Final

Demand Impact Model User Manual

Part of the Massachusetts Residential Retrofit and Low Income Program Area Evaluation

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MODEL OVERVIEW

The Cadmus Group has created an MS Excel 2007-based model, ***Demand Impact Model***, which allows users to estimate seasonal and coincident peak demand savings of energy-efficient measures. Users can trace all inputs and calculations, from load shape profiles to peak period definitions to measure level energy and demand savings.

This is an update to the previous Demand Impact Model developed in 2001 by Cadmus (operating as Quantec at the time). Cadmus has populated the model with load shapes developed in more recent years and more region-specific than were in the original version of the model.

The model is delivered prepopulated with:

- Utilities / service territories
- Fuel types
- Sector, segments, end uses, and programs
- Season definitions
- Holidays
- Load shapes (by fuel, sector, segment, and end use)
- Default definitions of seasonal and coincident peaks
- Program / measure data with annual savings estimates

The model produces seasonal on-peak, off-peak, and coincident peak savings by measure, to be used as inputs in cost-effectiveness analyses.

Sheet Descriptions

Input Sheets
Input sheets contain all the data from outside sources needed to estimate demand savings.

Model Definitions
The *modelDefinitions* sheet contains lists of unique values used for populating user interface controls and data validation lists. The model is delivered to clients with these lists already complete. Some of the lists are static and will never need to be updated by the user; others are dependent on the measures being offered by the program administrators and may need to be modified.

The lists that are static and should not be altered include:

- Day Type
- Day
- Hour
- Peak Period

- Selection Types

A few of the lists are used for assigning peak definitions to 8760 hourly load shapes and may need to be updated, depending on regional definitions of season and peak hours. These include:

- Season

- Month: The list of months (first column) should never be altered, but the season assigned to each month in the 2nd column of the list may need to be updated.

- Load shape base year: enter the calendar year the load shapes represent. This determines what days are assigned as weekends or weekdays.

- Holidays: whenever the load shape base year is modified, the holidays should be as well.

The following lists are based on characteristics of measures offered in programs by the program administrators. These lists need to be kept up-to-date because they supply the data validation drop-down lists that appear in the measure database. These lists provide consistent field values for measure data so that the filtering that occurs on the *Manager* sheet works properly.

- Sector

- Segment

- Fuel

- End Use

- Program Name

- Savings Units

- Program Administrator: this list contains a second column that assigns a fuel type to each program administrator. For program administrators that service both fuel types, enter Dual as the fuel type.

Load Shape Definitions

The *loadShapeDefinitions* sheet provides documentation for the load shapes contained in the *loadShapeDatabase* sheet. Each row in this sheet represents a load shape and is assigned an identification code used to represent the load shape elsewhere in the model. The identification code should be entered with the format *ls_n,* where *n* is a numeric value incremented by 1 for each subsequent row. Each load shape is assigned a unique name in the 2nd column of this sheet.

Load shapes are assigned by end use, so this sheet provides the documentation for which fuel, sector, segment, and end use each load shape represents. Data validation lists in the cells in these fields provide users pertinent values for the column, ensuring that consistent nomenclature is used throughout the model.

Note that the first load shape definition in this sheet must correspond with the first column of load shape data in the *loadShapeDatabase* sheet, the second load shape definition must correspond with the second column of load shape data in the *loadShapeDatabase* sheet, etc.

Load Shape Database

The *loadShapeDatabase* sheet provides the 8760 hourly load shapes for each definition contained in the *loadShapeDefinitions* sheet. Each row in this sheet represents an hour of the year; each value in the load shape represents the percent of the total annual load that occurs in a specific hour. This sheet also shows how seasons, costing periods, and day types are mapped to each hour of the year, as well as which hours are included in the user-defined peak period.

The load shape identification numbers appearing in the header row should be in the same order horizontally as they are vertically in the *loadShapeDefinitions* sheet.

Measure Database

The *measureDatabase* sheet provides the measures and annual energy savings used in the peak demand savings calculations. Data validation lists in the sector, fuel, segment, program name, end use, and load shape name fields provide users pertinent values for the column, ensuring that consistent nomenclature is used throughout the model. The measure name field should contain unique values representing the measure characteristics.

Users can assign to the measures any load shape from the *loadShapeDefinitions* sheet. Although load shapes are defined by fuel, sector, segment, and end use, users can override these definitions. Users also enter in annual energy savings per unit (UES) and the unit of savings.

User Interface Sheets

The user interface sheets contain buttons and drop-down lists that programmatically provide users with a simple, efficient method of assigning peak hours to load shapes and summarizing measure data to estimate demand savings.

Manager

The *Manager* sheet contains most user interface controls needed to operate the Demand Impact Model. It contains a series of drop-down lists and list boxes that are used to filter all the measures in the measure database, in order to select a measure or group of measures to analyze.

Users begin the process by selecting a program administrator name from the top drop-down list (Program Administrator). Only one selection can be made from this drop-down list. The selection determines which peak definitions appear in the Peak Definitions drop-down list, the last user interface box on the *Manager* sheet.

After selecting a program administrator, the next list box is automatically populated with the relevant fuels. If only one fuel type appears in the list, it is automatically selected and the next list box populates. Note that only one selection can be made in the fuel list box; all other list boxes allow multiple selections.

The procedure repeats itself. Users click on a value or values in a list box, and the box below it is populated with relevant values from the measure database. To quickly select all the values in a specific list box, click on the check box to the right of it.

Once all selections are made, users need to click the Calculate Impact button at the top of the sheet to run the model and produce demand savings by measure. Users receive a message

indicating that the calculation has finished, and the *measureCalculations* sheet activates, showing final results.

There are two other user interface buttons on the *Manager* sheet. Clicking the *Create Peaks* button at the top of the sheet takes the user to another user interface for adding new peak definitions. Clicking the *Measure Data* button takes the user to the *measureDatabase* sheet. On the *measureDatabase* sheet, users can view the measures populating the boxes on this sheet, as well as change annual savings and load shapes assigned to measures.

Create Peak Definitions

The *CreatePeakDefinitions* sheet provides an interface for users to define system and seasonal peak periods. This interface is where users create the peak definitions, not assign them for demand savings analysis (which is done on the *Manager* sheet, described above). On the *CreatePeakDefinitions* sheet, users select season, day type, month, day, hour, etc., from drop-down boxes to specify which hour or hours are considered peak hours. Then the definition is saved to the *peakDefinitions* sheet so that it can be accessed by the *Peak Definition* drop-down box on the *Manager* sheet.

The first step in creating a peak definition is to provide a unique name for the definition, and select the program administrator and fuel type to which it applies. This combination of name, program administrator, and fuel type creates a unique label for the definition in the *peakDefinitions* sheet.

The *Selection Type* drop-down box has two options corresponding with two methodologies for defining peak hours:

- Peak Period: this method uses the load shape selected in the *Load Shape* drop-down box to determine the peak hours

  - Peak Day: defined as the day with the highest total load proportion for the load shape selected.

  - Top *n* hours: defined as the *n* hours (where *n* is input in the *Number of Hours* box by the user) with the highest load proportion, for the load shape selected.

- Date-Time: this method allows users to select different combinations of season, day type, month, day, and hour to create continuous or non-continuous definitions of peak, as well as create seasonal peak definitions.

  - All drop-down boxes in this section, except for season, have an *All* option where all values in the range are included in the definition being created.

  - All drop-down boxes must be populated in order to save the definition.

Clicking the *Save Definition* button saves the choices made as a new row in the *peakDefinitions* sheet.

Interface Support Sheets

Peak Definitions
The *peakDefinitions* sheet records the output from saving a peak definition on the *CreatePeakDefinitons* sheet. Each row in this sheet is a unique definition. This sheet should not be modified manually by users. It can be used as documentation of the parameters of a named peak definition for a program administrator and fuel type.

VBA Values
The *vbaValues* sheet records the user selections made in the list boxes and drop-down boxes on the *Manager* sheet. This sheet should not be modified manually by users. The values in this sheet are used by the VBA code in extracting the appropriate measures for calculating demand savings results.

Calculation / Output Sheets

Measure Calculations
The *measureCalculations* sheet provides a report of demand savings by measure, based on the measures and peak definition selected on the *Manager* sheet. Each row in this sheet shows a unique measure, with the load shape and annual savings assigned to the measure. Seasonal on-peak and off-peak energy and demand savings are calculated in the columns to the right of the measure details.

Users can modify the load shape assigned to the measure on this sheet, as well as the annual energy savings assumption, and the peak calculations update in real-time.

Peak Application
The *peakApplication* sheet shows which hours of the year are included in the peak definition selected on the *Manager* sheet. This sheet should not be modified manually by users; it is populated through VBA code.

Load Shape Peak Days
The *loadShapePeakDays* sheet summarizes the total load proportion (the percent of annual load) occurring during each day of the year, for each load shape. In row 2, Excel formulas return the date with the highest proportional load for every load shape. This sheet should not be modified manually by users.

Installation and Setup

System Requirements
Users must have MS Excel 2007 or newer for the model to function properly. The model contains VBA (Visual Basic for Applications) code, which provides functions for the user interface and output generation, but all calculations are performed through standard Excel functions.

Installation Process
The Demand Impact Model installs in a straightforward manner. As a spreadsheet model, no special installation procedure is required. The model is delivered in a zip file, with contents extracted to a single directory. The following procedure outlines the process:

1. Save the zip file to appropriate directory on a local network; and

2. Using the mouse, right-click the zip file, and select *Extract Here.*

Opening the Model
Users must enable macros upon opening the model. To enable macros, click on the Options button, shown in Figure 1, which appears above the formula bar in Excel. When the ensuing screen appears, click the circle next to *Enable this content*, and click *OK.*

Figure 1. Enable Macros
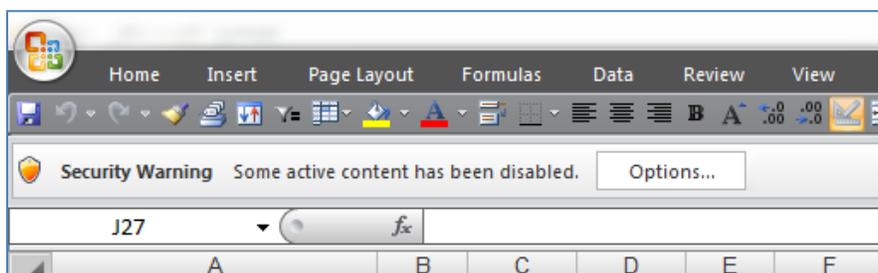
Users must enable macros because, upon opening the file, VBA code runs that executes the following:

*   Erases values in the interface support sheets that were captured during the previous analysis ;

*   Updates the user interface controls (list boxes and drop-down lists) with the most recently input values and prepares the model for new analyses.

Troubleshooting
Users must enable macros upon opening the model workbooks. Excel buttons and other built-in functions remain disabled until enabling macros. Depending on each user's network security settings, the security warning pictured in Figure 1 may not appear. If it does not, users need to go into the Excel Options menu to change the security settings. The location of Excel Options varies by Excel version.

In Excel 2010, click on the File menu in the ribbon and selection Options (Figure 2) from the list. (In Excel 2007, click on the Windows symbol in the upper left corner of the screen, and then choose Options). In the pop-up form that appears select Trust Center, then click the button for Trust Center Settings (Figure 3). Click Macro Settings from subsequent pop-up form that appears, and then click on the option for *Disable all macros with notification* (Figure 4). After making this change, save the Excel file, close it, and reopen. Upon reopening, the security warning from Figure 1 should appear.

Figure 2. Excel 2010 Options
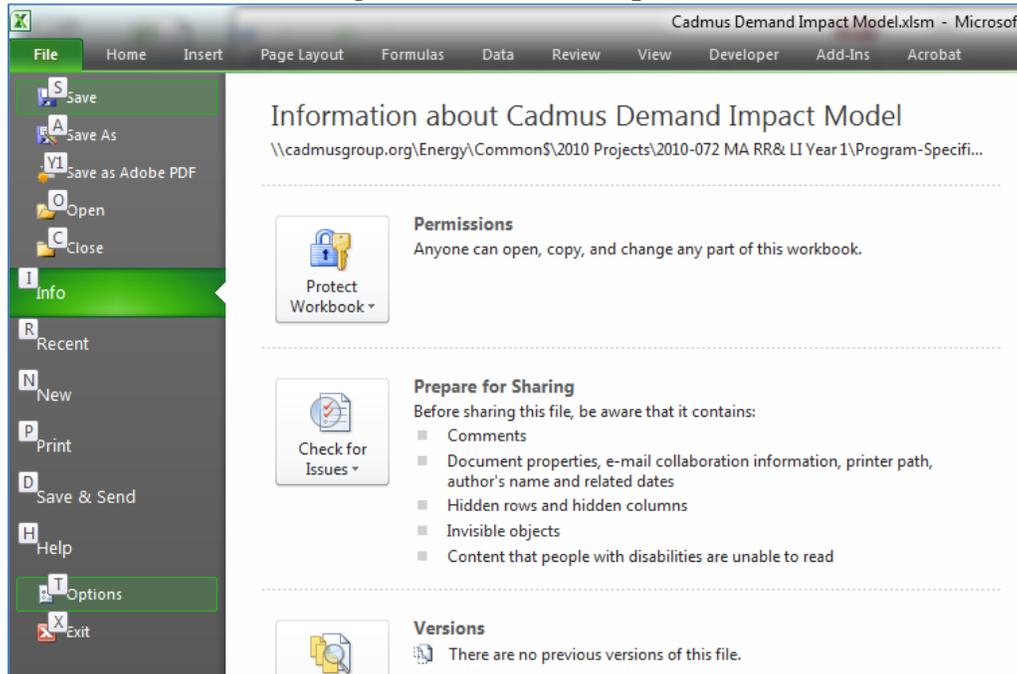
Figure 3. Excel 2007 & Excel 2010 Trust Center Settings
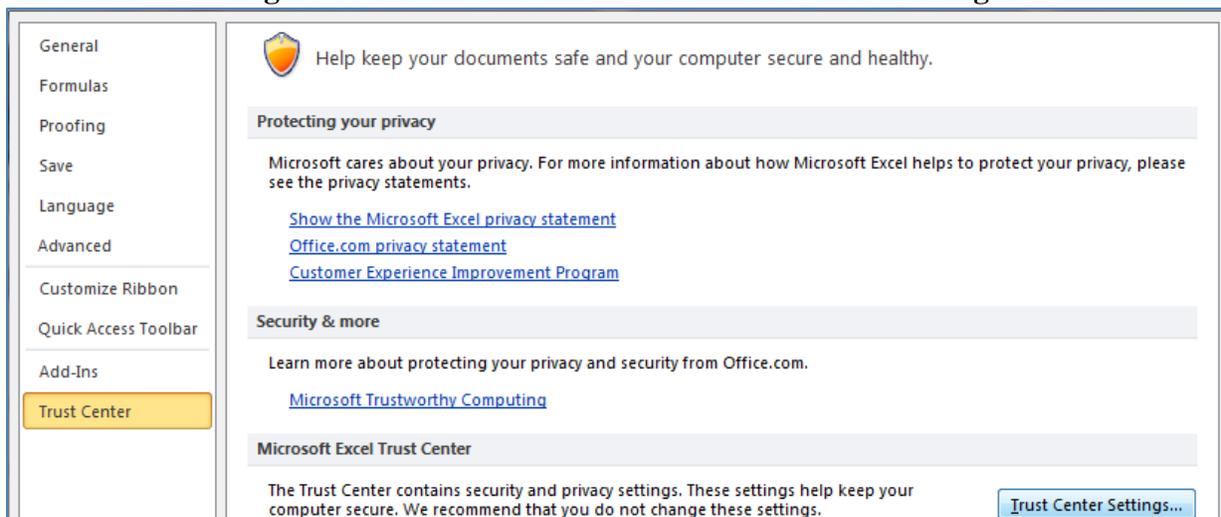
Figure 4. Excel 2007 & 2010 Macro Settings
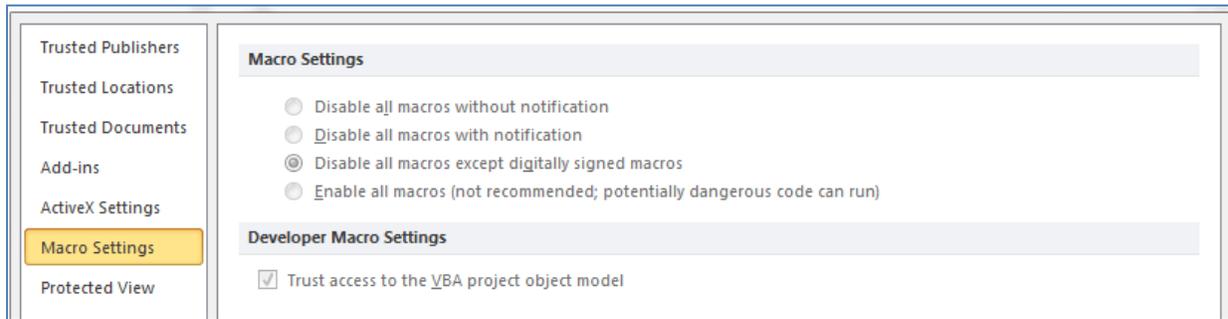
In Excel 2003, click on the Tools menu, select Macro from the list, and then choose Security. In the pop-up form that appears, select medium and click OK. Then save the file, close it, and reopen. Upon reopening, a pop-up form should appear asking the user if they want to enable macros.

USING THE MODEL

Selecting Measures

The model is delivered to users populated with program and measure data in the *measureDatabase* sheet. The *Manager* sheet provides users an interface for selecting measures for demand savings analyses. Through a series of list boxes, users can quickly and easily reduce the measure database list down to one or a few measures. Each subsequent list box shows a filtered list based on choices made in previous list boxes.

Program Administrator

To begin the process of selecting a measure or measures to analyze, users must first choose the program administrator by clicking the drop-down arrow and choosing from the list provided. The value selected for program administrator determines which peak definitions appear in the Peak Definition drop-down list at the bottom of the sheet. It also determines which fuel types appear in the fuel list box.

Figure 2. Select a Program Administrator

Fuel

Unlike subsequent list boxes that allow users to make multiple selections, the fuel list box allows only one unique selection. The methodology for calculating demand savings differs between electric and natural gas measures, so only one fuel type can be selected at a time.

Figure 3. Select a Fuel Type

Sector

The sector list box is populated with the corresponding sectors from measures that match the fuel selected. The model is currently populated with only residential measures, so upon selecting a fuel, the residential sector is automatically selected in the sector list box. If commercial or industrial measures were added to the *measureDatabase* sheet, then these options would appear in the sector list box as well.

Figure 4. Select a Sector

Segment

The segment list box is populated with the corresponding segments from measures that match the fuel and sector selected. In this list box, users can click on one or multiple segments. To select multiple segments, users first click on one segment, then another. An item will be highlighted in blue in the list box if it is selected. Clicking on an item highlighted in blue will remove the highlighting and deselect it. To quickly select all items in the list box (or any subsequent list box), click on the check box to the right of the list box. Unchecking this box quickly deselects all items in the list box.

Figure 5. Select a Segment – Select All Check Box

Program Name

The program name list box will show all values from the program name column in the *measureDatabase* where the corresponding segment, sector, and fuel match what is selected in the preceding list boxes. The program name list box has the same functionality as the segment list box; single or multiple selections can be made by clicking on items in the list box, and the check box to the right of the list box allows all items to be selected or deselected quickly.

Figure 6. Select a Program Name

End Use

The end use list box will show all values from the end use column in the *measureDatabase* where the corresponding program name, segment, sector, and fuel match what is selected in the preceding list boxes. The end use list box has the same functionality as the program name and segment list boxes; single or multiple selections can be made by clicking on items in the list box, and the check box to the right of the list box allows all items to be selected or deselected quickly.

Figure 7. Select an End Use

Measure Name

The measure name list box will show all values from the measure name column in the *measureDatabase* where the corresponding end use, program name, segment, sector, and fuel match what is selected in the preceding list boxes. The measure name list box has the same functionality as the end use, program name, and segment list boxes; single or multiple selections can be made by clicking on items in the list box, and the check box to the right of the list box allows all items to be selected or deselected quickly.

This is the last step in selecting measures for demand savings analyses. The value or values selected in the measure list box the ones included in the savings calculations on the *measureCalculations* sheet. If users cannot find the measure or measures they are searching for, they can return to any of the preceding list boxes and begin the filtering process over again. Any time a selection is made in one of the list boxes, all of the subsequent list boxes are cleared of values and the filtered lists of values to choose from are refreshed.

Peak Definition

To calculate the demand savings of the measures selected in the previous steps, users need to provide the model with the definitions of seasonal and system peak. The values appearing in the peak definition drop-down list are defined through the interface on the *CreatePeakDefinitions* sheet. Unique peak definitions are set up for each program administrator and fuel, so the selections users make in these boxes on the *Manager* sheet control what values appear in the peak definition drop-down box.

Figure 8. Select a Peak Definition

Calculate Impact

After selecting the peak definition to use in the calculations, users need to click the Calculate Impact button at the top of the sheet to add the selected measures to the *measureCalculations* sheet, and to refresh all the calculations of energy and demand savings.

Figure 9. Calculate Impact Button

Creating Peak Definitions

To determine the demand savings of a measure or group of measures, users have to provide the model with a definition of which hours are considered peak hours for their service territories. The *CreatePeakDefinitions* sheet provides an interface for creating definitions of peak hours, and as shown in Figure 8 above, users pick from these previously created definitions when running demand savings analyses from the *Manager* sheet.

Users can create as many definitions of peak hours as they want. Any definition created through the interface on the *CreatePeakDefinitions* sheet is saved to the *peakDefinitions* sheet so that it can be recalled quickly at a later time.

The interface on the *CreatePeakDefinitions* sheet is divided into three sections. The top section contains the characteristics that uniquely define the peak definition in the *peakDefinitions* sheet. The other two sections pertain to two methods for defining peak hours: by day and time, or by peak period.

Peak Definition Unique Characteristics

There are four inputs that uniquely define a peak definition (see Figure 10).

- Name: users provide a descriptive name.

- Program Administrator: users select the relevant program administrator from the drop-down list.

- Fuel: users select the corresponding fuel for the program administrator from the drop-down list.

- Selection Type: users select how they want to define the peak hours, either by date and time, or by peak period, from the drop-down list.

Figure 10. Peak Definitions Unique Inputs

By default, all of the user interface controls in the Date Time and Peak Period sections on this sheet are disabled. If users select Date – Time from the Selection Type drop-down list, the Date Time interface controls are enabled. If users select Peak Period from the Selection Type drop-down list, the Peak Period interface controls are enabled.

Date Time

The load shapes contained in the model are defined at an hourly level for an entire year (8760 hours). In the *loadShapeDatabase* sheet, every hour is labeled with its' corresponding month, day, day type (weekend, weekday, or holiday), season, and costing period (off-peak or on-peak). This section on the *CreatePeakDefinitions* sheet allows users to choose an hour or range of hours to define as peak hours by making specific selections for some or all of these parameters. As users proceed down through the drop-down lists, fewer hours are included in the peak definition.

Figure 11. Date Time Section

Users begin by selecting a season and day type. All the hours corresponding to the season and day type selected are retained in the peak definition. The season drop-down list is the only list in

this section that does not contain an option of selecting all values. Selecting "All" from any of the remaining drop-down lists indicates that no hours will be excluded from the peak definition for that parameter.

The remaining six drop-down boxes pertain to month, day of the month, and hour of the day, with each allowing a start and end value. The start and end values are inclusive, meaning that all hours that occur between the start and end values are included in the definition. For example, if users select six as the start month and eight as the end month, then all hours in June, July, and August are included in the definition. Then selections are made for day and hour to further refine this definition.

In Figure 11, the peak period is defined as all weekday hours in June, July, and August, from 11:00a.m.(11) to 3:00p.m. (15). The numbers in the start hour and end hour boxes indicate the hour ending, so 12 indicates 11:00a.m. to 12:00p.m. and 15 represents 2:00p.m. to 3:00p.m.

This interface is designed so that the peak definition can be set up as a non-continuous range. In the Figure 11 example, 5:00p.m. to 7:00p.m for the same days and months could be added to the peak definition. To do this, users would first save the definition created in Figure 11. Then they would enter the same name, program administrator, fuel, and selection type that were used in Figure 11. This time, the Date Time section would appear as in Figure 12.

Figure 12. Date Time Section - Modified

The only values that changed between Figure 11 and Figure 12 were the start hour and end hour. In Figure 12, 18 was selected as the start hour (represents 5:00p.m to 6:00p.m.) and 19 was selected as the end hour (represents 6:00p.m. to 7:00p.m.). When this definition is saved, there are two definitions in the *peakDefinitions* sheet with the same name, program administrator, and fuel. In doing this, users have created a non-continuous range.

Peak Period
In the peak period section, users define the peak period as either a peak day or a certain number of hours with the highest demand, based on a load shape they select. If Peak Day is selected from the Period Type drop-down list, the 24 hours pertaining to the day with the highest total demand are labeled as peak hours. In the load shape box, users select the load shape used to calculate peak day. For example, in Figure 13 the peak period is defined as the day with the highest cumulative demand, based on the residential single family natural gas water heating load shape.

Figure 13. Peak Period Section – Peak Day

The other option for defining the peak period is to select the top *n* hours and provide a number for *n.* Then the load shape selected is sorted by descending hourly load, and the top *n* hours are included in the peak definition. For example, in Figure 14 the peak period is defined as the 10 hours with the highest hourly demand, based on the residential single family indoor lighting load shape.

Figure 14. Peak Period Section – Top *N* Hours

Save Definition

After creating a peak definition through either the Date Time or Peak Period interface, users should click the Save Definition button at the top of the sheet to save the parameters to the *peakDefinitions* sheet.

Figure 15. Save Definition Button

Updating Load Shapes

It may be necessary to update the load shapes contained in the model in the future, as newer data or additional segmentation of load data becomes available. Users can edit an existing load shape, delete a load shape, or add a new one. Anytime users perform one of these actions, three sheets in the model are affected: *loadShapeDefinitions, loadShapeDatabase,* and *loadShapePeakDays*.

Load Shape Definitions

This sheet contains a description of each load shape in the *loadShapeDatabase* sheet. It can be linked to the load shapes in the *loadShapeDatabase* sheet by the load shape identification numbers (ls_1, ls_2, etc.). Whenever a user adds or deletes a load shape column in the *loadShapeDatabase* sheet, the row with the same load shape identification number in this sheet should also be added or deleted.

Drop-down lists in the fuel, sector, segment, and end use cells on this sheet assist users with populating these fields. Load shape names should be descriptive so that when selecting it from a drop-down list on another sheet, users can identify precisely what that load shape represents. The current load shapes in the model have been named with the following convention: *sector & segment & fuel & end use*.

Load Shape Database

Columns A to I should never be modified when making updates to the *loadShapeDatabase* sheet. The hourly load shape data begins in column J of this sheet, which corresponds to row 3 in the *loadShapeDefinitions* sheet. Since there are formulas above the load shape data calculating on-peak and off-peak demand and energy percent by season, when adding or deleting hourly load shapes users need to select the entire column.

To delete a column, users should highlight the entire column and delete it. To add a new load shape, users should find the last column with data, highlight the entire column and copy it, then go the row 1 of the next column and paste both formulas and formats. For example, in Figure 16, column BV has been copied, and cell BW1 has been selected as where to paste the new load shape. After pasting the formulas and formats, users need to overwrite the hourly load data with the relevant data for the new load shape they are adding to the model.

Figure 16. Add a New Load Shape to the Database

Load Shape Peak Days

The *loadShapePeakDays* sheet contains 365 rows of daily load data for each load shape listed in the *loadShapeDefinitions* sheet. The daily values are calculated as the sum of the hourly load percent for every day of the year, for every load shape. As with the *loadShapeDatabase* sheet, if a load shape is added or deleted, a corresponding addition or deletion needs to be made in this sheet. For example, if users add a new load shape to the model, they need to find the last column in the *loadShapePeakDays* sheet, copy the entire column, and paste formulas and formats in the next empty column.

Updating Measure Data

The *measureDatabase* sheet contains all of the measure data used in the model. Each row in this sheet contains the details for one unique measure. Measures are defined by their sector, segment, fuel, associated program name, end use, and measure name. Each measure is assigned a default load shape, which can be modified by users either in this sheet, or on the *measureCalculations* sheet when doing demand savings analysis. In addition, the annual energy savings compared to the baseline measure is provided in this sheet.

To add a record, users can either insert a new row or find the first blank row in the sheet. When clicking in any cell in the row (except for the Annual UES column), drop-down lists appear to provide usera a list of values to select from (see Figure 17). This ensures consistent spelling and provides consistent naming of measure parameters for the filter lists on the *Manager* sheet.

Figure 17. Adding a Measure

Existing measures in the sheet can be edited in the same way, by clicking on a cell in the row and choosing a new value from the drop-down list that appears. To delete a measure, users can select the entire row in the sheet and delete it.

The drop-down lists in the *measureDatabase* list receive their values from the lists contained on the *modelDefinitions* sheet. If the user does not find a value they are searching for in the drop-down list that appears on the *measureDatabase* sheet, they can add the value to appropriate list in the *modelDefinitions* sheet.

Interpreting Results

The *measureCalculations* sheet provides the demand savings results for every measure selected from the interface provided on the *Manager* sheet. Each row in the *measureCalculations* sheet represents one unique measure. Measure details such as sector, segment, end use, and fuel are provided, as well as the load shape assigned to the measure, and the annual energy savings.

Excel formulas calculate annual on-peak and off-peak energy and demand savings by season. A brief description of the outputs follows:

- On Peak Energy Percent: the percent of total annual load occurring during the seasonal daily on-peak hours.

- On Peak Energy Savings: the portion of annual energy savings occurring during the seasonal daily on-peak hours.

- Off Peak Energy Percent: the percent of total annual load occurring during the seasonal daily off-peak hours.

- Off Peak Energy Savings: the portion of annual energy savings occurring during the seasonal daily off-peak hours.

- Peak Demand Percent: for electric measures, this is the average demand occurring during the seasonal hours contained in the peak definition selected by the user on the *Manager* sheet; for natural gas measures it is the sum of the demand.

- Peak Demand Savings: for electric measures, the average demand savings during the peak hours; for natural gas measures, it is the sum of the demand savings during the peak hours.

- Maximum Load Reduction: the higher of the winter and summer peak demand savings.

- Summer Coincident Percent: the ratio between the Summer Peak Demand Percent and the Maximum Load Reduction

- Winter Coincident Percent: the ratio between the Winter Peak Demand Percent and the Maximum Load Reduction

Users have the option to do some scenario analysis in the *measureCalculations* sheet. The default load shape assigned to a measure can be altered in this sheet to see the corresponding impact on energy and demand savings. For example, a user could be doing analysis on residential heat pumps and decide to see how the results would change if a heating load shape was assigned to the measures instead of a heat pump load shape (see Figure 18). After selecting a different load shape from the drop-down list that appears in the load shape column of the *measureCalculations* sheet, the energy and demand savings calculations will refresh and show different savings values.

Figure 18. Assigning Different Load Shape to Measure

measures with energy and demand savings calculations		Back to Manager				Winter			
						On Peak Energy	On Peak	Off Peak Energy	Off Peak
Measure Name	End Use	LoadShape	Annual UES	Savings Units	Annual Participation	Percent	Energy Savings	Percent	Energy Savings
CoolSmart HP Digital Check	Heat Pump	Res Single Family Electric Heating	354	KWh	1	37.8%	133.9	62.1%	219.8
CoolSmart HP QIV ES	Heat Pump	Res Single Family Electric Heating	319	KWh	1	37.8%	120.6	62.1%	198.1
CoolSmart HP QIV NES	Heat Pump	Res Single Family Electric Heat Pump	319	KWh	1	33.6%	107.2	55.2%	176.1
CoolSmart HP SEER 14.5 (Eq	Heat Pump	Res Single Family Electric Heat Pump	488	KWh	1	33.6%	164.1	55.2%	269.4
CoolSmart HP SEER 15.0 => I	Heat Pump	Res Single Family Electric Heating	694	KWh	1	33.6%	233.3	55.2%	383.2
Mini Split HP (Lost Opportu	Heat Pump	Res Single Family Electric Lighting- Indoor	3216	KWh	1	33.6%	1081.1	55.2%	1775.7
MiniSplit HP SEER 19, EER 1	Heat Pump	Res Single Family Electric Lighting- Outdoor	535	KWh	1	33.6%	179.9	55.2%	295.4
MiniSplit HP SEER 23, EER 1	Heat Pump	Res Single Family Electric Plug Load New	656	KWh	1	33.6%	220.5	55.2%	362.2
		Res Single Family Electric Refrigeration							
		Res Single Family Natural Gas Water Heat							
		Res Single Family Natural Gas Heating							