescent	or Retail/Contra	RET	Yes	Low	FULL	\$0.00	\$19.36	\$0.00	\$27.14	\$46.50 Lamp
D03-823	LTG	16 Watt Modular CFL	16 Watt - pin based 18 Watt < 1,100 Lumens -	60W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$18.87	\$0.00	\$27.14	\$46.01 Lamp
D03-824	LTG	18 Watt Modular CFL	pin based	60W Incandescent	Retail/Contra or	RET	Yes	Low	FULL	\$0.00	\$20.35	\$0.00	\$27.14	\$47.49 Lamp
D03-824	LTG	18 Watt Modular CFL	18 Watt < 1,100 Lumens - pin based	60W Incandescent	Retail/Contra or	et RET	Yes	High	FULL	\$0.00	\$19.83	\$0.00	\$27.14	\$46.97 Lamp
-			18 Watt ≥1,100 Lumens - pi	n	Retail/Contra	ct								
D03-825	LTG	18 Watt Modular CFL	based 18 Watt ≥1,100 Lumens - pi	75W Incandescent	or Retail/Contra		Yes	Low	FULL	\$0.00	\$20.35	\$0.00	\$27.14	\$47.49 Lamp
D03-825	LTG	18 Watt Modular CFL	based 19 Watt ≥1,100 Lumens - pi	75W Incandescent	or Retail/Contra	RET	Yes	High	FULL	\$0.00	\$19.83	\$0.00	\$27.14	\$46.97 Lamp
D03-826	LTG	19 Watt Modular CFL	based	75W Incandescent	or	RET	Yes	Low	FULL	\$0.00	\$20.84	\$0.00	\$27.14	\$47.98 Lamp
D03-826	LTG	19 Watt Modular CFL	19 Watt ≥1,100 Lumens - pi based	75W Incandescent	Retail/Contra or	RET	Yes	High	FULL	\$0.00	\$20.31	\$0.00	\$27.14	\$47.45 Lamp
D03-827	LTG	20 Watt Modular CFL	20 Watt - pin based	75W Incandescent	Retail/Contra or	ct RET	Yes	Low	FULL	\$0.00	\$21.34	\$0.00	\$27.14	\$48.48 Lamp
					Retail/Contra	ct								
D03-827	LTG	20 Watt Modular CFL	20 Watt - pin based	75W Incandescent	or Retail/Contra	RET ct	Yes	High	FULL	\$0.00	\$20.79	\$0.00	\$27.14	\$47.93 Lamp
D03-828	LTG	23 Watt Modular CFL	23 Watt - pin based	100W Incandescent	or Retail/Contra	RET	Yes	Low	FULL	\$0.00	\$22.82	\$0.00	\$27.14	\$49.96 Lamp
D03-828	LTG	23 Watt Modular CFL	23 Watt - pin based	100W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$22.23	\$0.00	\$27.14	\$49.37 Lamp
D03-829	LTG	25 Watt Modular CFL	25 Watt <1,600 Lumens - pi based	n 75W Incandescent	Retail/Contra or	ct RET	Yes	Low	FULL	\$0.00	\$23.80	\$0.00	\$27.14	\$50.94 Lamp
		-	-				-	-	-			•	-	

# Appendix B: Measure Cost Data

-			25 Watt <1,600 Lumens	- pin	Retail/Co	ontract								-
D03-829	LTG	25 Watt Modular CFL	based	75W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$23.20	\$0.00	\$27.14	\$50.33 Lamp
-			25 Watt ≥1,600 Lumens	- pin	Retail/Co	ontract								
D03-830	LTG	25 Watt Modular CFL	based	100W Incandescent	or	RET	Yes	Low	FULL	\$0.00	\$23.80	\$0.00	\$27.14	\$50.94 Lamp
			25 Watt ≥1,600 Lumens		Retail/Co									
D03-830	LTG	25 Watt Modular CFL	based	100W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$23.20	\$0.00	\$27.14	\$50.33 Lamp
			26 Watt <1,600 Lumens	r	Retail/Co									
D03-831	LTG	26 Watt Modular CFL	based	75W Incandescent	or	RET	Yes	Low	FULL	\$0.00	\$24.30	\$0.00	\$27.14	\$51.44 Lamp
			26 Watt <1,600 Lumens	r	Retail/Co									
D03-831	LTG	26 Watt Modular CFL	based	75W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$23.68	\$0.00	\$27.14	\$50.81 Lamp
			26 Watt ≥1,600 Lumens		Retail/Co									
D03-832	LTG	26 Watt Modular CFL	based	100W Incandescent	or	RET	Yes	Low	FULL	\$0.00	\$24.30	\$0.00	\$27.14	\$51.44 Lamp
			26 Watt ≥1,600 Lumens		Retail/Co		**	*** *						0.00.04.7
D03-832	LTG	26 Watt Modular CFL	based	100W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$23.68	\$0.00	\$27.14	\$50.81 Lamp
D02 022	1.00	20 W M 11 CFI	20.337	100W Incandescent	Retail/Co		37	*	PHI I	60.00	625.20	60.00	627.14	052 42 I
D03-833	LTG	28 Watt Modular CFL	28 Watt - pin based	100 W Incandescent	or Retail/C	RET	Yes	Low	FULL	\$0.00	\$25.28	\$0.00	\$27.14	\$52.42 Lamp
D03-833	LTG	28 Watt Modular CFL	28 Watt - pin based	100W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$24.64	\$0.00	\$27.14	\$51.78 Lamp
D03-833	LIG	26 Watt Modulai CFE	20 watt - piii bascu	100 W Incandescent	Retail/Co		103	High	FULL	30.00	324.04	30.00	327.14	331.78 Lamp
D03-834	LTG	30 Watt Modular CFL	30 Watt - pin based	120W Incandescent	or	RET	Yes	Low	FULL	\$0.00	\$26.27	\$0.00	\$27.14	\$53.41 Lamp
					Retail/Co						4-01-1			p
D03-834	LTG	30 Watt Modular CFL	30 Watt - pin based	120W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$25.60	\$0.00	\$27.14	\$52.74 Lamp
					Retail/Co	ontract								
D03-835	LTG	40 Watt Modular CFL	40 Watt - pin based	120W Incandescent	or	RET	Yes	Low	FULL	\$0.00	\$31.20	\$0.00	\$27.14	\$58.34 Lamp
			•		Retail/Co	ontract								
D03-835	LTG	40 Watt Modular CFL	40 Watt - pin based	120W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$30.41	\$0.00	\$27.14	\$57.54 Lamp
					Retail/Co									
D03-836	LTG	55 Watt Modular CFL	55 Watt - pin based	200W Incandescent	or	RET	Yes	Low	FULL	\$0.00	\$38.60	\$0.00	\$27.14	\$65.74 Lamp
					Retail/Co									
D03-836	LTG	55 Watt Modular CFL	55 Watt - pin based	200W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$37.62	\$0.00	\$27.14	\$64.75 Lamp
					Retail/Co									
D03-837	LTG	65 Watt Modular CFL	65 Watt - pin based	200W Incandescent	or	RET	Yes	Low	FULL	\$0.00	\$43.54	\$0.00	\$27.14	\$70.68 Lamp
					Retail/Co									
D03-837	LTG	65 Watt Modular CFL	65 Watt - pin based	200W Incandescent	or	RET	Yes	High	FULL	\$0.00	\$42.42	\$0.00	\$27.14	\$69.56 Lamp

#### LIGHTING - CONTROLS

	_				Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost 1	Installed Cost Cost U
D		Reduced Lighting - 10%		y T24 maximum LPA per Table										
D03-001	LTG Controls	reduction	10%	146-C	Not priced						Not priced			
D		Reduced Lighting - 40%		y T24 maximum LPA per Table										
D03-002	LTG Controls	reduction	40%	146-C	Not priced						Not priced			
		Small area lighting sensor	lighting level reduced based		retail/wholesa	ıl								
D03-003	LTG Controls	control	on bldg type, activity area	N/A	e/contractor	RET/NEW	no	Low	FULL/FULL	\$0.00	\$210.13	\$0.00	\$112.21	\$322.34 kW Ctrl
			0 7, 7											
		Large area lighting sensor	lighting level reduced based		retail/wholesa	ıl								
D03-004	LTG Controls	control	on bldg type, activity area		e/contractor	RET/NEW	no	Low	FULL/FULL	\$0.00	\$99.38	\$0.00	\$90.67	\$190.06 kW Ctrl
			add daylighting controls, mi	n.										
		Add daylighting controls to			retail/wholesa									
D03-005	LTG Controls	side-lit space w/ cont. ctrl		N/A	e/contractor	RET/NEW	no	Low	FULL/FULL	\$0.00	\$1,139.65	\$0.00	\$87.26	\$1,226.91 kW Ctrl
			add daylighting controls, mi	n.										
			lumen level based on bldg		retail/wholesa									
D03-006	LTG Controls	side-lit space w/ 2-step ctrl	add daylighting controls, mi	N/A	e/contractor	RET/NEW	no	Low	FULL/FULL	\$0.00	\$617.17	\$0.00	\$87.26	\$704.43 kW Ctrl
		Add daylighting controls to		n.	retail/wholesa	,1								
D03-007	LTG Controls	top-lit space w/ cont. ctrl	type	N/A	e/contractor	RET/NEW	no	Low	FULL/FULL	\$0.00	\$733.20	\$0.00	\$23.80	\$757.00 kW Ctrl
D03-007	L I G Controls	top-nt space w/ cont. ctri	add daylighting controls, mi		e/contractor	KE I/NE W	no	Low	FULL/FULL	\$0.00	\$/33.20	\$0.00	\$23.80	\$/5/.00 kW Ctri
		Add daylighting controls to	lumen level based on bldg	11.	retail/wholesa	al								
D03-008	LTG Controls	top-lit space w/ 1-step ctrl		N/A	e/contractor		no	Low	FULL/FULL	\$0.00	\$79.20	\$0.00	\$23.80	\$103.00 kW Ctrl
		top the space to a step can	add daylighting controls, mi								4771=0		4-0.00	
		Add daylighting controls to	lumen level based on bldg		retail/wholesa	ıl								
D03-009	LTG Controls	top-lit space w/ 2-step ctrl	type	N/A	e/contractor	RET/NEW	no	Low	FULL/FULL	\$0.00	\$79.20	\$0.00	\$23.80	\$103.00 kW Ctrl
			minimum unoccupied lighti	ng										
			power density based on bldg	3	retail/wholesa									
D03-010	LTG Controls	Timeclock for Lighting	type	N/A	e/contractor	RET/NEW	no	Low	FULL/FULL	\$0.00	\$76.96	\$0.00	\$41.73	\$118.69 Timeclo
			Assume control 3 2-lamp	·		•				•			-	·
			fixtures w/T8 34W EL		Retail/Contra									
D03-856	LTG Controls	Occ-Sensor - Wall box	Ballast	No Occupancy Sensor	or	RET/NEW	No	Low	FULL/FULL	\$0.00	\$42.28	\$0.00	\$35.00	\$77.28 Sensor

			Controling 4 - 70W (95W		D-t-:1/Ct									
D03-858	LTG Controls	Timeclock:	w/ballast) HPS fixtures	No Timeclock	Retail/Contract or	RET/NEW	No	Low	FULL/FULL	\$0.00	\$123.01	\$0.00	\$116.88	\$239.89 Timeclock
			Assume in conjunction with										-	
			time-clock controling 4 - 70W (95W w/ballast) HPS		Retail/Contrac	rt .								
D03-859	LTG Controls	Photocell:	fixtures	No Photocell	or	RET/NEW	No	Low	FULL/FULL	\$0.00	\$12.06	\$0.00	\$47.75	\$59.81 Photocell
LIGHTING -	FIXTURES													
EIGHTH 10 -					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description 20W CFL Table Lamp - pin	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost I	Installed Cost Cost Unit
D03-838	LTG	20W CFL Table Lamp	based	60W Incandescent Table Lamp	Retail	RET/NEW	No	Low	INCR/INCR	\$50.43	\$50.43 \$	-	\$0.00	\$0.00 Fixture
D03-839	LTG	25W CFL Table Lamp	25W CFL Table Lamp - pin based	75W Incandescent Table Lamp	D -4-:1	RET/NEW	No	Low	INCR/INCR	\$61.13	\$61.13 \$	,	\$0.00	\$0.00 Fixture
D03-839	LIG	25 W CFL Table Lamp	30W CFL Table Lamp - pin	/5 W Incandescent Table Lamp	Retail	KEI/NEW	No	Low	INCR/INCR	\$01.13	\$61.13 \$	-	\$0.00	50.00 Fixture
D03-840	LTG	30W CFL Table Lamp	based 55W CFL Table Lamp - pin	100W Incandescent Table Lamp	Retail	RET/NEW	No	Low	INCR/INCR	\$63.20	\$63.20 \$	-	\$0.00	\$0.00 Fixture
D03-841	LTG	55W CFL Table Lamp	based	150W Incandescent Table Lamp	Retail	RET/NEW	No	Low	INCR/INCR	\$122.96	\$122.96 \$	-	\$0.00	\$0.00 Fixture
	. ma	sew on m	55W CFL Torchiere - pin			n Doma i Divi			nian mian	0.00.00	0.000.00		****	
D03-842	LTG	55W CFL Torchiere 70W CFL Torchiere (two	based 70W CFL Torchiere (two	300W Halogen Bulb Torchiere	Retail	RET/NEW	No	Low	INCR/INCR	\$59.39	\$59.39 \$	-	\$0.00	\$0.00 Torchiere
D03-843	LTG	LAMPs)	LAMPs) - pin based	300W Halogen Bulb Torchiere	Retail	RET/NEW	No	Low	INCR/INCR	\$55.76	\$55.76 \$	-	\$0.00	\$0.00 Torchiere
D03-844	LTG	50W Metal Halide	50W Metal Halide	150W Incandescent	Retail/Contract	rt RET	Yes	Low	FULL	\$0.00	\$113.85	\$0.00	\$100.51	\$214.36 Fixture
					Retail/Contrac	et .								
D03-845	LTG	75 Metal Halide	75 Metal Halide	100W Mercury Vapor	or Retail/Contrac	RET	Yes	Low	FULL	\$0.00	\$120.09	\$0.00	\$100.51	\$220.60 Fixture
D03-846	LTG	100W Metal Halide	100W Metal Halide	175W Mercury Vapor	or	RET	Yes	Low	FULL	\$0.00	\$126.66	\$0.00	\$100.51	\$227.17 Fixture
D03-847	LTG	175W PS Metal Halide	175W PS Metal Halide	250W Metal Halide	Retail/Contract	rt RET	No	Low	FULL	\$0.00	\$129.01	\$0.00	\$67.84	\$196.86 Fixture
D03-847	LIG	175 W 13 Metal Hande	175 W 1 5 Wetai Hande	250 W Wictai Hande	Retail/Contrac		110	Low	FOLL	30.00	\$129.01	30.00	307.04	\$190.00 Fixture
D03-848	LTG	175W PS Metal Halide	175W PS Metal Halide	500W Incandescent	or Retail/Contrac	RET	No	Low	FULL	\$0.00	\$129.01	\$0.00	\$67.84	\$196.86 Fixture
D03-849	LTG	250W PS Metal Halide	250W PS Metal Halide	400W Mercury Vapor	or	RET	No	Low	FULL	\$0.00	\$152.08	\$0.00	\$67.84	\$219.92 Fixture
D02.050	LTC	200W HDG	200W HBC	400W.M. W.	Retail/Contrac		N		ETH I	60.00	601.05	60.00	067.04	
D03-850	LTG	200W HPS	200W HPS	400W Mercury Vapor	or Retail/Contrac	RET	No	Low	FULL	\$0.00	\$91.05	\$0.00	\$67.84	\$158.89 Fixture
D03-851	LTG	180W LPS	180W LPS	400W Mercury Vapor	or	RET	No	Low	FULL	\$0.00	\$74.62	\$0.00	\$67.84	\$142.46 Fixture
D03-854	LTG	De-lamp from 4', 4 lamp/fixture	Four ft. 4 lamp fixture	Four ft. 4 lamp fixture	Retail/Contract	RET	No	Low	FULL	\$0.00	\$3.08	\$0.00	\$22.63	\$25.71 Fixture
		De-lamp from 8', 4			Retail/Contrac	rt .								
D03-855	LTG	lamp/fixture	Eight ft. 4 lamp fixture	Eight ft. 4 lamp fixture	or Retail/Contrac	RET	No	Low	FULL	\$0.00	\$3.28	\$0.00	\$22.63	\$25.91 Fixture
D03-860	LTG	LED Exit Sign (New)	LED Exit Sign (New)	Incandescent Exit Sign	or	RET	Yes	Low	FULL	\$0.00	\$31.52	\$0.00	\$33.92	\$65.44 Sign
D03-860	LTG	LED Exit Sign (New)	LED Exit Sign (New)	Incandescent Exit Sign	Retail/Contract	rt RET	Yes	High	FULL	\$0.00	\$29.02	\$0.00	\$33.92	\$62.94 Sign
					Retail/Contrac	et								
D03-861	LTG	LED Exit Sign Retrofit Kit	LED Exit Sign Retrofit Kit	Incandescent Exit Sign	or Retail/Contrac	RET	Yes	Low	FULL	\$0.00	\$16.66	\$0.00	\$33.92	\$50.58 Sign
D03-861	LTG	LED Exit Sign Retrofit Kit	LED Exit Sign Retrofit Kit	Incandescent Exit Sign	or	RET	Yes	High	FULL	\$0.00	\$15.34	\$0.00	\$33.92	\$49.27 Sign
D03-862	LTG	Electroluminescent Exit	Electroluminescent Exit Sign (New)	Incandescent Exit Sign	Retail/Contrac	rt RET	Vac	Low	FULL	\$0.00	\$73.42	\$0.00	\$33.92	\$107.34 Sign
D05-802	LIG	Sign (New) Electroluminescent Exit	Electroluminescent Exit Sign		Retail/Contrac		Yes	LOW	FULL	30.00	\$73.42	\$0.00	\$33.92	\$107.54 Sigii
D03-862	LTG	Sign (New)	(New)	Incandescent Exit Sign	or D-t-:1/Ct	RET	Yes	High	FULL	\$0.00	\$67.61	\$0.00	\$33.92	\$101.53 Sign
D03-863	LTG	Electroluminescent Exit Sign Retrofit Kit	Electroluminescent Exit Sign Retrofit Kit	Incandescent Exit Sign	Retail/Contract or	RET	Yes	Low	FULL	\$0.00	\$70.14	\$0.00	\$33.92	\$104.06 Sign
D02.062	LTC	Electroluminescent Exit	Electroluminescent Exit Sign		Retail/Contrac		**	TY: 1	ETH I	\$0.00	0.4.50	60.00	622.02	600.51.0
D03-863	LTG	Sign Retrofit Kit	Retrofit Kit	Incandescent Exit Sign	or	RET	Yes	High	FULL	\$0.00	\$64.59	\$0.00	\$33.92	\$98.51 Sign
LIGHTING -	SKYLIGHTS AND	CONTROLS			n. 11						.,			
Measure ID	Category	Measure Name	Measure Description	Base Description	Delivery Channel	Application	Energy Star?	Purchase Volume	Cost Basis	Base Equipment Cost	Measure Equipment Cost	Incremental Equipment Cost	Labor Cost	Installed Cost Cost Unit
	g,		skylight w/ indicated						2002	2022				,
		High perf glass (PI 0.81) and cont dayltg ctrls in ton-	performance index & T24  reamts in daylit spaces, cont	skylights with properties based of	n retail/wholesa	1								
D03-031	SkyLights	lit spaces	ctrl	location, no dayltg ctrls	e/contractor	RET/NEW	N/A	High	FULL/INCR	\$26.77	\$27.77	\$0.99	\$2.53	\$30.29 Sq Ft
		High perf glass (PI 0.92)	skylight w/ indicated performance index & T24				-		-				<u></u>	
			•	skylights with properties based of	n retail/wholesa	1								
D03-032	SkyLights	lit spaces	ctrl	location, no dayltg ctrls	e/contractor	RET/NEW	N/A	High	FULL/INCR	\$26.77	\$27.90	\$1.13	\$2.53	\$30.43 Sq Ft

			skylight w/ indicated											
		II:-bf -l (DI 1 02)												
		High perf glass (PI 1.03)			1 4 27/ 1 1									
	at v: 1	, ,		ont. skylights with properties bas			27/1	*** *	THE PROPERTY OF THE PROPERTY O					
D03-033	SkyLights	lit spaces	ctrl skylight w/ indicated	location, no dayltg ctrls	e/contractor	RET/NEW	N/A	High	FULL/INCR	\$26.77	\$28.04	\$1.27	\$2.53	\$30.57 Sq Ft
		III C. I. (DI.O.O.)												
		High perf glass (PI 0.81)			1 4 27/ 1 1									
D02 024	CL Tile			step skylights with properties bas			27/4	TT: 1	FILL I /DICD	607.77	627.01	60.24	62.52	620 54 G F:
D03-034	SkyLights	lit spaces	ctrl skylight w/ indicated	location, no dayltg ctrls	e/contractor	RET/NEW	N/A	High	FULL/INCR	\$26.77	\$27.01	\$0.24	\$2.53	\$29.54 Sq Ft
		High perf glass (PI 0.92)												
						.1								
	at v: 1			-step skylights with properties bas			27/1	*** *	THE PROPERTY OF THE PROPERTY O					000 (0 0 7
D03-035	SkyLights	lit spaces	ctrl skylight w/ indicated	location, no dayltg ctrls	e/contractor	RET/NEW	N/A	High	FULL/INCR	\$26.77	\$27.15	\$0.38	\$2.53	\$29.68 Sq Ft
		II:-bf -l (DI 1 02)	, ,											
		High perf glass (PI 1.03)			1 . 27 1 1									
D02.026	CL Tile			step skylights with properties bas			27/4	TT: 1	FILL I /DICD	607.77	627.20	60.52	62.52	620.02 G F:
D03-036	SkyLights	lit spaces	ctrl skylight w/ indicated	location, no dayltg ctrls	e/contractor	RET/NEW	N/A	High	FULL/INCR	\$26.77	\$27.29	\$0.52	\$2.53	\$29.82 Sq Ft
		II:-b (DI 0 91)												
		High perf glass (PI 0.81)				.1								
D03-037	Clastials	, , ,		-step skylights with properties bas		RET/NEW	N/A	TT: -1.	FULL/INCR	\$26.77	\$27.01	\$0.24	62.52	620 54 C - E
D03-037	SkyLights	lit spaces	ctrl skylight w/ indicated	location, no dayltg ctrls	e/contractor	KEI/NEW	N/A	High	FULL/INCR	\$20.77	\$27.01	\$0.24	\$2.53	\$29.54 Sq Ft
		High perf glass (PI 0.92)												
		0,0,,	•			.1								
D02 020	CL Tile	, , ,		step skylights with properties bas			N/A	771 1	ELII I (DICO)	607.77	627.15	60.20	62.52	620 (0 G F)
D03-038	SkyLights	lit spaces	ctrl skylight w/ indicated	location, no dayltg ctrls	e/contractor	RET/NEW	N/A	High	FULL/INCR	\$26.77	\$27.15	\$0.38	\$2.53	\$29.68 Sq Ft
		High perf glass (PI 1.03)												
						.1								
D02 020	Clastials	, , ,		-step skylights with properties bas			NT/A	TT: -1.	FULL/INCR	627.77	\$27.29	\$0.52	\$2.53	620 02 C - F4
D03-039	SkyLights	lit spaces	ctrl	location, no dayltg ctrls	e/contractor	RET/NEW	N/A	High	FULL/INCK	\$26.77	\$21.29	\$0.52	\$4.33	\$29.82 Sq Ft

MOTORS														
					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	<b>Equipment Cost</b>	Equipment Cost	Labor Cost I	Installed Cost Cost Unit
		Premium Efficiency Moto	r - Premium Efficiency Motor	- 1	Retail/Contrac	t								
D03-914	Motors	1 HP	HP ODP 1200 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$316.81	\$347.79	\$30.98	\$0.00	\$0.00 Motor
			r - Premium Efficiency Motor		Retail/Contrac									
D03-915	Motors	5 HP	HP ODP 1200 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$639.36	\$743.60	\$104.24	\$0.00	\$0.00 Motor
			r - Premium Efficiency Motor		Retail/Contrac									
D03-916	Motors	10 HP	10 HP ODP 1200 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$1,365.09	\$1,665.28	\$300.20	\$0.00	\$0.00 Motor
			r - Premium Efficiency Motor		Retail/Contrac									
D03-917	Motors	15 HP	15 HP ODP 1200 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$1,706.90	\$1,998.92	\$292.02	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor	-	Retail/Contrac									
D03-918	Motors	20 HP	20 HP ODP 1200 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$1,930.59	\$2,185.01	\$254.43	\$0.00	\$0.00 Motor
			r - Premium Efficiency Motor	-	Retail/Contrac									
D03-919	Motors	25 HP	25 HP ODP 1200 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$2,458.98	\$2,455.45	s -	\$0.00	\$0.00 Motor
			r - Premium Efficiency Motor	-	Retail/Contrac									
D03-920	Motors	50 HP	50 HP ODP 1200 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$4,060.97	\$4,554.88	\$493.91	\$0.00	\$0.00 Motor
			r - Premium Efficiency Motor	-	Retail/Contrac									
D03-921	Motors	100 HP	100 HP ODP 1200 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$7,368.18	\$8,128.33	\$760.15	\$0.00	\$0.00 Motor
			r - Premium Efficiency Motor		Retail/Contrac									
D03-922	Motors	150 HP	150 HP ODP 1200 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$10,604.64	\$11,062.00	\$457.36	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor	-	Retail/Contrac	rt .								
D03-923	Motors	200 HP	200 HP ODP 1200 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$13,703.87	\$15,754.00	\$2,050.13	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor -	- 1	Retail/Contrac	t								·
D03-914	Motors	1 HP	HP ODP 1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$226.86	\$291.43	\$64.57	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor -	- 5	Retail/Contrac	t								·
D03-915	Motors	5 HP	HP ODP 1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$474.61	\$515.36	\$40.76	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor -	-	Retail/Contrac	t								·
D03-916	Motors	10 HP	10 HP ODP 1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$820.19	\$894.66	\$74.47	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor -	-	Retail/Contrac	t								·
D03-917	Motors	15 HP	15 HP ODP 1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$1,019.26	\$1,072.31	\$53.05	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor -	-	Retail/Contrac	t								·
D03-918	Motors	20 HP	20 HP ODP 1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$1,053.22	\$1,278.52	\$225.29	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor -	3	Retail/Contrac	rt .								
D03-919	Motors	25 HP	25 HP ODP 1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$1,276.67	\$1,560.14	\$283.47	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor	•	Retail/Contrac	et								
D03-920	Motors	50 HP	50 HP ODP 1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$1,782.75	\$2,487.62	\$704.87	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor	=	Retail/Contrac	et								
D03-921	Motors	100 HP	100 HP ODP 1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$4,290.93	\$4,781.61	\$490.69	\$0.00	\$0.00 Motor
		Premium Efficiency Moto	r - Premium Efficiency Motor	=	Retail/Contrac	et								
D03-922	Motors	150 HP	150 HP ODP 1800 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$7,251.89	\$8,296.68	\$1,044.79	\$0.00	\$0.00 Motor

-		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract								
D03-923	Motors	200 HP 200 HP ODP 1800 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$10,801.10	\$11,880.25	\$1,079.15	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor - 1	Retail/Contract		_						
D03-914	Motors	1 HP HP ODP 3600 RPM EPAct Efficiency Motors  Premium Efficiency Motor - Premium Efficiency Motor - 5	or ROB/NEW	yes	Low	INCR/INCR	\$201.03	\$253.71	\$52.67	\$0.00	\$0.00 Motor
D03-915	Motors	5 HP HP ODP 3600 RPM EPAct Efficiency Motors	Retail/Contract or ROB/NEW	yes	Low	INCR/INCR	\$312.45	\$384.36	\$71.91	\$0.00	\$0.00 Motor
D03-713	Wiotois	Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract	yes	Low	nveienveic	\$512.45	\$304.30	3/1.71	\$0.00	30.00 1410101
D03-916	Motors	10 HP 10 HP ODP 3600 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$661.24	\$784.51	\$123.27	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract								
D03-917	Motors	15 HP 15 HP ODP 3600 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$1,022.02	\$1,190.00	\$167.98	\$0.00	\$0.00 Motor
D03-918	Motors	Premium Efficiency Motor - Premium Efficiency Motor - 20 HP	Retail/Contract or ROB/NEW	ves	Low	INCR/INCR	\$1,070.42	\$1,245.59	\$175.18	\$0.00	\$0.00 Motor
D03-710	Wiotois	Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract	yes	Low	incidine	\$1,070.42	\$1,245.57	\$175.16	\$0.00	\$0.00 1410101
D03-919	Motors	25 HP	or ROB/NEW	yes	Low	INCR/INCR	\$1,340.00	\$1,583.80	\$243.80	\$0.00	\$0.00 Motor
200.000		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract			n ion mion					00.0034
D03-920	Motors	50 HP 50 HP ODP 3600 RPM EPAct Efficiency Motors  Premium Efficiency Motor - Premium Efficiency Motor -	or ROB/NEW Retail/Contract	yes	Low	INCR/INCR	\$2,858.70	\$3,059.13	\$200.43	\$0.00	\$0.00 Motor
D03-921	Motors	100 HP 100 HP ODP 3600 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$5,349.00	\$5,640.67	\$291.67	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract					,			
D03-922	Motors	150 HP 150 HP ODP 3600 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$7,976.73	\$8,737.04	\$760.31	\$0.00	\$0.00 Motor
D02.022	36.	Premium Efficiency Motor - Premium Efficiency Motor - 200 HP	Retail/Contract			DICD DICD	612 212 16	614.072.14	61 550 00	60.00	60.00 14 .
D03-923	Motors	200 HP 200 HP ODP 3600 RPM EPAct Efficiency Motors  Premium Efficiency Motor - Premium Efficiency Motor - 1	or ROB/NEW Retail/Contract	yes	Low	INCR/INCR	\$13,313.16	\$14,873.14	\$1,559.98	\$0.00	\$0.00 Motor
D03-924	Motors	1 HP HP TEFC 1200 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$350.53	\$532.48	\$181.95	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor - 5	Retail/Contract								
D03-925	Motors	5 HP HP TEFC 1200 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$1,008.31	\$1,108.62	\$100.32	\$0.00	\$0.00 Motor
D03-926	Motors	Premium Efficiency Motor - Premium Efficiency Motor -  10 HP	Retail/Contract or ROB/NEW	VAC	Low	INCR/INCR	\$1,501.04	\$1,810.23	\$309.19	\$0.00	\$0.00 Motor
D03-920	MOIOIS	Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract	yes	Low	INCK/INCK	\$1,501.04	\$1,610.23	\$309.19	\$0.00	\$0.00 Motor
D03-927	Motors	15 HP 15 HP TEFC 1200 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$1,932.13	\$2,369.81	\$437.68	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract								<del></del>
D03-928	Motors	20 HP 20 HP TEFC 1200 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$2,599.68	\$3,108.76	\$509.08	\$0.00	\$0.00 Motor
D03-929	Motors	Premium Efficiency Motor - Premium Efficiency Motor - 25 HP 25 HP TEFC 1200 RPM EPAct Efficiency Motors	Retail/Contract or ROB/NEW	yes	Low	INCR/INCR	\$3,153.29	\$3,583.53	\$430.23	\$0.00	\$0.00 Motor
D03-727	Wiotois	Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract	yes	Low	nveienveic	95,155.27	\$5,565.55	\$450.25	\$0.00	30.00 1410101
D03-930	Motors	50 HP 50 HP TEFC 1200 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$5,531.04	\$6,345.17	\$814.13	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract								
D03-931	Motors	100 HP 100 HP TEFC 1200 RPM EPAct Efficiency Motors  Premium Efficiency Motor - Premium Efficiency Motor -	or ROB/NEW Retail/Contract	yes	Low	INCR/INCR	\$10,099.55	\$11,941.43	\$1,841.89	\$0.00	\$0.00 Motor
D03-932	Motors	150 HP 150 HP TEFC 1200 PRM EPAct Efficiency Motors	or ROB/NEW	ves	Low	INCR/INCR	\$14,892.10	\$16,073.40	\$1,181.30	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract	) - ··			V-1,02=110	,	,	40100	
D03-933	Motors	200 HP 200 HP TEFC 1200 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$16,800.22	\$18,741.20	\$1,940.98	\$0.00	\$0.00 Motor
200.001		Premium Efficiency Motor - Premium Efficiency Motor - 1	Retail/Contract			nian mian	00.4.50	0.400.00	0.00.00		00.0034
D03-924	Motors	1 HP HP TEFC 1800 RPM EPAct Efficiency Motors  Premium Efficiency Motor - Premium Efficiency Motor - 5	or ROB/NEW Retail/Contract	yes	Low	INCR/INCR	\$364.52	\$432.03	\$67.51	\$0.00	\$0.00 Motor
D03-925	Motors	5 HP HP TEFC 1800 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$578.35	\$637.38	\$59.03	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract								
D03-926	Motors	10 HP 10 HP TEFC 1800 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$923.97	\$1,046.42	\$122.45	\$0.00	\$0.00 Motor
D03-927	Motors	Premium Efficiency Motor - Premium Efficiency Motor - 15 HP 15 HP TEFC 1800 RPM EPAct Efficiency Motors	Retail/Contract or ROB/NEW	ves	Low	INCR/INCR	\$1,129.85	\$1,370.30	\$240.45	\$0.00	\$0.00 Motor
D03-927	MOIOIS	Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract	yes	Low	INCK/INCK	\$1,129.63	\$1,570.50	3240.43	\$0.00	\$0.00 Motor
D03-928	Motors	20 HP 20 HP TEFC 1800 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$1,620.53	\$1,730.04	\$109.51	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract	-							-
D03-929	Motors	25 HP 25 HP TEFC 1800 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$1,683.79	\$2,151.75	\$467.96	\$0.00	\$0.00 Motor
D03-930	Motors	Premium Efficiency Motor - Premium Efficiency Motor - 50 HP 50 HP TEFC 1800 RPM EPAct Efficiency Motors	Retail/Contract or ROB/NEW	yes	Low	INCR/INCR	\$3,162.34	\$3,851.21	\$688.86	\$0.00	\$0.00 Motor
D03-730	Wiotois	Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract	yes	Low	nveienveic	35,102.54	95,051.21	\$000.00	\$0.00	30.00 1410101
D03-931	Motors	100 HP 100 HP TEFC 1800 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$8,561.75	\$8,775.46	\$213.71	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract		_						
D03-932	Motors	150 HP 150 HP TEFC 1800 PRM EPAct Efficiency Motors  Premium Efficiency Motor - Premium Efficiency Motor -	or ROB/NEW Retail/Contract	yes	Low	INCR/INCR	\$11,644.55	\$12,915.23	\$1,270.68	\$0.00	\$0.00 Motor
D03-933	Motors	200 HP 200 HP TEFC 1800 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$15,111.83	\$15,596.14	\$484.31	\$0.00	\$0.00 Motor
200 700		Premium Efficiency Motor - Premium Efficiency Motor - 1	Retail/Contract	,	Lon-	nicionien	4.5,111.55	210,070.11	9101.01	ψ0.00	30.00 1110101
D03-924	Motors	1 HP HP TEFC 3600 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$382.55	\$398.94	\$16.39	\$0.00	\$0.00 Motor
D02.025		Premium Efficiency Motor - Premium Efficiency Motor - 5	Retail/Contract			DICD DICD	6507.50	0.000 70	600.00	60.00	60.00 14 .
D03-925	Motors	5 HP HP TEFC 3600 RPM EPAct Efficiency Motors  Premium Efficiency Motor - Premium Efficiency Motor -	or ROB/NEW Retail/Contract	yes	Low	INCR/INCR	\$597.78	\$686.78	\$89.00	\$0.00	\$0.00 Motor
D03-926	Motors	10 HP 10 HP TEFC 3600 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$866.83	\$1,020.90	\$154.07	\$0.00	\$0.00 Motor
		Premium Efficiency Motor - Premium Efficiency Motor -	Retail/Contract	,							
D03-927	Motors	15 HP 15 HP TEFC 3600 RPM EPAct Efficiency Motors	or ROB/NEW	yes	Low	INCR/INCR	\$1,186.30	\$1,386.59	\$200.29	\$0.00	\$0.00 Motor

		Premium Efficien	cy Motor - Premium Efficiency Motor	r -	Retail/C	Contract								
D03-928	Motors	20 HP	20 HP TEFC 3600 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$1,423.91	\$1,691.37	\$267.46	\$0.00	\$0.00 Motor
		Premium Efficien	cy Motor - Premium Efficiency Motor	r -	Retail/C	Contract								
D03-929	Motors	25 HP	25 HP TEFC 3600 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$1,750.63	\$2,133.41	\$382.78	\$0.00	\$0.00 Motor
		Premium Efficien	Premium Efficiency Motor - Premium Efficiency Motor -			Contract								
D03-930	Motors	50 HP	50 HP TEFC 3600 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$3,209.02	\$3,999.17	\$790.15	\$0.00	\$0.00 Motor
		Premium Efficien	icy Motor - Premium Efficiency Motor	r -	Retail/C	Contract								
D03-931	Motors	100 HP	100 HP TEFC 3600 RPM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$8,797.52	\$9,240.33	\$442.81	\$0.00	\$0.00 Motor
		Premium Efficien	icy Motor - Premium Efficiency Motor	r -	Retail/C	Contract								
D03-932	Motors	150 HP	150 HP TEFC 3600 PRM	EPAct Efficiency Motors	or	ROB/NEW	yes	Low	INCR/INCR	\$14,572.38	\$14,544.17 \$	-	\$0.00	\$0.00 Motor
		Premium Efficien				Contract								
D03-933	Motore	200 HP	200 HP TEEC 3600 RPM	EPAct Efficiency Motors	or	ROB/NEW	vec	Low	INCR/INCR	\$18 119 50	\$18 357 50	\$238.00	\$0.00	\$0.00 Motor

#### POOL PUMPS

TOOLTCIME					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	<b>Equipment Cost</b>	Equipment Cost	Labor Cost	Installed Cost Cost Unit
		Efficient Single Speed Poo	l Efficient Single Speed Pool	Inefficient Single Speed Pool	Retail/Contrac	t			FULL/INCR/INC					
D03-966	Pool Pumps	Pumps	Pumps, 0.75 HP	Pumps	or	RET/ROB/NEW	No	Low	R	\$294.82	\$334.63	\$39.81	\$271.02	\$605.64 Pump
		Efficient Single Speed Poo	l Efficient Single Speed Pool	Inefficient Single Speed Pool	Retail/Contrac	t			FULL/INCR/INC					
D03-966	Pool Pumps	Pumps	Pumps, 1.0 HP	Pumps	or	RET/ROB/NEW	No	Low	R	\$315.94	\$373.68	\$57.75	\$271.27	\$644.95 Pump
		Efficient Single Speed Poo	l Efficient Single Speed Pool	Inefficient Single Speed Pool	Retail/Contrac	t			FULL/INCR/INC					
D03-966	Pool Pumps	Pumps	Pumps, 1.5 HP	Pumps	or	RET/ROB/NEW	No	Low	R	\$345.03	\$395.94	\$50.91	\$357.12	\$753.06 Pump
		Efficient Single Speed Poo	l Efficient Single Speed Pool	Inefficient Single Speed Pool	Retail/Contrac	t			FULL/INCR/INC					
D03-966	Pool Pumps	Pumps	Pumps, 2.0 HP	Pumps	or	RET/ROB/NEW	No	Low	R	\$395.67	\$447.53	\$51.86	\$357.62	\$805.14 Pump
		Efficient Single Speed Poo	l Efficient Single Speed Pool	Inefficient Single Speed Pool	Retail/Contrac	t			FULL/INCR/INC					
D03-966	Pool Pumps	Pumps	Pumps, 2.5 HP	Pumps	or	RET/ROB/NEW	No	Low	R	\$456.40	\$510.00	\$53.60	\$358.12	\$868.12 Pump
		Efficient Two Speed Pool	Efficient Two Speed Pool	Inefficient Single Speed Pool	Retail/Contrac	t			FULL/INCR/INC					
D03-967	Pool Pumps	Pumps	Pumps, 1.0 HP	Pumps	or	RET/ROB/NEW	No	Low	R	\$315.94	\$536.99	\$221.05	\$271.27	\$808.26 Pump
		Efficient Two Speed Pool	Efficient Two Speed Pool	Inefficient Single Speed Pool	Retail/Contrac	t			FULL/INCR/INC					
D03-967	Pool Pumps	Pumps	Pumps, 1.5 HP	Pumps	or	RET/ROB/NEW	No	Low	R	\$345.03	\$527.21	\$182.18	\$357.12	\$884.33 Pump
		Efficient Two Speed Pool	Efficient Two Speed Pool	Inefficient Single Speed Pool	Retail/Contrac	t			FULL/INCR/INC					
D03-967	Pool Pumps	Pumps	Pumps, 2.0 HP	Pumps	or	RET/ROB/NEW	No	Low	R	\$395.67	\$659.70	\$264.04	\$357.62	\$1,017.32 Pump
		Efficient Two Speed Pool	Efficient Two Speed Pool	Inefficient Single Speed Pool	Retail/Contrac	t			FULL/INCR/INC					
D03-967	Pool Pumps	Pumps	Pumps, 2.5 HP	Pumps	or	RET/ROB/NEW	No	Low	R	\$456.40	\$700.39	\$243.99	\$358.12	\$1,058.51 Pump

#### REFRIGERATION - SUPERMARKET

KEFKIGEKA	TION - SUPERMA	KKL I			Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost		Labor Cost	Installed Cost Cost Unit
Mediodi e 12	curegory	nzeubure rume		Standard A/C multiplex, SST	Cinnine	пррисшин	Star I	rotune	Cost Dasis	Cost	Equipment Cost	Equipment Cost	Zabor Cost	instance cost cost cint
	Supermarket			p setpt reduced 3F, SCT setpt										
D03-201	Refrigeration	Retrocommisioning	maint.	raised 3F.	Contractor	RET	No	single	FULL	\$0.00	\$0.00	\$0.00	\$49.60	\$49.60 tons
	Supermarket	High-efficiency walk-in fa	n Substitute high effy motors						FULL/INCR/INC					
D03-202	Refrigeration	motors	for standard effy.	Utiliizes a shaded pole motor.	Contractor	RET/ROB/NEW	No	bulk	R	\$0.00	\$167.43	\$90.50	\$41.89	\$209.32 Motor
	Supermarket	High-efficiency display far	Substitute high effy motors	-					FULL/INCR/INC					
D03-203	Refrigeration	motors	for standard effy.	Utiliizes a shaded pole motor.	Contractor	RET/ROB/NEW	No	bulk	R	\$0.00	\$13.58	\$6.79	\$13.67	\$27.25 LinFt
	Supermarket	Heat Recovery form Centr	al Adds an 85F holdback valve	e, Standard A/C multiplex system,										
D03-204	Refrigeration	Refrigeration System	active only when needed.	no heat reclaim.	Contractor	NEW	No	single	FULL	\$0.00	\$0.36	\$0.00	\$0.14	\$0.51 SqFt
				0. 1.11/0. 111										
	Supermarket			e, Standard A/C multiplex system,	_									
D03-204	Refrigeration	Refrigeration System	active only when needed.	no heat reclaim.	Contractor	RET	No	single	FULL	\$0.00	\$0.50	\$0.00	\$0.41	\$0.91 SqFt
	Supermarket	Night Covers for Disply												
D03-205	Refrigeration	Cases (Med. Temp)	Night cover reduces	Open cases with no night cover.	Contractor	RET/NEW	No	bulk	FULL/FULL	\$0.00	\$33.75	\$0.00	\$3.79	\$37.54 LinFt
	Supermarket		Cover open MT cases											
D03-206	Refrigeration	Medium Temp Glass Door		Open cases with no night cover.	Contractor	RET	No	bulk	FULL	\$0.00	\$514.13	\$0.00	\$99.81	\$613.95 LinFt
	Supermarket	New Med. Temp Display	Retrofit glass doors on open											
D03-207	Refrigeration	Case with Doors	MT cases.	Open cases with no night cover.	Contractor	RET	No	bulk	FULL	\$0.00	\$515.58	\$0.00	\$329.66	\$845.24 LinFt
	Supermarket	Auto-closers on Main	Install automatic door closer	rs										
D03-208	Refrigeration	Cooler Doors	on walk-in cooler doors.	No door closer.	Contractor	RET/NEW	No	bulk	FULL/FULL	\$0.00	\$322.59	\$0.00	\$110.63	\$433.22 Door
	0 1.		7 ( N ( ) ( ) 1											
D	Supermarket	Auto-closers on Main	Install automatic door closes	••		D.D.T. O.L.							0440.60	0.100.00.70
D03-209	Refrigeration	Freezer Doors	on walk-in freezer doors.	No door closer. at; Evaporator fans run continuouls	Contractor	RET/NEW	No	bulk	FULL/FULL	\$0.00	\$322.59	\$0.00	\$110.63	\$433.22 Door
	0 1 1	F . F G . I	duty cycle occasionally whe		ıy									
D	Supermarket													000 55 14
D03-210	Refrigeration	Walk-in Coolers & Freeze		vintage.	Contractor	NEW	No	single	FULL	\$0.00	\$52.50	\$0.00	\$38.25	\$90.75 Motor
			*	at; Evaporator fans run continuouls	ıy									
D.02.240	Supermarket		duty cycle occasionally whe			n.com					0.00.00			0445.00
D03-210	Refrigeration	Walk-in Coolers & Freeze	rs off.	vintage.	Contractor	RET	No	single	FULL	\$0.00	\$62.50	\$0.00	\$83.25	\$145.75 Motor

-			Replace multipley air-coole	d Multiplex A/C condenser of										
	C	Air Cooled Condenses												
200 011	Supermarket	Air-Cooled Condenser to	condenser with evap	vintage-dependent size and		n rom					0.100.00			0.004.48
D03-211	Refrigeration	Evap. Condenser	condenser.	efficiency.	Contractor	RET	No	single	FULL	\$0.00	\$430.60	\$0.00	\$264.96	\$695.57 tons
				Multiplex A/C condenser of										
	Supermarket	Energy Efficient Air-Coole	d Upgrade from 53 Btu/Watt (	@ vintage-dependent size and					FULL/INCR/INC					
D03-212	Refrigeration	Condenser	10TD to 84 Btu/Watt	efficiency.	Contractor	RET/ROB/NEW	No	single	R	\$0.00	\$652.75	\$140.30	\$152.68	\$805.43 tons
				Multiplex evap condenser of										
	Supermarket	Energy Efficient Evap-	Reduce SCT by ~5F and	vintage-dependent size and					FULL/INCR/INC					
D03-213	Refrigeration	Cooled Condenser	improve effy to 200 Btu/Wa		Contractor	RET/ROB/NEW	No	single	R	\$0.00	\$495.00	\$86.94	\$182.69	\$677.69 tons
D03-213	Kenigeranon	Cooled Colldeliser		th Single compressor sys, A/C co		KE1/KUD/NEW	INO	single	K	\$0.00	\$493.00	300.94	\$102.09	3077.09 tolls
	0 1 4	Maria Carria Maria			iiu									
	Supermarket	Multiplex Sys With Mech		w/ of vintage dependent size and										
D03-214	Refrigeration	Subcooling (air-cooled)	fixed stpt.	effy.	Contractor	RET/ROB	No	single	FULL/FULL	\$0.00	\$1,972.97	\$0.00	\$906.54	\$2,879.50 tons
				th Single compressor sys, evap co	ond									
	Supermarket	Multiplex Sys With Mech	subcooled multiplex, FHP w	v/ of vintage dependent size and										
D03-215	Refrigeration	Subcool (evap-cooled)	fixed stpt.	effy.	Contractor	RET/ROB	No	single	FULL/FULL	\$0.00	\$1,779.87	\$0.00	\$896.88	\$2,676.76 tons
	-			-				_						
		Multiplex Sys With Mech	Replace single comp sys with	th Single compressor sys, A/C co	nd									
	Supermarket	Subcool (high eff air-	subcooled multi., hi-effy	of vintage dependent size and										
D03-216				effy.	Contractor	RET/ROB	No	ainala	FULL/FULL	\$0.00	\$2,138.03	\$0.00	\$914.79	\$3,052.82 tons
D03-210	Refrigeration	cooled)	cond, FHP w/ fixed stpt.	elly.	Contractor	KE1/KOB	NO	single	FULL/FULL	\$0.00	\$2,138.03	\$0.00	\$914.79	\$3,032.82 tons
		Multiplex Sys With Mech		th Single compressor sys, evap co	ond									
	Supermarket	Subcool (high eff evap-	subcooled multi., hi-effy	of vintage dependent size and										
D03-217	Refrigeration	cooled)	cond, FHP w/ fixed stpt.	effy.	Contractor	RET/ROB	No	single	FULL/FULL	\$0.00	\$1,885.53	\$0.00	\$902.16	\$2,787.70 tons
	-		•	Standard A/C multiplex sys, no	)			_						
	Supermarket	Low Temp Mech	Addition of a LT subcooler	to subcool (<92), 70F subcool (92										
D03-218	Refrigeration	Subcooling	an A/C multiplex.	2000).	Contractor	RET	No	single	FULL	\$0.00	\$227.04	\$0.00	\$191.79	\$418.82 tons
D03=218	Refrigeration	Subcooming	Addition of LT and MT	Standard A/C multiplex sys, no		KLI	110	Siligic	POLL	\$0.00	\$227.04	30.00	\$171.77	3410.82 tolls
	0 1 4	T 134 15 34 1												
	Supermarket	Low and Med Temp Mech		subcool (<92), 70F subcool (92										
D03-219	Refrigeration	Subcooling	multiplex.	2000).	Contractor	NEW	No	single	FULL	\$0.00 \$	-	\$0.00	\$0.00	\$0.00 tons
			Addition of LT and MT	Standard A/C multiplex sys, no										
	Supermarket	Low and Med Temp Mech	subcoolers to an A/C	subcool (<92), 70F subcool (92	2-									
D03-219	Refrigeration	Subcooling	multiplex.	2000).	Contractor	RET	No	single	FULL	\$0.00	\$447.94	\$0.00	\$199.88	\$647.82 tons
			•											
	Supermarket	Floating SST control on L3	SST setpoint reset based on	Standard A/C multiplex sys, SS	ST									
D03-220	Refrigeration	and MT suction groups	worst-case demand	controlled to fixed setpoint.	Contractor	NEW	No	single	FULL	\$0.00 \$	_	\$0.00	\$18.60	\$18.60 tons
D03-220	Remigeration	and WT suction groups	worst-case demand	controlled to fixed scipoliti.	Contractor	THE IT	110	Siligic	TOLL	30.00 3		30.00	\$10.00	310.00 tons
	C		El-stine CCT - outsel on LT	Ct	ore.									
D	Supermarket		Floating SST control on LT			n rom					010.10		000000	000.05
D03-220	Refrigeration	Floating Suction Pressure	and MT suction groups.	controlled to fixed setpoint.	Contractor	RET	No	single	FULL	\$0.00	\$13.18	\$0.00	\$26.78	\$39.96 tons
		Floating Head Pressure												
	Supermarket	(FHP), Fixed Setpoint (air-	Floating SCT controlled to	Standard A/C multiplex sys, SO	CT									
D03-221	Refrigeration	cooled)	70F.	control temp by vintage.	Contractor	NEW	No	single	FULL	\$0.00 \$	-	\$0.00	\$22.32	\$22.32 tons
		Floating Head Pressure		. , .										
	Supermarket		Floating SCT controlled to	Standard A/C multiplex sys, SO	CT									
D03-221	Refrigeration	cooled)	70F.	control temp by vintage.	Contractor	RET	No	single	FULL	\$0.00 \$		\$0.00	\$27.90	\$27.90 tons
D03-221	Kenigeranon	cooled)	/UF.	control temp by vintage.	Contractor	KEI	INO	single	FULL	\$0.00 \$	-	30.00	\$27.90	327.90 tons
	0 1 4	EHD E. 10	EL COOT LILE	0. 1.1. 1.1.16.1										
	Supermarket		<ul> <li>Floating SCT controlled to</li> </ul>	Standard evap cooled multiples										
D03-222	Refrigeration	cooled)	70F.	sys, SCT control temp by vinta	ge.Contractor	NEW	No	single	FULL	\$0.00 \$	-	\$0.00	\$22.32	\$22.32 tons
	Supermarket	FHP, Fixed Setpoint (evap-	- Floating SCT controlled to	Standard evap cooled multiples	x									
D03-222	Refrigeration	cooled)	70F.	sys, SCT control temp by vinta		RET	No	single	FULL	\$0.00 \$	-	\$0.00	\$27.90	\$27.90 tons
	Supermarket	FHP, Variable Setpoint (air		Standard A/C multiplex sys, SO					-					
D03-223	Refrigeration	cooled)	setpoint, 70F minimum.	control temp by vintage.	Contractor	NEW	No	single	FULL	\$0.00	\$8.13	\$0.00	\$29.01	\$37.14 tons
1005-225	Supermarket					INE W	INU	single	FULL	φ <b>υ.υ</b> υ	\$0.13	30.00	φ <b>49.01</b>	⇒J1.1≒ tOHS
D02 222		FHP, Variable Setpoint (air		Standard A/C multiplex sys, SO		DET	N		ETH I	60.00	610.04	60.00	640.00	650.05
D03-223	Refrigeration	cooled)	setpoint, 70F minimum.	control temp by vintage.	Contractor	RET	No	single	FULL	\$0.00	\$10.04	\$0.00	\$40.92	\$50.95 tons
	_													
	Supermarket	FHP, Variable Setpoint	Wetbulb following SCT	Standard evap cooled multiples	X									
D03-224	Refrigeration	(evap-cooled)	setpoint, 70F minimum.	sys, SCT control temp by vinta	ge.Contractor	NEW	No	single	FULL	\$0.00	\$7.02	\$0.00	\$30.87	\$37.90 tons
				* * * * * * * * * * * * * * * * * * * *	-									·
	Supermarket	FHP, Variable Setpoint	Wetbulb following SCT	Standard evap cooled multiples	x									
D03-224	Refrigeration	(evap-cooled)	setpoint, 70F minimum.	sys, SCT control temp by vinta		RET	No	single	FULL	\$0.00	\$8.93	\$0.00	\$40.92	\$49.85 tons
1005-224	Kenigeranon	(cvap-cooled)	Ambient following SCT	3y3, SC1 control temp by vinta	ge. Contractor	IXL I	110	singic	LOLL	\$0.00	\$0.73	30.00	φ <del>4</del> 0.72	347.03 10115
	C	FIID Ward 11 Cook		Standard A/O 1011 CC	OT.									
	Supermarket	FHP, Variable Setpt &	setpoint, 70F min, variable											
D03-225	Refrigeration	Speed (air-cooled)	spd cond fan.	control temp by vintage.	Contractor	NEW	No	single	FULL	\$0.00	\$275.54	\$0.00	\$52.08	\$327.62 tons
			Ambient following SCT											
	Supermarket	FHP, Variable Setpt &	setpoint, 70F min, variable	Standard A/C multiplex sys, SO	CT									
D03-225	Refrigeration	Speed (air-cooled)	spd cond fan.	control temp by vintage.	Contractor	RET	No	single	FULL	\$0.00	\$294.33	\$0.00	\$91.66	\$385.99 tons
		- F ( )	Wetbulb following SCT						-					
	Supermarket	FHP, Variable Setpt &	setpoint, 70F min, variable	Standard evap cooled multiples	v									
D02 226						NEW	No	oincl-	EIIII	\$0.00	860 15	60.00	\$40.17	£100 22 +
D03-226	Refrigeration	Speed (evap-cooled)	spd cond fan.	sys, SCT control temp by vinta	ge.Contractor	NEW	No	single	FULL	\$0.00	\$68.15	\$0.00	\$40.17	\$108.33 tons

D03-913 Vending

Vending Machine Controller Uncooled Snack Machine none

			W 4 H C H : COT											
	Supermarket	FHP, Variable Setpt &	Wetbulb following SCT setpoint, 70F min, variable	Standard evap cooled multiplex										
D03-226	Refrigeration	Speed (evap-cooled)	spd cond fan.	sys, SCT control temp by vintag	e.Contractor	RET	No	single	FULL	\$0.00	\$151.97	\$0.00	\$68.92	\$220.89 tons
	_		Turn off fixture lights when											
D03-227	Supermarket	Display Case Lighting	store is closed (midnight- 6AM).	Tiekte en ell benne	Control	NEW	NI-	LII-	FULL	\$0.00	\$1.56	\$0.00	\$0.78	62 24 I :E4
D03-227	Refrigeration	Control	Turn off fixture lights when	Lights on all hours	Contractor	NEW	No	bulk	FULL	\$0.00	\$1.30	\$0.00	\$0.78	\$2.34 LinFt
	Supermarket	Display Case Lighting	store is closed (midnight-											
D03-227	Refrigeration	Control	6AM).	Lights on all hours	Contractor	RET	No	bulk	FULL	\$0.00	\$3.08	\$0.00	\$2.75	\$5.84 LinFt
D03-228	Supermarket Refrigeration	Zero Heat Reach-in Glass Door Cases	Eliminate anti-sweat heaters from doors.	Door and frame heaters.	Contractor	NEW	No	bulk	INCR	\$0.00	\$0.00	\$28.00	\$0.00	\$28.00 Door
D03-228	Kenigeranon	Door Cases	Holli doors.	Door and frame ficaters.	Contractor	NEW	INO	buik	INCK	\$0.00	\$0.00	\$28.00	\$0.00	\$28.00 D001
REFRIGERA	TION - WAREHOU	USE												
Measure ID	C-+	M N	M Diti	D D	Delivery Channel	A 15	Energy Star?	Purchase Volume	C4 Pi-	Base Equipment Cost	Measure Equipment Cost	Incremental	Caban Cast I	nstalled Cost Cost Unit
Measure ID	Category Warehouse	Measure Name	Measure Description Extensive refrigeration	Base Description Std. A/C multiplex, SST stpt	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost 1	Labor Cost II	stalled Cost Cost Unit
D03-301	Refrigeration	Retrocommissioning	equpiment maintenance.	reduced 3F, SCT stpt raised 2F.	Contractor	RET	No	Low	FULL	\$0.00	\$0.00	\$0.00	\$35.27	\$35.27 Tons
	Warehouse		Size cond to 5F lower TD,	Cond sized at ~24F TD, Effy an										
D03-302	Refrigeration Warehouse	Oversized evap condenser	400Btu/Watt. Size cond to 5F lower TD.	SCT based on vintage.	Contractor	NEW	No	Low	INCR	\$0.00	\$0.00	\$88.26	\$0.00	\$88.26 Tons
D03-302	Refrigeration	Oversized evap condenser	400Btu/Watt.	Cond sized at ~24F TD, Effy an SCT based on vintage.	Contractor	RET/ROB	No	Low	FULL/FULL	\$0.00	\$321.17	\$0.00	\$65.56	\$386.73 Tons
203 302	remgeration	o reisized erap condenser	Size cond to 5F lower TD,	ber oused on vintage.	Contractor	ILL PROD	110	Lon	TOLLITOLL	\$0.00	9321.17	\$0.00	- 400.00	9300.73 10113
	Warehouse	Oversized evap cond w/	400Btu/Watt, VFD & WBT	, , , , , , , , , , , , , , , , , , , ,										
D03-303	Refrigeration	FHP	following Size cond to 5F lower TD,	SCT based on vintage.	Contractor	NEW	No	Low	INCR	\$0.00	\$0.00	\$188.20	\$14.80	\$203.00 Tons
	Warehouse	Oversized evap cond w/	400Btu/Watt, VFD & WBT	Cond sized at ~24F TD, Effy an	d									
D03-303	Refrigeration	FHP	following	SCT based on vintage.	Contractor	RET/ROB	No	Low	FULL/FULL	\$0.00	\$448.18	\$0.00	\$102.10	\$550.27 Tons
	Warehouse		Add VFD to 1 comp in ea.	All compressors have slide valve										
D03-304	Refrigeration Warehouse	Variable speed compressor	s suction group.  Add VFD to 1 comp in ea.	control.  All compressors have slide valve	Contractor	NEW	No	Low	FULL	\$0.00	\$115.45	\$0.00	\$56.03	\$171.48 Tons
D03-304	Refrigeration	Variable speed compressor		control.	Contractor	RET	No	Low	FULL	\$0.00	\$159.97	\$0.00	\$106.93	\$266.90 Tons
203 301	remgeration	variable speed compressor	Add mechanical subcooler to		Continuetor		110	Lon	TOLL	\$0.00	0107.77	\$0.00	9100.73	9200.90 10115
	Warehouse		LT liq line, fed by MT	No subcooling or flash cooling of										
D03-305	Refrigeration Warehouse	Low temp subcooling	system. Floating SST control on LT	LT system liquid.  Suction temperature controlled t	Contractor	RET	No	Low	FULL	\$0.00	\$330.77	\$0.00	\$125.40	\$456.17 Tons
D03-306	Refrigeration	Floating suction pressure	and MT suction groups.	fixed setpoint.	Contractor	NEW	No	Low	FULL	\$0.00	\$0.00	\$0.00	\$27.20	\$27.20 Tons
	Warehouse		Floating SST control on LT	Suction temperature controlled t										
D03-306	Refrigeration	Floating suction pressure	and MT suction groups.	fixed setpoint.	Contractor	RET	No	Low	FULL	\$0.00	\$17.46	\$0.00	\$23.93	\$41.39 Tons
D03-307	Warehouse Refrigeration	FHP, fixed setpoint (evap cooled)	Floating SCT controlled to 70F.	SCT based on vintage, fixed setpoint with fan cycling.	Contractor	NEW	No	Low	FULL	\$0.00	\$13.33	\$0.00	\$6.80	\$20.13 Tons
D03-307	Warehouse	FHP, fixed setpoint (evap	Floating SCT controlled to	SCT based on vintage, fixed	Contractor	NEW	NO	Low	FULL	\$0.00	\$13.33	\$0.00	\$0.00	\$20.13 TORS
D03-307	Refrigeration	cooled)	70F.	setpoint with fan cycling.	Contractor	RET	No	Low	FULL	\$0.00	\$0.00	\$0.00	\$15.87	\$15.87 Tons
	Warehouse	FHP, variable setpt (evap	Wetbulb following SCT	SCT based on vintage, fixed										
D03-308	Refrigeration Warehouse	cooled) FHP, variable setpt (evap	setpoint, 70F min. Wetbulb following SCT	setpoint with fan cycling. SCT based on vintage, fixed	Contractor	NRE	No	Low	FULL	\$0.00	\$17.98	\$0.00	\$9.80	\$27.78 Tons
D03-308	Refrigeration	cooled)	setpoint, 70F min.	setpoint with fan cycling.	Contractor	RET	No	Low	FULL	\$0.00	\$6.15	\$0.00	\$19.60	\$25.75 Tons
			Wetbulb following SCT	, ,										
	Warehouse	FHP, VSP and VFD (evap												
D03-309	Refrigeration	cooled)	cond. Wetbulb following SCT	setpoint with fan cycling.	Contractor	NEW	No	Low	FULL	\$0.00	\$112.21	\$0.00	\$14.80	\$127.01 Tons
	Warehouse	FHP, VSP and VFD (evap		SCT based on vintage, fixed										
D03-309	Refrigeration	cooled)	cond.	setpoint with fan cycling.	Contractor	RET	No	Low	FULL	\$0.00	\$129.26	\$0.00	\$33.50	\$162.76 Tons
			<u></u>										-	
VENDING M	ACHINE CONTRO	JLS			Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis		Equipment Cost		Labor Cost In	stalled Cost Cost Unit
				·	Retail/Contra	act								
D03-912	Vending	Vending Machine Controll	erCold Drink Vending Machin	ne none	or D-t-:1/Ct-	RET/NEW	No	Low	FULL/FULL	\$0.00	\$180.00	\$0.00	\$35.50	\$215.50 Machine
D03-912	Vending	Vending Machine Controll	erCold Drink Vending Machin	ne none	Retail/Contra or	act RET/NEW	No	High	FULL/FULL	\$0.00	\$154.72	\$0.00	\$28.17	\$182.88 Machine
203-712	, chang	, chang machine control	e. co.a Dinik venang Macini	ic none	Retail/Contra		110		. OLL/I OLL	\$0.00	9154./2	\$0.00	920.17	\$102.00 Macmile
D03-913	Vending	Vending Machine Controll	erUncooled Snack Machine	none	or	RET/NEW	No	Low	FULL/FULL	\$0.00	\$75.00	\$0.00	\$33.00	\$108.00 Machine
					Retail/Contra	act								

High

FULL/FULL

\$0.00

\$71.53

\$0.00

\$25.67

\$97.20 Machine

RET/NEW

WINDOWS	COM	AEDCIAI.

M ID	C-+	M N	M Diti	Dana Danasindian	Delivery	A 15 45	Energy Star?	Purchase Volume	Cost Basis	Base Equipment	Measure Equipment Cost	Incremental	Taban Cart 1	(
Measure ID	Category	Measure Name	Measure Description	Base Description glass type as defined by location	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost	Installed Cost Cost U
03-017	Commercial Window		than required by T-24	and window-wall ratio	Contractor	RET/NEW	No	High	FULL/INCR	\$25.38	\$24.02	(\$1.35)	\$4.92	\$28.94 SqFt
			East glass SHGC 20% less	glass type as defined by location				8		4-0.00	4==	(41.01)	4	
003-018	Commercial Window		than required by T-24	and window-wall ratio	Contractor	RET/NEW	No	High	FULL/INCR	\$33.21	\$40.20	\$6.99	\$4.92	\$45.12 SqFt
		Sourth glass SHGC 20%		glass type as defined by location				8		*****		****	4	
003-019	Commercial Window	ws less than required	than required by T-24	and window-wall ratio	Contractor	RET/NEW	No	High	FULL/INCR	\$33.21	\$40.20	\$6.99	\$4.92	\$45.12 SqFt
		West glass SHGC 20% les	s West glass SHGC 20% less	glass type as defined by location										•
003-020	Commercial Window	wsthan required	than required by T-24	and window-wall ratio	Contractor	RET/NEW	No	High	FULL/INCR	\$33.21	\$40.20	\$6.99	\$4.92	\$45.12 SqFt
		North glass SHGC 20% le	ss North glass SHGC 20% less	glass type as defined by location				_						•
003-021	Commercial Window	wsthan required	than required by T-24	and window-wall ratio	Contractor	RET/NEW	No	High	FULL/INCR	\$25.38	\$28.10	\$2.72	\$4.92	\$33.01 SqFt
		East glass SHGC 30% less	East glass SHGC 30% less	glass type as defined by location										
003-022	Commercial Window		than required by T-24	and window-wall ratio	Contractor	RET/NEW	No	High	FULL/INCR	\$33.21	\$47.17	\$13.96	\$4.92	\$52.08 SqFt
		Sourth glass SHGC 30%	South glass SHGC 30% less	glass type as defined by location										
003-023	Commercial Window		than required by T-24	and window-wall ratio	Contractor	RET/NEW	No	High	FULL/INCR	\$33.21	\$47.17	\$13.96	\$4.92	\$52.08 SqFt
			is West glass SHGC 30% less	glass type as defined by location										
03-024	Commercial Window		than required by T-24	and window-wall ratio	Contractor	RET/NEW	No	High	FULL/INCR	\$33.21	\$47.17	\$13.96	\$4.92	\$52.08 SqFt
		High perf glass (PI 1.15)	High perf glass (PI 1.15) and											
			e- cont dayltg ctrls in side-lit	base case has std glass types, no										
003-025	Commercial Window		spaces	daylighting controls	Contractor	RET/NEW	No	High	FULL/INCR	\$41.07	\$45.91	\$4.83	\$5.15	\$51.06 SqFt
		High perf glass (PI 1.26)												
			e- performance index in daylit	base case has std glass types, no										
003-026	Commercial Window		spaces, cont. ctrl	daylighting controls	Contractor	RET/NEW	No	High	FULL/INCR	\$41.07	\$45.91	\$4.83	\$5.15	\$51.06 SqFt
		High perf glass (PI 1.38)	glass w/ indicated											
			e- performance index in daylit	base case has std glass types, no	_									
003-027	Commercial Window		spaces, cont. ctrl	daylighting controls	Contractor	RET/NEW	No	High	FULL/INCR	\$41.07	\$45.91	\$4.83	\$5.15	\$51.06 SqFt
		High perf glass (PI 1.15)	glass w/ indicated											
		and 2-step dayltg ctrls in	performance index in daylit	base case has std glass types, no		D DOWN LOVE		***	DITT TO TOO	0.44.0	0.00.00			040.04.0.7
03-028	Commercial Window		spaces, 2-step ctrl glass w/ indicated	daylighting controls	Contractor	RET/NEW	No	High	FULL/INCR	\$41.07	\$43.69	\$2.62	\$5.15	\$48.84 SqFt
		High perf glass (PI 1.26)	0	1 1 11 1										
02.020	C : 1W: 1	and 2-step dayltg ctrls in	performance index in daylit	base case has std glass types, no		DETAILEN	N	xx: 1	PLIL I (D.ICD	641.07	0.42.60	60.60	65.15	640.04.C.Fr
003-029	Commercial Window	Wsside-lit spaces High perf glass (PI 1.38)	spaces, 2-step ctrl glass w/ indicated	daylighting controls	Contractor	RET/NEW	No	High	FULL/INCR	\$41.07	\$43.69	\$2.62	\$5.15	\$48.84 SqFt
		and 2-step dayltg ctrls in	performance index in daylit	base case has std glass types, no										
202 020	C			0 7, 7	Control	DETAILW	NI-	TT: -b	ELIL I /INICD	641.07	643.00	60.70	65.15	640.04.C-E:
D03-030	Commercial Window	wsside-iit spaces	spaces, 2-step ctrl	daylighting controls	Contractor	RET/NEW	No	High	FULL/INCR	\$41.07	\$43.69	\$2.62	\$5.15	\$48.84 SqFt

## WINDOWS - FILMS AND SUNSCREENS

					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost	Installed Cost Cost Unit
		Single Pane Clear Glass	Single Pane Clear Glass Wi	h	retail/contracto	)								
D03-443	Window Films	With Reflective Film	Reflective Film	NA	r	RET	No	High	FULL	\$0.00	\$1.49	\$0.00	\$0.64	\$2.13 SqFt
		Single Pane Clear Glass												
		With Spectrally Selective	Single Pane Clear Glass Wit	th	retail/contracto	)								
D03-444	Window Films	Film	Spectrally Selective Film	NA	r	RET	No	High	FULL	\$0.00	\$2.06	\$0.00	\$0.64	\$2.70 SqFt
		Single Pane Clear Glass	Single Pane Clear Glass Wi	h	retail/contracto	)								
D03-445	Window Films	With Standard Film	Standard Film	NA	r	RET	No	High	FULL	\$0.00	\$0.90	\$0.00	\$0.64	\$1.54 SqFt
		Default Window With	Default Window With		retail/contracto	)								
D03-442	SunScreens	Sunscreen	Sunscreen	NA	r	RET/NEW	No	High	FULL/FULL	\$0.00	\$0.63	\$0.00	\$0.64	\$1.27 SqFt

## WINDOWS - RESIDENTIAL

					Delivery		Energy	Purchase		Base Equipment	Measure	Incremental		
Measure ID	Category	Measure Name	Measure Description	Base Description	Channel	Application	Star?	Volume	Cost Basis	Cost	Equipment Cost	Equipment Cost	Labor Cost 1	Installed Cost Cost Unit
		U-0.50 / SHGC-0.65 (clear)	) U-0.50 / SHGC-0.65 (clear)											
D03-446	Residential Windows	Window	Window	Double Pane Clear Window	Contractor	RET/NEW	No	Low	FULL/INCR	\$16.41	\$17.13	\$0.72	\$2.07	\$19.20 SqFt
		U-0.40 / SHGC-0.65 (clear)	) U-0.40 / SHGC-0.65 (clear)											
D03-447	Residential Windows		Window	Double Pane Clear Window	Contractor	RET/NEW	No	Low	FULL/INCR	\$16.41	\$11.03	(\$5.38)	\$2.07	\$13.10 SqFt
			) U-0.35 / SHGC-0.55 (clear)											
D03-448	Residential Windows		Window	Double Pane Clear Window	Contractor	RET/NEW	No	Low	FULL/INCR	\$16.41	\$11.85	(\$4.56)	\$2.07	\$13.92 SqFt
		U-0.25 / SHGC-0.35 (clear)	) U-0.25 / SHGC-0.35 (clear)											
D03-449	Residential Windows		Window	Double Pane Clear Window	Contractor	RET/NEW	Yes	Low	FULL/INCR	\$16.41	\$13.48	(\$2.93)	\$2.07	\$15.55 SqFt
		U-0.50 / SHGC-0.40 (tint)	U-0.50 / SHGC-0.40 (tint)											
D03-450	Residential Windows	Window	Window	Double Pane Clear Window	Contractor	RET/NEW	No	Low	FULL/INCR	\$16.41	\$26.79	\$10.38	\$2.07	\$28.86 SqFt
		U-0.40 / SHGC-0.40 (tint)	U-0.40 / SHGC-0.40 (tint)											
D03-451	Residential Windows		Window	Double Pane Clear Window	Contractor	RET/NEW	Yes	Low	FULL/INCR	\$16.41	\$20.70	\$4.29	\$2.07	\$22.77 SqFt
		U-0.35 / SHGC-0.32 (tint)	U-0.35 / SHGC-0.32 (tint)											
D03-452	Residential Windows		Window	Double Pane Clear Window	Contractor	RET/NEW	Yes	Low	FULL/INCR	\$16.41	\$20.74	\$4.33	\$2.07	\$22.81 SqFt
		U-0.25 / SHGC-0.22 (tint)	U-0.25 / SHGC-0.22 (tint)											
D03-453	Residential Windows	Window	Window	Double Pane Clear Window	Contractor	RET/NEW	Yes	Low	FULL/INCR	\$16.41	\$18.51	\$2.10	\$2.07	\$20.58 SqFt

# Appendix B: Measure Cost Data

	U-0.50 / SHGC-0.40 (tint)	U-0.50 / SHGC-0.40 (tint)											
D03-454	Residential Windows Window	Window	Double Pane Tinted Window	Contractor	RET/NEW	No	Low	FULL/INCR	\$16.41	\$26.79	\$10.38	\$2.07	\$28.86 SqFt
	U-0.40 / SHGC-0.40 (tint)	U-0.40 / SHGC-0.40 (tint)											
D03-455	Residential Windows Window	Window	Double Pane Tinted Window	Contractor	RET/NEW	Yes	Low	FULL/INCR	\$16.41	\$20.70	\$4.29	\$2.07	\$22.77 SqFt
	U-0.35 / SHGC-0.32 (tint)	U-0.35 / SHGC-0.32 (tint)											
D03-456	Residential Windows Window	Window	Double Pane Tinted Window	Contractor	RET/NEW	Yes	Low	FULL/INCR	\$16.41	\$20.74	\$4.33	\$2.07	\$22.81 SqFt
	U-0.25 / SHGC-0.22 (tint)	U-0.25 / SHGC-0.22 (tint)											
D03-457	Residential Windows Window	Window	Double Pane Tinted Window	Contractor	RET/NEW	Yes	Low	FULL/INCR	\$16.41	\$18.51	\$2.10	\$2.07	\$20.58 SqFt

# APPENDIX C: ANALYTIC METHODS, OBSERVATIONS, AND MEASURE STATISTICS

Non-Residential Weather Sensitive Analytic Methods, Observations, and Measure Statistics

Residential Weather Sensitive Analytic Methods, Observations, and Measure Statistics

Non-Residential and Residential Non-Weather Sensitive Analytic Methods, Observations, and Measure Statistics

Refrigeration Analytic Methods, Observations, and Measure Statistics

Appendix C: Non-Residential Weather Sensitive Analytic Methods, Observations and Measure Statistics

						Measure					Base		
Measure ID	Measure Name	Analytic Method	No. of Observations	Mean	Min	Max	Precision @ 95%	R^2	Mean	Min	Max	Precision @ 95%	R^2
	Occupancy Sensor Pack-200 SF	Weighted average	19										
D03-004	Occupancy Sensor Pack-1000 SF	Weighted average	6										
D03-005	DayLtg Controls, Side Ltg, Cont. Ctrl	Weighted average	26										ĺ
D03-006	DayLtg Controls, Side Ltg, 2-step Ctrl	Weighted average	12										
D03-007	DayLtg Controls, Top Ltg, Cont. Ctrl	Weighted average	8										
D03-008	DayLtg Controls, Top Ltg, 1-step Ctrl	Weighted average	4										
D03-009	DayLtg Controls, Top Ltg, 2-step Ctrl	Weighted average	8										
D03-010	Timeclock for Lighting	Weighted average	15										
D03-013	Ceiling/Roof Insulation	regression	23					0.345					
D03-014	Tank Insulation-Fiber Blanket	regression	10					0.395					
D03-016	Light Colored Roof	Regression	25					0.129					
D03-017	Low SHGC Windows -15% - North	Regression	27					0.530					ĺ
D03-018	Low SHGC Windows -20% - East	Regression	27					0.530					
D03-019	Low SHGC Windows -20% - South	Regression	27					0.530					1
D03-020	Low SHGC Windows -20% - West	Regression	27					0.530					
D03-021	Low SHGC Windows -20% - North	Regression	27					0.530					
D03-022	Low SHGC Windows -30% - East	Regression	27					0.530					
D03-023	Low SHGC Windows -30% - South	Regression	27					0.530					
D03-024	Low SHGC Windows -30% - West	Regression	27					0.530					
D03-025	Hi Perf. Glass, PI=1.15, Side Ltg, Cont. Ctrl	Measure = Regression, Base = Average	27					0.530	\$ 41.07	\$ 7.30	\$ 85.67	28%	
D03-026	Hi Perf. Glass, PI=1.26, Side Ltg, Cont. Ctrl	Measure = Regression, Base = Average	27					0.530	\$ 41.07	\$ 7.30	\$ 85.67	28%	
D03-027	Hi Perf. Glass, PI=1.38, Side Ltg, Cont. Ctrl	Measure = Regression, Base = Average	27					0.530	\$ 41.07	\$ 7.30	\$ 85.67	28%	
D03-028	Hi Perf. Glass, PI=1.15, Side Ltg, 2- Step Ctrl	Measure = Regression, Base = Average	27					0.530	\$ 41.07	\$ 7.30	\$ 85.67	28%	
D03-029		Measure = Regression, Base = Average	27					0.530	\$ 41.07	\$ 7.30	\$ 85.67	28%	
		Measure = Regression, Base = Average	27					0.530	\$ 41.07	\$ 7.30	\$ 85.67	28%	
	Hi Perf. Glass, PI=0.81, Top Ltg, Cont. Ctrl	Regression	81					0.001					
D03-032	Hi Perf. Glass, PI=0.92, Top Ltg, Cont. Ctrl	Regression	81					0.001					
D03-033	Hi Perf. Glass, PI=1.03, Top Ltg, Cont. Ctrl	Regression	81					0.001					
D03-034	Hi Perf. Glass, PI=0.81, Top Ltg, 1- Step Ctrl	Regression	81					0.001					
D03-037	Hi Perf. Glass, PI=0.81, Top Ltg, 2- Step Ctrl	Regression	81					0.001					
	Hi Perf. Glass, PI=0.92, Top Ltg, 2- Step Ctrl	Regression	81					0.001					

Appendix C: Non-Residential Weather Sensitive Analytic Methods, Observations and Measure Statistics

• •		,					Measure						Base		
Measure ID	Measure Name	Analytic Method	No. of Observations	Mean	Min	1	Max	Precision @ 95%	R^2	Mean		Min	Max	Precision @ 95%	R^2
D03-039	Hi Perf. Glass, PI=1.03, Top Ltg, 2- Step Ctrl	Regression	81						0.001						
D03-040	High Efficiency Centrifugal Chillers < 150 Tons	Regression	26						0.779						0.645
D03-041	High Efficiency Air-Cooled Recip Packaged Chillers	Weighted Average	13												
D03-042	High Efficiency VSD Centrifugal Chillers < 150 Tons	Regression	21						0.656						0.847
D03-043	Gas Absorption Chiller	Weighted Average	39												
D03-044	Chilled Water Reset	Custom	6												
D03-045	Hot Water Reset	Custom	7												
D03-046	Variable Flow Chilled Water Loop	Custom	8												
D03-047	VSD Chilled Water Loop Pump	Custom	8												
D03-048	Variable Flow Hot Water Loop	Custom	8												
D03-049	VSD Hot Water Loop Pump	Custom	8												
D03-050	Variable Air Volume Box	Regression	24						0.601						
D03-051	VSD Supply Fan Motors	Regression	21						0.279						
D03-052	Fan Powered Mixing Boxes	Regression	16						0.552						
D03-053	Evap Cool Indirect - Central System	Regression	18						0.006						
D03-054	Evap Cool Indirect - Packaged Sys	Regression	19						0.155						
D03-055	Reducing Overventilation	Average	5	\$ 39.84	\$ 15	5.60	\$ 72.00	53%							
D03-056	Air To Air Heat Exchanger	Regression	15						0.011						
D03-057	Rotary Heat Recovery	Regression	22						0.093						
D03-058	Economizer - Packaged System	Regression	6						0.670						
D03-060	Economizer Maintenance	Regression	5						0.159						
D03-061	Clean Condenser Coils	Regression	23						0.216						
D03-062	Cooling Tower for Packaged System		10												
D03-063	Two-Speed Cooling Tower Fans	Custom	28												
D03-064	VSD Cooling Tower Fans	Custom	36												
D03-065	Efficient Gas Furnace	Not priced													
D03-066	High Efficiency Large Boilers	regression	243						0.701						
D03-067	High Efficiency Small HW Boilers	regression	205						0.897						
D03-068	High Efficiency Small Steam Boilers	regression	38						0.941						
D03-069	Efficient Water Source Heat Pump	average	13	\$ 740.93	\$ 503	3.80	\$ 1,116.00	29%		\$ 561.1	4 \$	378.60	\$ 1,032.00	25%	
D03-070	Hydronic Heat Pump Var Flow Valve	Custom	13	Ψ 740.23	ψ 303	2.00	ψ 1,110.00	2270		Φ 301.1	Τ Ψ	376.66	ų 1,032.00	2370	
D03-071	Time Clocks (heating/cooling)	Average	51	\$ 162.08	\$ 45	5.00	\$ 426.50	16%	1						
D03-072	Energy Management System	Regression	55		1				0.187						
D03-073	Setback Programmable Thermostats	Median	55												
D03-075	Duct Insulation Material	average	10	\$ 0.68	8 8 (	0.23	\$ 1.04	24%							
D03-078	H.E. Air-Cooled Package A/C < 65k (single phase)	Custom	35	φ σ.σ.ς	, , ,	0.23	<u> </u>	2170							
D03-079	H.E. Air-Cooled Split/Package A/C 65k-134k	Average	22	\$ 757.38	\$ 553	3.50	\$ 903.53	21%		\$ 608.2	5 \$	435.90	\$ 780.60	56%	
D03-080	H.E. Air-Cooled Package HP < 65k (single phase)	Custom	9												
D03-081	H.E. Air-Cooled Split/Package HP 65k-134k	Custom	7												

Appendix C: Non-Residential Weather Sensitive Analytic Methods, Observations and Measure Statistics

		-					M	easure						Ba	ise		
Measure ID	Measure Name	Analytic Method	No. of Observations	Mean		Min		Max	Precision @ 95%	R^2	Mean		Min		Max	Precision @ 95%	R^2
D03-082	H.E. Evap/Water-Cooled Pkg A/C < 65k	average	10	\$ 740.9	3 \$	503.80	\$	1,116.00	29%		\$ 573.0	7 \$	378.60	\$	1,032.00	41%	
D03-083	H.E. Evap/Water-Cooled Pkg A/C >=65k	custom	14														
D03-084	H.E. Package Terminal A/C < 7k	Regression	69							0.957							
D03-085	H.E. Package Terminal HP < 7k	Regression	35							0.964							
D03-086	Efficient HVAC Motors - Supply Fans	Weighted Average	84														
D03-087	Efficient HVAC Motors - Return Fans	Weighted Average	84														
D03-088	Efficient HVAC Motors - Clg Tower Fans	weighted average	59														
D03-089	Effic. Motors - Chilled Water Loop Pumps	Weighted Average	84														
D03-090	Effic. Motors - Hot Water Loop Pumps	weighted average	84														
D03-091	Effic. Motors - Cond. Water Loop Pumps	weighted average	84														
D03-092	High Efficiency Gas Water Heater	Average	27	\$ 534.4	4 \$	394.00	\$	1,002.30	33%		\$ 455.7	3 \$	308.00	\$	1,131.92	21%	1
D03-093	Gas Tankless Water Heating	measure = regression, base = average	31							0.573	\$ 1,844.1	9 \$	709.72	\$	3,498.23	26%	
D03-094	Point of Use Water Heating	regression	146							0.776							0.546
D03-095	Circulation Pump Timeclock Retrofit	average	4	\$ 59.0	0 \$	46.75	\$	69.62	16%								
D03-096	High Eff Large Size Gas Water Heater	regression	88							0.255							
D03-097	High Eff Med Size Gas Water Heater	regression	88							0.255							
D03-098	Water Side Economizer	Custom	17														
D03-099	H.E. Package Terminal A/C 7k-15k	Regression	69							0.957							
D03-100	H.E. Package Terminal A/C > 15k	Regression	69							0.957							
D03-101	H.E. Package Terminal HP 7k-15k	Regression	35							0.964							
D03-102	H.E. Package Terminal HP > 15k	Regression	35							0.964							
D03-103	H.E. Air-Cooled Split/Package A/C 135-239k	Average	21	\$ 785.7	7 \$	404.20	\$	1,305.00	8%		\$ 674.8	8 \$	409.02	\$	1,000.00	33%	
D03-104	H.E. Air-Cooled Split/Package A/C 240-759k	Measure = Average, Base = Custom	21	\$ 649.6	3 \$	649.63	\$	649.63	N/A								
D03-105	H.E. Air-Cooled Split/Package A/C >= 760k	Measure = Average, Base = Custom	21	\$ 555.1	5 \$	555.15	\$	555.15	N/A								
D03-108	H.E. Air-Cooled Split A/C < 65k (3 phase before 2008)	Regression	44							0.775							
D03-109	H.E. Air-Cooled Package A/C < 65k (12 SEER, 3 phase before 2008)	Custom	34														
D03-110	H.E. Air-Cooled Package A/C < 65k (13 SEER, 3 phase before 2008)	Custom	34														
D03-111	H.E. Air-Cooled Split HP < 65k (3 phase before 2008)	Regression	38							0.540							
D03-112	H.E. Air-Cooled Package HP < 65k (12 SEER, 3 phase before 2008)	Custom	9														

Appendix C: Non-Residential Weather Sensitive Analytic Methods, Observations and Measure Statistics

••		•				Measure					Base		
Measure ID	Measure Name	Analytic Method	No. of Observations	Mean	Min	Max	Precision @ 95%	R^2	Mean	Min	Max	Precision @ 95%	R^2
D03-113	H.E. Air-Cooled Package HP < 65k (13 SEER, 3 phase before 2008)	Custom	9										
D03-114		Regression	5					1.000					
	High Efficiency Water-Cooled Recip Chillers		5	\$ 478.86	\$ 268.66	\$ 637.93	45%		\$ 462.59	\$ 348.62	\$ 576.55	48%	
	High Efficiency Centrifugal Chillers 150-299 Tons		26					0.779					0.645
D03-117	High Efficiency Centrifugal Chillers >= 300 Tons	Regression	26					0.779					0.645
D03-118		Regression	7					0.978					
D03-119	High Efficiency Screw Chillers 150- 299 Tons	Regression	7					0.978					
D03-120	High Efficiency Screw Chillers >= 300 Tons	Regression	7					0.978					
D03-121	High Efficiency VSD Centrifugal Chillers 150-299 Tons	Regression	21					0.656					0.847
D03-122	High Efficiency VSD Centrifugal Chillers >= 300 Tons	Regression	21					0.656					0.847
D03-123	Floor Insulation	regression	22					0.803					ĺ
D03-124	H.E. Air-Cooled Split/Package HP >= 760k	Custom	7										

Appendix C: Residential Weather Sensitive Analytic Methods, Observations and Measure Statistics

						ľ	Measure					Base		
Measure ID	Measure Name	Analytic Method	No. of Observations	Mean	Min		Max	Precision @ 95%	R^2	Mean	Min	Max	Precision @ 95%	R^2
D03-401	Programmable Thermostat	Average of all costs at or below median	50	\$ 56.37	\$ 27.50	\$	80.00	7%						
D03-402	13 SEER(11.09 EER) Split System Air Conditioner	regression	27						0.420					
D03-403	14 SEER(12.15 EER) Split-System Air Conditioner	regression	27						0.420					
D03-404	15 SEER(12.72 EER) Split-System Air Conditioner	regression	27						0.420					
D03-463	16 SEER (11.61 EER) Split System Air Conditioner	regression	27						0.420					
D03-464	17 SEER (12.28 EER) Split-System Air Conditioner	regression	27						0.420					
D03-465	18 SEER (13.37 EER) Split-System Air Conditioner	regression	26						0.420					
D03-405	Direct Evaporative Cooler	Measure = Average Base = Weighted Average	55	\$ 813.44	\$ 250.00	\$	5 1,444.00	9%						
D03-406	Indirect Evaporative Cooler	Not priced	-											
D03-407	Direct-Indirect Evaporative Cooler	Measure = Average Base = Weighted Average	15	\$ 1,553.00	\$ 1,553.00	\$	3 1,553.00	single observation						
D03-408	Refrigerant charge - typical charge adjustment	Average	10	\$ 10.36	\$ 3.08	\$	28.83	45%						
D03-409	Refrigerant charge - high charge adjustment	Average	10	\$ 17.87	\$ 6.00	\$	37.00	33%						
D03-410	Condensing 90 AFUE(1.11 HIR) Furnace	regression	99						0.662					0.095
D03-411	Condensing 92 AFUE(1.08 HIR) Furnace	regression	99						0.662					0.095
D03-412	Condensing 94 AFUE(1.06 HIR) Furnace	regression	98						0.662					0.095
D03-413	Condensing 96 AFUE(1.03 HIR) Furnace	regression	98						0.662					0.095
D03-414	13 SEER(11.07 EER)/8.1 HSPF(3.28 COP) A/C Heat pump	Regression	29						0.969					
D03-415	14 SEER(12.19 EER)/8.6 HSPF(3.52 COP) A/C Heat Pump	Regression	29						0.969					
D03-416	15 SEER(12.70 EER)/8.8 HSPF(3.74 COP) A/C Heat Pump	Regression	29						0.969					
D03-466	16 SEER (12.06 EER) / 8.4 HSPF (3.48 COP) A/C Heat Pump	Regression	28						0.969					
D03-467	17 SEER (12.52 EER) / 8.6 HSPF (3.26 COP) A/C Heat Pump	Regression	28						0.969					
D03-417	18 SEER(12.8 EER)/9.2 HSPF(3.66 COP) A/C Heat Pump	Regression	28						0.969					
D03-418	Duct Sealing (Total Leakage Reduction 28% of AHU flow)	Custom	6											
D03-420		regression	23						0.345					

Appendix C: Residential Weather Sensitive Analytic Methods, Observations and Measure Statistics

								Measure	е					Base		
Measure ID	Measure Name	Analytic Method	No. of Observations	N	Iean	N	Min	Max	ĸ	Precision @ 95%	R^2	Mean	Min	Max	Precision @ 95%	R^2
D03-423	R-38 Insulation-Batts	regression	23								0.345					
D03-424	R-49 Insulation-Batts	regression	23								0.345					
D03-426	Floor R-0 to R-19 Insulation Batts	regression	22								0.803					
D03-427	Floor R-0 to R-30 Insulation Batts	regression	22								0.803					
D03-428	Floor R-19 to R-30 Insulation-Batts	regression	22								0.803					
D03-429	Wall 2x4 R-15 Insulation-Batts	regression	22								0.803					
D03-430	Wall 2x6 R-19 Insulation-Batts	regression	22								0.803					í
D03-431	Wall 2x6 R-21 Insulation-Batts	regression	22								0.803					
D03-435	Wall 2x4 R-13 Batts + R-5 Rigid	measure = average & regression base = regression	47	\$	0.45	\$	0.31	\$	0.59	36%						0.803
D03-436	Wall 2x6 R-19 Batts + R-5 Rigid	measure = average & regression; base = regression (see notes)	47	\$	0.45	\$	0.31	\$	0.59	36%						0.803
D03-437	Wall 2x6 R-21 Batts + R-5 Rigid	measure = average & regression; base = regression (see notes)	47	\$	0.45	\$	0.31	\$	0.59	36%						0.803
D03-438	Wall Blow-In R-0 to R-13 Insulation	regression	10								0.031					
D03-441	Whole House Fans	Average	10	\$	400.56	\$ 3	302.25	\$ 56	68.00	12%						
D03-442	Default Window With Sunscreen	Regression	68								0.203					
D03-443	Single Pane Clear Glass With Reflective Film	Regression	25								0.031					
D03-444	Single Pane Clear Glass With Spectrally Selective Film	Regression	10								0.621					
D03-445	Single Pane Clear Glass With Standard Film	Regression	33								0.004					
D03-446	U-0.50/SHGC-0.65 (clear) Window	regression	30								0.070					1
D03-447	U-0.40/SHGC-0.65 (clear) Window	regression	30								0.070					
D03-448	U-0.35/SHGC-0.55 (clear) Window	regression	30								0.070					
D03-449	U-0.25/SHGC-0.35 (clear) Window	regression	30								0.070					
D03-450	U-0.50/SHGC-0.40 (tint) Window	regression	30								0.070					
D03-451	U-0.40/SHGC-0.40 (tint) Window	regression	30								0.070					
D03-452	U-0.35/SHGC-0.32 (tint) Window	regression	30								0.070					1
D03-453	U-0.25/SHGC-0.22 (tint) Window	regression	30								0.070					
D03-454	U-0.50 / SHGC-0.40 (tint) Window	regression	30								0.070					
D03-455	U-0.40 / SHGC-0.40 (tint) Window	regression	30								0.070					
D03-456	U-0.35 / SHGC-0.32 (tint) Window	regression	30								0.070					
D03-457	U-0.25 / SHGC-0.22 (tint) Window	regression	30								0.070					
D03-460	Refrigerant charge - high charge adjustment & duct sealing	Average	10	\$	17.87	\$	6.00	\$ 3	37.00	33%						

Appendix C: Non-Residential and Residential Non-Weather Sensitive Analytic Methods, Observations and Measure Statistics

						Measure					Base		
Measure ID	Measure Name	Analytic Method	No. of Observations	Mean	Min	Max	Precision @ 95%	R^2	Mean	Min	Max	Precision @ 95%	R^2
D03-801	13 Watt Intergral CFL	Base: Average; Measure: Regression	26					0.894	\$ 0.57	\$ 0.36	\$ 1.25	58%	
D03-802	13 Watt Intergral CFL	Base: Average; Measure: Regression	31					0.936	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-803	14 Watt Intergral CFL	Base: Average; Measure: Regression	31					0.936	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-804	15 Watt Intergral CFL	Base: Average; Measure: Regression	31					0.936	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-805	16 Watt Intergral CFL	Base: Average; Measure: Regression	31					0.936	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-806	18 Watt Intergral CFL	Base: Average; Measure: Regression	31					0.936	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-807	18 Watt Intergral CFL	Base: Average; Measure: Regression	29					0.900	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-808	19 Watt Intergral CFL	Base: Average; Measure: Regression	29					0.900	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-809	20 Watt Intergral CFL	Base: Average; Measure: Regression	29					0.900	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-810	23 Watt Intergral CFL	Base: Average; Measure: Regression	35					0.933	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-811	25 Watt Intergral CFL	Base: Average; Measure: Regression	29					0.900	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-812	25 Watt Intergral CFL	Base: Average; Measure: Regression	35					0.933	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-813	26 Watt Intergral CFL	Base: Average; Measure: Regression	29					0.900	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-814	26 Watt Intergral CFL	Base: Average; Measure: Regression	35					0.933	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-815	28 Watt Intergral CFL	Base: Average; Measure: Regression	35					0.933	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-816	30 Watt Intergral CFL	Base: Average; Measure: Regression	35					0.933	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-817	36 Watt Intergral CFL	Base: Average; Measure: Regression	16					0.959	\$ 2.22	\$ 1.09	\$ 2.98	34%	
D03-818	40 Watt Intergral CFL	Base: Average; Measure: Regression	16					0.959	\$ 2.22	\$ 1.09	\$ 2.98	34%	
D03-819	13 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.57	\$ 0.36	\$ 1.25	58%	
D03-820	13 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-821	14 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-822	15 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	

Appendix C: Non-Residential and Residential Non-Weather Sensitive Analytic Methods, Observations and Measure Statistics

			·			Measure					Base		
Measure ID	Measure Name	Analytic Method	No. of Observations	Mean	Min	Max	Precision @ 95%	R^2	Mean	Min	Max	Precision @ 95%	R^2
D03-825	18 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-826	19 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-827	20 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-828	23 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-829	25 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-830	25 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-831	26 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-832	26 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-833	28 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-834	30 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-835	40 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 0.61	\$ 0.36	\$ 1.42	66%	
D03-836	55 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 2.22	\$ 1.09	\$ 2.98	34%	
D03-837	65 Watt Modular CFL	Dual Regression on Ballast and Lamp for measure; average for base	137					N/A	\$ 2.22	\$ 1.09	\$ 2.98	34%	
D03-838	20W CFL Table Lamp	average	38	\$ 50.43	\$ 22.95	\$ 73.99	14%		\$ 50.43	\$ 22.95	\$ 73.99	14%	
D03-839	25W CFL Table Lamp	average	36	\$ 61.13	\$ 39.00	\$ 79.95	12%		\$ 61.13		\$ 79.95	12%	
D03-840	32W CFL Table Lamp	average	42	\$ 63.20			16%		\$ 63.20		\$ 119.00	16%	

Appendix C: Non-Residential and Residential Non-Weather Sensitive Analytic Methods, Observations and Measure Statistics

						Measure					Base		
Measure ID	Measure Name	Analytic Method	No. of Observations	Mean	Min	Max	Precision @ 95%	R^2	Mean	Min	Max	Precision @ 95%	R^2
D03-841	50W CFL Table Lamp	average	6	\$ 122.96	\$ 99.99	\$ 136.95	18%		\$ 122.96	\$ 99.99	\$ 136.95	18%	
D03-842	55W CFL Torchiere	Average	42	\$ 59.39	\$ 12.73	\$ 89.99	15%		\$ 59.39	\$ 12.73	\$ 89.99	15%	
D03-843	70W CFL Torchiere (two bulbs)	Average	40	\$ 55.76	\$ 12.73	\$ 149.99	21%		\$ 55.76	\$ 12.73	\$ 149.99	21%	
D03-844	50W Metal Halide	Average	5	\$ 102.29	\$ 56.06	\$ 161.53	38%						
D03-845	75W Metal Halide	Average	8	\$ 120.09	\$ 56.06	\$ 154.80	19%						ĺ
D03-846	100W Metal Halide	Average	7	\$ 126.66	\$ 68.98	\$ 172.58	19%						1
D03-847	175W PS Metal Halide	Average	5	\$ 129.01	\$ 91.82	\$ 182.25	23%						

Appendix C: Non-Residential and Residential Non-Weather Sensitive Analytic Methods, Observations and Measure Statistics

			-				Mea	asure							Ba	ise		
Measure ID	Measure Name	Analytic Method	No. of Observations	Ме	an	Min		Max	Precision @ 95%	R^2		Mean		Min		Max	Precision @ 95%	R^2
D03-850	200W HPS	Average	2		91.05	\$ 68.25	\$	113.84	49%									
D03-851	180W LPS	Average	8		74.62	\$ 44.10	\$	101.66	16%									
D03-852	Premium T8 El Ballast	average	16		23.42	\$ 15.63	\$	32.54	21%		\$		\$	13.11	\$	26.99	18%	
D03-853	T8 32W Dimming El Ballast	average	21		72.89	\$ 44.34	\$	104.99	16%		\$	16.54	\$	11.50	\$	21.51	19%	
D03-854	De-lamp from 4', 4 lamp/fixture	labor cost = average	46		22.63	\$ 16.75	\$	29.25	4%									
D03-855	De-lamp from 8', 4 lamp/fixture	labor cost = average	46			\$ 16.75	\$	29.25	4%									
D03-856	Occ-Sensor - Wall box	average	3		42.28	\$ 28.65	\$	65.90	55%									
D03-857	Occ-Sensor - Plug loads	average	4		32.25	\$ 71.00	\$	90.00	11%									
D03-858	Timeclock:	Average	8		23.01	\$ 39.25	\$	270.75	43%									
D03-859	Photocell:	Average	16	\$	12.06	\$ 9.96	\$	13.95	6%									
D03-860	LED Exit Sign (New)	average	9		31.52	\$ 18.50	\$	56.23	26%									
D03-861	LED Exit Sign Retrofit Kit	average	10	\$	16.66	\$ 9.99	\$	24.60	18%									
D03-862	Electroluminescent Exit Sign (New)	average	2	\$	73.42	\$ 56.63	\$	90.21	45%									
D03-863	Electroluminescent Exit Sign Retrofit Kit	average	2	\$	70.14	\$ 46.76	\$	93.52	65%									
D03-901	High Efficiency Copier	normalized average	27															
D03-902	High Efficiency Copier	normalized average	10															
D03-903	High Efficiency Copier	Average	4		24.63	\$ 7,857.00	\$ 1	16,995.00	37%									
D03-904	High Efficiency Gas Fryer	Average	65		03.15	\$ 3,389.33		5,159.35	15%		\$	1,520.61	\$	594.15	\$	3,379.00	11%	
D03-905	High Efficiency Gas Griddle	Average	45	. /	50.67	\$ 1,137.78		5,927.20	23%				\$	672.00	\$	4,765.00	19%	
D03-906	High Efficiency Electric Fryer	Average	27	\$ 12,0				25,931.00	43%					2,279.00	\$	4,588.00	8%	
D03-907	Hot Food Holding Cabinet	Average	79		39.81	\$ 1,062.50		5,017.00	8%			1,545.67	\$	869.97	\$	2,019.00	11%	
D03-908		Average	70		06.64	\$ 789.78		6,702.12	20%				\$	2,662.63	\$	11,292.19	12%	
D03-909	Point of Use Water Heat	measure = regression, base = average	125	,_		, ,,,,,,		2,7. 02.122		0.573	\$		\$	258.00	\$	1,615.90	13%	
D03-910	Circulation Pump Timeclock	average	4	\$	59.00	\$ 46.75	\$	69.62	16%									
D03-911	High Eff. Water Heater, EF=0.64	Average	26		54.64	\$ 278.00	\$	926.25	34%		\$	375.65	\$	258.00	\$	879.45	18%	
D03-912	Vending Machine Controller	Weighted Average	8		37.07	Ψ 270.00	Ψ	720.23	5470		Ψ	373.03	Ψ	230.00	Ψ	017.43	1070	
D03-913	Vending Machine Controller	Weighted Average	16															
D03-914	Premium Efficiency Motor - 1 HP	Average	2		91.43	\$ 257.85	\$	325.00	23%									
D03-915	Premium Efficiency Motor - 5 HP	Average	4		15.36	\$ 389.00	\$	796.00	36%									
D03-916	,	Average	3		94.66	\$ 664.00	\$	1,293.00	44%									
D03-917	·	Average	4		72.31	\$ 884.00	\$	1,504.00	26%									
D03-918	Premium Efficiency Motor - 20 HP		3		78.52	\$ 1,079.00	\$	1,578.00	23%									
D03-919	Premium Efficiency Motor - 25 HP	Average	4		50.14		\$	1,834.00	15%									
D03-920	Premium Efficiency Motor - 50 HP		3		37.62	\$ 2,309.85	\$	2,831.00	14%									
D03-921	Premium Efficiency Motor - 100 HP	ŭ	4	, , ,		\$ 4,130.00	\$	5,884.00	16%									
D03-922	Premium Efficiency Motor - 150 HP	Average	5	\$ 8,2	96.68	\$ 7,141.00	\$ 1	10,176.00	13%									
D03-923	Premium Efficiency Motor - 200 HP	Average	4	\$ 11,8	80.25	\$ 9,022.00	\$ 1	19,505.00	42%									
D03-924	Premium Efficiency Motor - 1 HP	Average	9	\$ 4	32.03	\$ 317.25	\$	680.00	17%									
D03-925		Average	9		37.38	\$ 518.74	\$	949.05	13%									
D03-926	Premium Efficiency Motor - 10 HP		10		49.68		\$	2,079.00	20%									
D03-927	Premium Efficiency Motor - 15 HP		9		70.30	\$ 1,031.00	s	2,079.00	15%									
D03-928	Premium Efficiency Motor - 20 HP		9		30.04	\$ 1,441.00	\$	2,551.50	13%									
D03-929	Premium Efficiency Motor - 25 HP		9			\$ 1,707.75	_	3,190.05	14%									1
D03-929 D03-930	Premium Efficiency Motor - 50 HP		7			\$ 3,181.95	\$	5,764.50	17%									
D05-250	1 Termulii Efficiency Motor - 30 ff	Avelage	/	φ 5,0.	11.41	ψ 5,101.95	Φ	5,704.30	1 / 70									<u> </u>

Appendix C: Non-Residential and Residential Non-Weather Sensitive Analytic Methods, Observations and Measure Statistics

				Measure				Base									
Measure ID	Measure Name	Analytic Method	No. of Observations	Mea	an	Min	Max	Precision @ 95%	R^2	]	Mean		Min		Max	Precision @ 95%	R^2
D03-933	Premium Efficiency Motor - 200 HP	Average	7	\$ 15,59	96.14	\$ 13,775.00	\$ 17,906.00	7%									
D03-934	Faucet Aerators	average	112	\$	7.12	\$ 1.61	\$ 33.36	12%									
D03-935	Heat Pump Water Heater	average	2	\$ 1,53		\$ 1,274.90	\$ 1,803.36	34%									
D03-936	Pipe Wrap	average	19	\$	0.37	\$ 0.07	0.7.2	30%									
D03-937	Low Flow Showerhead	average	14			\$ 8.00	\$ 	25%									
D03-938	High Efficiency Water Heater	Average	26	\$ 46	54.64	\$ 278.00	\$ 926.25	34%		\$	375.65	\$	258.00	\$	879.45	18%	
D03-939	High Efficiency Water Heater	Regression	78						0.546								
D03-940	Point of Use Water Heat	measure = regression, base = average	125						0.573	\$	492.96	\$	258.00	\$	1,615.90	13%	
D03-941	Efficient Clothes Dryer	Average	78	\$ 55	57.25	\$ 261.18	\$ 869.00	9%		\$	319.02	\$	224.10	\$	508.50	8%	
D03-942	Efficient Clothes Dryer	Average	64	\$ 60	04.91	\$ 386.10	\$ 899.10	8%		\$	362.65	\$	269.10	\$	574.20	9%	
D03-943	Energy Star Clothes Washer	Average	-							\$	565.08	\$	565.08	\$	565.08	single observatio n	
D03-944	Energy Star Clothes Washer	Average	7	\$ 94	46.40	\$ 677.08	\$ 1,353.00	21%		\$	565.08	\$	565.08	\$	565.08	single observatio n	
D03-945	Energy Star Clothes Washer	Average	14	\$ 1,34	49.87	\$ 483.08	\$ 2,108.00	18%		\$	565.08	\$	565.08	\$	565.08	single observatio n	
D03-946	Energy Star Clothes Washer	Average	44	\$ 76	59.17	\$ 655.00	\$ 848.08	4%		\$	588.39	\$	295.00	\$	1,208.00	22%	
D03-947	Energy Star Clothes Washer	Average	115	\$ 1,13	37.38	\$ 594.00	\$ 2,018.08	6%		\$	588.39	\$	295.00	\$	1,208.00	22%	
D03-948	Energy Star Clothes Washer	Average	41	\$ 1,18	31.16	\$ 711.23	\$ 2,108.00	18%		\$	588.39	\$	295.00	\$	1,208.00	22%	
D03-949	Energy Star Clothes Washer	Average	124	\$ 76	51.68	\$ 528.00	\$ 1,148.08	8%		\$	515.54	\$	303.23	\$	805.00	5%	
D03-950	Energy Star Clothes Washer	Average	89	\$ 1,36	58.54	\$ 1,139.00	\$ 1,598.08	33%		\$	515.54	\$	303.23	\$	805.00	5%	
D03-951	Energy Star Clothes Washer	Average	143	\$ 1,28	80.46	\$ 905.00	\$ 1,758.00	4%		\$	515.54	\$	303.23	\$	805.00	5%	
D03-952	Energy Star Dish Washer	Average	93	\$ 42	26.30	\$ 197.99	\$ 768.60	7%		\$	292.65	\$	179.00	\$	419.00	11%	
D03-953	Energy Star Dish Washer	Average	93	\$ 42	26.30	\$ 197.99	\$ 768.60	7%		\$	292.65	\$	179.00	\$	419.00	11%	
D03-954	Refrigerator: Bottom Mount Freezer without through-the-door ice	Average	17	\$ 89	94.66	\$ 647.10	\$ 1,300.00	11%		\$	880.00	\$	820.00	\$	950.00	8%	
D03-955	Refrigerator: Bottom Mount Freezer without through-the-door ice	Average	20	\$ 1,08	86.81	\$ 791.10	\$ 1,400.00	8%		\$	945.00	\$	920.00	\$	970.00	5%	
D03-956	Refrigerator: Top Mount Freezer without through-the-door ice	Average	11	\$ 45	50.75	\$ 349.00	\$ 570.00	22%		\$	507.14	\$	430.00	\$	600.00	8%	
D03-957	Refrigerator: Top Mount Freezer without through-the-door ice	Average	17	\$ 59	90.00	\$ 449.00	\$ 719.00	13%		\$	448.64	\$	349.00	\$	649.00	13%	
D03-958	Refrigerator: Top Mount Freezer without through-the-door ice	Average	14	\$ 69	98.67	\$ 595.00	\$ 807.00	10%		\$	537.75	\$	439.00	\$	717.00	11%	
D03-959	Refrigerator: Side Mount Freezer without through-the-door ice	Average	18	\$ 1,89	90.41	\$ 1,579.00	\$ 2,177.10	6%		\$	939.60	\$	854.10	\$	1,000.00	3%	
D03-960	Refrigerator: Side Mount Freezer without through-the-door ice	Average	6	\$ 1,15	50.48	\$ 809.10	\$ 1,296.90	20%		\$	1,052.10	\$	899.10	\$	1,205.10	29%	
D03-961	Refrigerator: Side Mount Freezer with through-the-door ice	Average	17	\$ 1,15	53.52	\$ 809.10	\$ 1,945.80	28%		\$	983.30	\$	700.00	\$	1,853.10	18%	
D03-962	Refrigerator: Side Mount Freezer with through-the-door ice	Average	13	, ,		\$ 899.10	\$ -,	9%		\$	928.74	\$	730.00	\$	1,025.10	8%	
D03-964	Refrigerator Recycling	Average	2		97.75	\$ 96.50	\$ 99.00	3%									
D03-965	Freezer Recycling	Average	2		97.75	\$ 96.50	\$ 99.00	3%									
D03-966	Efficient Single Speed Pool Pump	Average	47			\$ 218.00	320.00	5%		\$	230.02	\$	133.33	\$	326.67	8%	
D03-967	Efficient Two Speed Pool Pump	Average	38	\$ 27	78.81	\$ 173.33	\$ 340.00	15%		\$	230.02	\$	133.33	\$	326.67	8%	1

Appendix C: Refrigeration Analytic Methods, Observations, and Measure Statistics

Appendix C.	Refrigeration Analytic Methods,	Observations, and Meas	No. of		
Measure ID	Measure Name	Analytic Method	No. 01 Observations		
D03-201	Retrocommissioning	Custom	1		
D03-202	High Efficiency Walk-in Fan Motors	Custom	7		
D03-203	High Efficiency Display Fan Motors	Custom	4		
D03-204	Heat Recovery from Central Refrigeration System	Custom	11		
D03-205	Night Covers for Display Cases (medium temp)	Custom	5		
D03-206	Medium Temp Glass Doors (open display cases)	Custom	8		
D03-207	New Medium Temp Refrig Display Case with Doors	Custom	9		
D03-208	Auto-Closers on Main Cooler Doors	Custom	4		
D03-209	Auto-Closers on Main Freezer Doors	Custom	4		
D03-210	Evaporator Fan Control on Walk-in Coolers & Freezers	Custom	6		
D03-211	Air-Cooled Condenser to Evaporative Condenser	Custom	12		
D03-212	Energy Efficient Air-Cooled Condenser	Custom	14		
D03-213	Energy Efficient Evap-Cooled Condenser	Custom	16		
D03-214	Multiplex System with Mech Subcooling (air-cooled)	Custom	14		
D03-215	Multiplex System with Mech Subcooling (evap-cooled)	Custom	15		
D03-216	Multiplex System with Mech Subcooling (high eff air-cooled)	Custom	14		
D03-217	Multiplex System with Mech Subcooling (high eff evap-cooled)	Custom	15		
D03-218	Low Temperature Mechanical Subcooling	Custom	8		
D03-219	Low and Medium Temp Mechanical Subcooling	Custom	13		
D03-220	Floating Suction Pressure	Custom	4		
D03-221	Floating Head Pressure, Fixed Setpoint (air-cooled)	Custom	2		
D03-222	Floating Head Pressure, Fixed Setpoint (evap-cooled)	Custom	2		
D03-223	Floating Head Pressure, Variable Setpoint (air-cooled)	Custom	7		
D03-224	Floating Head Pressure, Variable Setpoint (evap-cooled)	Custom	7		
D03-225	Floating Head Pressure, Variable Setpt & Speed (air-cooled)	Custom	9		
D03-226	Floating Head Pressure, Variable Setpt & Speed (evap-cooled)	Custom	9		
D03-227	Display Case Lighting Control	Custom	9		
D03-228	Zero Heat Reach-in Glass Doors	Custom	2		
D03-301	Retrocommissioning	custom	3		
D03-303	Oversized Evaporative Condenser & Floating Head	custom	20		
D03-304	Variable-Speed Compressors	custom	13		

Appendix C: Refrigeration Analytic Methods, Observations, and Measure Statistics

Measure ID	Measure Name	Analytic Method	No. of Observations	
D03-305	Low-Temperature Subcooling	custom	5	
D03-306	Floating Suction Pressure	custom	7	
D03-307	Floating Head Pressure, Fixed	custom	4	
D03-307	Setpoint (evap-cooled)	custom	4	
D03-308	Floating Head Pressure, Variable	custom	11	
D03-308	Setpoint (evap-cooled)	custom		
D03-309	Floating Head Pressure, Variable	custom	11	
D03-309	Setpt & Speed (evap-cooled)	custom	11	