



Home Upgrade

Energy Upgrade California®

Snugg Pro Energy Modeling Guide

San Diego Gas & Electric and SoCalGas®

Version 2.0

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NOTE: *This document is not authored by Snugg Pro.
Please contact Snugg Pro directly for guidance on software use.*
www.snuggpro.com

Purpose

The guidance within this document is designed to give Participating Contractors and auditors an understanding of values specific to the Energy Upgrade California® Home Upgrade Program (Home Upgrade). This knowledge is valuable to help Snugg Pro users enter program approved values and settings in the software. This document is not intended to be a complete manual on how to use Snugg Pro modeling software. Users of Snugg Pro participating in Home Upgrade should have previously set up an account with Snugg Pro, have a good understanding of how the software works and be able to properly create and model a project in the software.

Chapter 1:

The information presented in this document is based on Snugg Pro version 5.5. Snugg Pro is a web-based program. Google Chrome is the required Snugg Pro browser for desktops and laptops. Snugg Pro recommends Chrome for mobile devices, although you can operate Snugg Pro with Safari Mobile on iOS devices. Using any other browser may lead to issues.

Contractors and auditors participating in San Diego Gas & Electric and/or SoCalGas® Home Upgrade have various paths they can choose. Each Advanced Home Upgrade project may follow one of the paths listed below.

- **Advanced Home Upgrade Custom Path**
- **Advanced Home Upgrade Custom Path with utility bill calibration**

Each of the paths have specific rules and guidelines set by the Program. Depending on the path chosen, the values input into Snugg Pro may vary. This document gives direction regarding the proper values to be used for each individual path. For more information about the differences between the Custom path, and the Custom Path with utility bill calibration consult your RHA Program Manager.

One of the purposes of this document is to help users enter the proper values in the proper locations to create an accurate energy model. To create consistent energy models, it is important to input proper values into the software. When using Snugg Pro for Advanced Home Upgrade path projects, the values entered in the software will be either Actual Values or Default Values.

Actual Values: Measured or observed values are collected during the pre-retrofit audit. Actual values are used for items such as area, equipment type, building details, etc.

Default Values: Are a combination of state-approved values based on deemed energy savings, building codes established from the vintage of the home and values specific to San Diego Gas & Electric/SoCalGas, and SoCalGas Program Advanced Home Upgrade projects. Default values shall only be used when health and/or safety issues prevent the contractor from acquiring actual value

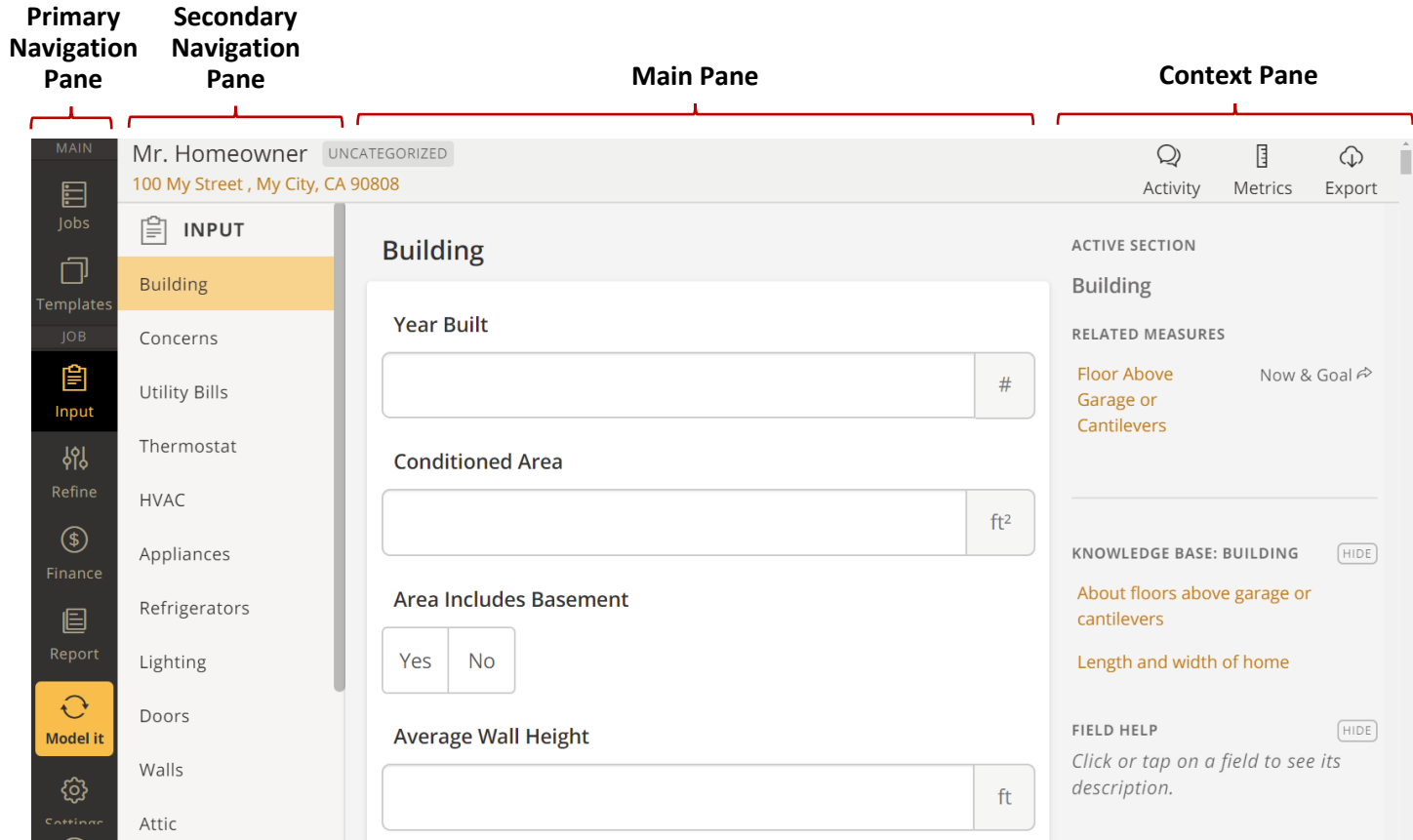
Default values are used for items such as insulation values (attic, duct, wall, knee wall and floor), building leakage, duct leakage, window U-Factor, window SHGC, heating and cooling efficiencies, water heating efficiency, refrigerator efficiency, dishwasher efficiency, clothes washer efficiency, water heater temperature, and thermostat setpoints. Other Default values include items specific to Snugg Pro such as; Shielding, Window Venting, ENERGY STAR® certified appliances, Wind Zone and Lighting.

***For projects participating in the Custom Path utilizing Snugg Pro's utility bill calibration, please follow Snugg Pro's guidelines on how to enter inputs for Custom Path projects with utility bill calibration.**

Snugg Pro Navigation

The following image is representative of the screens you will see in Snugg Pro. For clarification purposes, four sections of the screen are identified throughout this manual:

- Primary Navigation Pane:** Allows you to select the section of Snugg Pro to be worked on.
- Secondary Navigation Pane:** Allows the user to select a particular area within a section.
- Main Pane:** This is where the user inputs values from the Energy Audit Field Sheet into Snugg Pro.
- Context Pane:** Gives users valuable information regarding the subject currently in the Main Pane. (The Context pane has been intentionally left off most images in this document.)



Once the Input icon has been selected in the Primary Navigation Pane, 19 separate items will show up in the Secondary Navigation Pane. For each of the items in the Secondary Navigation Pane there is a corresponding section in the Main Pane.

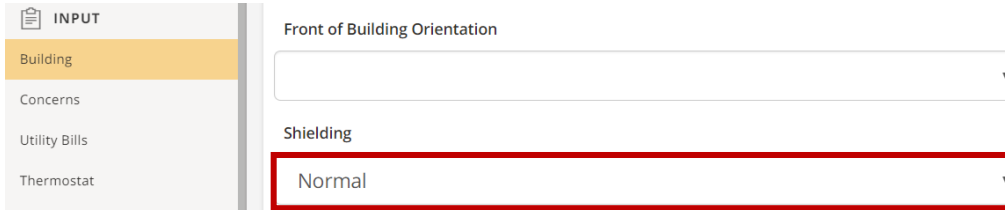
Modeling Procedure

This chapter contains a series of screen shots and directions for completing a successful Snugg Pro model. For the most consistent energy modeling results for Advanced Home Upgrade projects follow the steps outlined below.

Step 1: Enter initial model data

After clicking the Input button on the *Primary Navigation Pane*, use the values from your Energy Audit Field Sheet to complete the *Main Pane*. Scroll down through the *Secondary Navigation Pane* one item at a time (the specific item you are working on will be highlighted gold). Fill-out the corresponding section in the *Main Pane* until you have reached the PV section of the *Secondary Navigation Pane*.

1. Initial Model Data Building

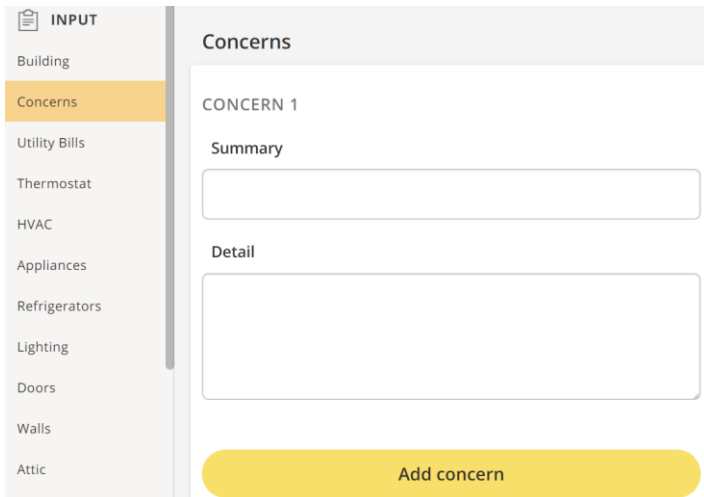


The screenshot shows the 'INPUT' section of the software. The 'Building' category is selected in the left-hand navigation pane. In the main area, the 'Front of Building Orientation' dropdown is empty. Below it, the 'Shielding' dropdown is set to 'Normal' and is highlighted with a red rectangular border.

Input Screen Values - Building:

Shielding	Normal
-----------	--------

2. Initial Model Data -Concerns



The screenshot shows the 'INPUT' section with 'Concerns' selected in the navigation pane. The main area displays 'CONCERN 1' with a 'Summary' text box and a 'Detail' text box. At the bottom, there is a yellow 'Add concern' button.

The Concerns section is used to record homeowner concerns about their home. Home Upgrade does not require that you fill out this section. It has no bearing on the modeled energy-savings. You may complete this section if you deem it necessary for your report.

3. Initial Model Data - Utility Bills

INPUT

- Building
- Concerns
- Utility Bills
- Thermostat
- HVAC
- Appliances
- Refrigerators
- Lighting
- Doors
- Walls
- Attic
- Foundation

Utility Bills

Bill Entry Type

Detailed Simple **No Bills**

ELECTRICITY

Electric Utility Provider Name

abc

PRIMARY HEATING FUEL

Primary Heating Fuel Type

Natural Gas

Fuel Utility Provider Name

Select *No Bills* in the *Utility Bills* section for the customer path and choose the *Primary Heating Fuel Type*, leave the other cells in this section blank. For Advanced Home Upgrade Custom path with utility bill calibration refer to chapter 4.

Input Screen Values – Utility Bills:

Bill Entry Type:	No Bills
------------------	----------

4. Initial Model Data - Thermostat

INPUT

- Building
- Concerns
- Utility Bills
- Thermostat
- HVAC
- Appliances
- Refrigerators
- Lighting
- Doors
- Walls
- Attic
- Foundation
- Windows
- Air Leakage
- Hot Water (DHW)
- Pools

Thermostat

Programmable Thermostat Installed

Yes No

Heating Setpoint: High
(at home)

68

Heating Setpoint: Low
(not at home/sleeping)

68

Cooling Setpoint: Low
(at home)

75

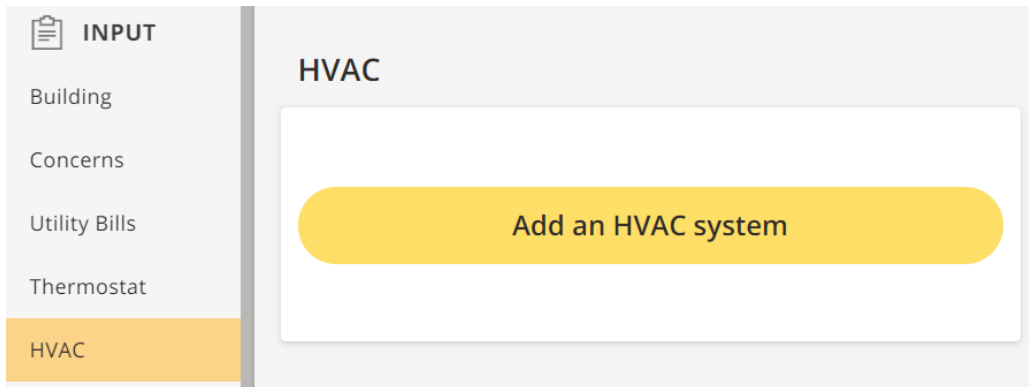
Cooling Setpoint: High
(not at home)

75

Input Screen Values – Thermostat:	
Programmable Thermostat	Yes/No
Heating Setpoint: High	68
Heating Setpoint: Low	68
Cooling Setpoint: High	75
Cooling Setpoint: Low	75

5. Initial Model Data - HVAC

Click on HVAC In the Primary Navigation Pane, click "Add an HVAC System" in the Main Pane and fill-in the name, type and action cells. For additional information regarding HVAC systems and how to enter their values, consult Snugg Pro's Context Pane or the Knowledge Base: <https://snuggpro.com/help/article/video-16-hvac>, <https://snuggpro.com/help/article/adding-a-new-hvac-system>.



Fill-in all BASE (pre-retrofit) conditions for Heating, Cooling and Ducts of the home. Fill-in the Fuel Type and Load Percentage for the IMPROVED (post-retrofit) conditions. Complete the remainder of the IMPROVED conditions with projected/installed equipment characteristics. Verify the proper information is included in the Main Pane of the Refine Screen.

HEATING:

When you click on the grey box for System Efficiency BASE a warning box will appear, select *Edit Field Anyway* and input the AFUE value.

Input Screen Values – HVAC Heating:	
Is Condensing	No
System Efficiency	Use model number to determine efficiency values of existing heating equipment. When you click on the grey box "System Efficiency Base" a warning box will appear, select Edit Field Anyway and input value

COOLING:

INPUT

- Building
- Concerns
- Utility Bills
- Thermostat
- HVAC**
- Appliances
- Refrigerators
- Lighting
- Doors
- Walls
- Attic
- Foundation
- Windows

Cooling

Load Percentage

BASE %

IMPROVED %

Model Year

BASE #

System Efficiency

BASE SEER

Cooling Capacity

BASE BTU/h

When you click on the grey box for System Efficiency BASE a warning box will appear, select *Edit Field Anyway* and input the SEER value of the existing cooling equipment.

Input Screen Values – HVAC Cooling:

System Efficiency

Use model number on existing cooling equipment to determine efficiency value. When you click on the grey box "System Efficiency Base" a warning box will appear, select Edit Field Anyway and input default value

DUCTS:

INPUT

- Building
- Concerns
- Utility Bills
- Thermostat
- HVAC
- Appliances
- Refrigerators
- Lighting
- Doors
- Walls
- Attic
- Foundation
- Windows
- Air Leakage
- Hot Water (DHW)

BASE

Attic (unconditioned) ▼

Leakage

BASE

Measured (CFM25) ▼

Leakage Value

BASE

CFM25

Insulation

BASE

Measured (R Value) ▼

Insulation Value

BASE

R Value

IMPROVED

IMPROVED

IMPROVED

Input Screen Values – HVAC Ducts:	
Duct Leakage	Select “Measured (CFM25)”
Leakage Value	Input measured Leakage to Outdoors value If a hazardous condition or safety concerns prohibits duct testing convert Vintage Table Default % leakage to default leakage in CFM25: <i>(default percentage x total system airflow = leakage in CFM25)</i>
Insulation (Duct)	Select “Measured R-Value”
Insulation Value	Input R-Value of duct insulation observed on-site

6. Initial Model Data - Appliances

Appliances

Range Fuel Type

Oven Fuel Type

Dryer Fuel Type

Clothes Washer Type
 Front Load Top Load No Clothes Washer

ENERGY STAR Clothes Washer?
 Yes No

Dishwasher Installed?
 Yes No

ENERGY STAR Dishwasher?
 Yes No

ACTIVE SECTION
Appliances

RELATED MEASURES

- Freezer [Now & Goal ↗](#)
- Dishwasher [Now & Goal ↗](#)**
- Clotheswasher [Now & Goal ↗](#)**

KNOWLEDGE BASE: APPLIANCES [HIDE](#)

Appliance Product Finders

FIELD HELP [HIDE](#)

Dishwasher Energy Star
Choose Yes if the Dishwasher is an ENERGY STAR model.

Data Type:
Multiple choice

CSV Field Name:
Dishwasher > ENERGY STAR

If the home has a stand-alone freezer click *Add a freezer*.

Navigate to the "detailed Input" screen by selecting the appliance in the grayed section to the right, as seen above.

Now and Goal:

Dishwasher Installed?

BASE
 Yes No

IMPROVED
 No Improvement Yes No

ENERGY STAR

BASE
 Yes No

Energy Factor

BASE
 EF

Navigate to the "detailed inputs" screen to enter the assigned IMEF value for clothes washers, which is **1.29**

Now and Goal:

Type

BASE

Top Load

IMPROVED

No Improvement

Integrated Modified Energy Factor

BASE

1.29 IMEF

ENERGY STAR

BASE

Yes No

Input Screen Values – Appliances:	
Range Fuel Type	Enter existing type determined from pre-inspection (audit)
Oven Fuel Type	Enter existing type determined from pre-inspection (audit)
Clothes Washer Type	Unless utility bill data is provided, all AHU projects shall select "Top-Load"
Energy Star Clothes Washer	Unless utility bill data is provided, all AHU projects shall select "No" for this field
Energy Star Dishwasher	Unless utility bill data is provided, all AHU projects will use a default EF of 0.62

7. Initial Model Data - Refrigerators

Refrigerators

Refrigerator 1

Age (in years)

15-21

Size (in cubic ft)

19-21

ENERGY STAR

Yes No

ACTIVE SECTION

Refrigerators

RELATED MEASURES

Refrigerator [Now & Goal ↗](#)

KNOWLEDGE BASE: REFRIGERATORS (HIDE)

No knowledge base articles

FIELD HELP (HIDE)

Refrigerator Size

Select the size range of this refrigerator.

Data Type:

Multiple choice

Input the values in the sections above. Once these are selections are made, click on the refrigerator In the grayed section to the right to enter the detailed view. Navigate to the kWh/yr section and Input 691 for both base and improved condition.

Now and Goal:

Refrigerator 1

Usage

BASE

691 kWh/yr

IMPROVED

691 kWh/yr

ENERGY STAR

BASE

Yes No

IMPROVED

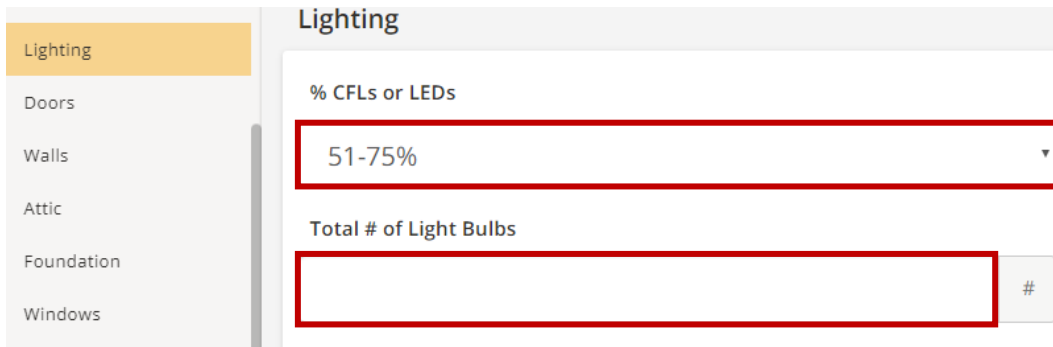
Yes No

If the home has more than one refrigerator click Add refrigerator and fill-out that section with the above values for each additional refrigerator.

Input Screen Values – Refrigerators:	
Age (in years)	15-21
Size (in cubic ft.)	19-21
Energy Star	No

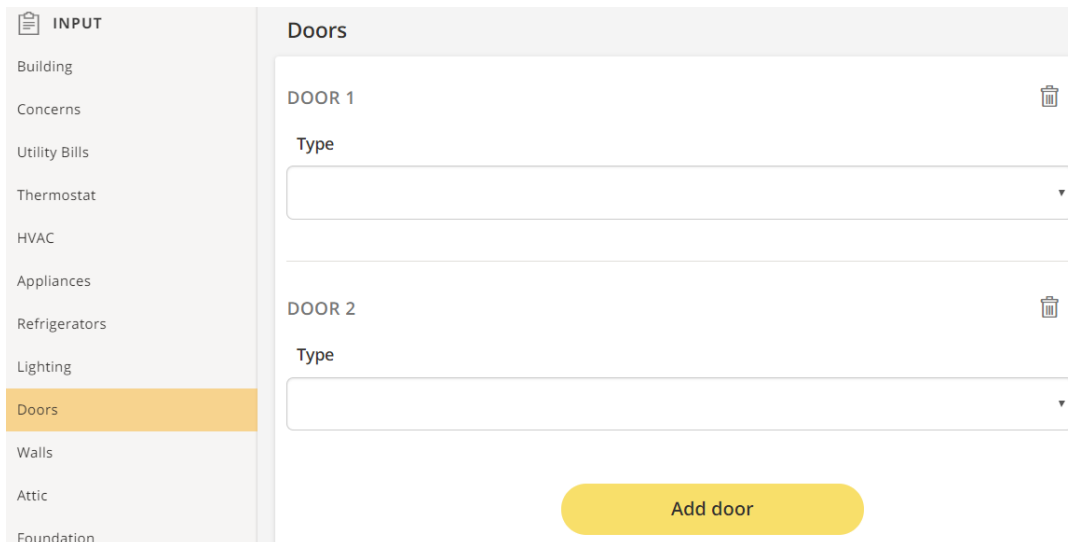
8. Initial Model Data - Lighting

Conduct a full lighting count at time of pre-inspection (audit) to determine percentage of high efficacy (CFL & LED) lighting. Enter the total # of lights observed on-site and determine which percentage range is appropriate for high efficacy lighting.



The screenshot shows a software interface for entering lighting data. On the left is a vertical navigation menu with categories: Lighting (highlighted in orange), Doors, Walls, Attic, Foundation, and Windows. The main content area is titled "Lighting" and contains two input fields. The first field is labeled "% CFLs or LEDs" and has a dropdown menu with "51-75%" selected. The second field is labeled "Total # of Light Bulbs" and is an empty text input box with a "#" symbol to its right.

9. Initial Model Data - Doors



The screenshot shows a software interface for entering door data. On the left is a vertical navigation menu with categories: INPUT (with a clipboard icon), Building, Concerns, Utility Bills, Thermostat, HVAC, Appliances, Refrigerators, Lighting, Doors (highlighted in orange), Walls, Attic, and Foundation. The main content area is titled "Doors" and contains two entries, "DOOR 1" and "DOOR 2", each with a trash icon to its right. Below each entry is a "Type" label and a dropdown menu. At the bottom of the form is a yellow "Add door" button.

If the home has more than two exterior doors click the *Add door* button and add as many doors as needed. Use drop-down to complete type for each additional *Door* added.

10. Initial Model Data - Walls

INPUT

- Building
- Concerns
- Utility Bills
- Thermostat
- HVAC
- Appliances
- Refrigerators
- Lighting
- Doors
- Walls**
- Attic
- Foundation

Walls

EXTERIOR WALL SYSTEM 1

Insulated?

Well Poorly Yes No

Siding

Construction

Add wall

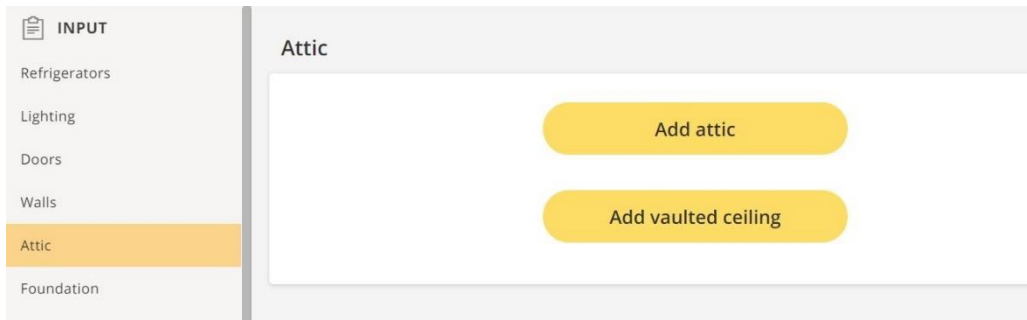
If the home has more than one type of wall system click the *Add wall* button and add wall systems as needed. Fill-out the *Walls* section for each additional *Wall* section added.

Input Screen Values – Walls:

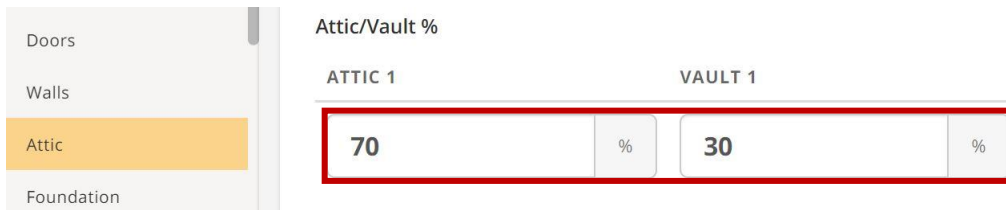
Insulated?

Choose "Yes" only if you are sure insulation is installed. Only choose "Well" OR "Poorly" if you have actually seen the insulation, otherwise leave this blank

11. Initial Model Data - Attic



Click the *Add attic* button and add attics as needed (maximum of two). Fill-out the *Attic* section for each attic. If the home has a vaulted ceiling(s) click the *Add vaulted ceiling* button to add vaulted ceilings as needed (maximum of two).



For homes with both attic(s) and vaulted roof(s) determine the percentage of roof vs. vaulted area and enter those values. The percentages must add up to 100% when there are both attic(s) and vault(s).

Input Screen Values – Attic:	
Attic 1	Input insulation value based on average depth reading. When measuring insulation depth take at least 3 reading from different locations in the attic.
Vault 1	Input insulation R-value based on insulation label, if possible. When unable to ascertain R-value of vaulted ceiling insulation, refer to default value based on vintage of home.

Now and Goal:

Attic 1

Modeled Area

BASE

 ft²

IMPROVED

 ft²

Insulation Type

BASE

IMPROVED

Insulation

BASE

 R Value

IMPROVED

 R Value

Assembly R Value

BASE

 R Value

IMPROVED

 R Value

Radiant Barrier?

BASE

 Yes No

IMPROVED

 Yes No

12. Initial Model Data - Foundation

Thermostat

HVAC

Appliances

Refrigerators

Lighting

Doors

Walls

Attic

Foundation

Windows

Air Leakage

Hot Water (DHW)

Pools

Foundation

Foundation Makeup

BASEMENT	CRAWL	SLAB
<input type="text" value="0"/> %	<input type="text" value="100"/> %	<input type="text" value="0"/> %

Foundation Above Grade Height

ft

Crawlspace Insulation

Crawlspace Type

If there is more than one type of foundation, the foundation make-up percentages must add up to 100%.

13. Initial Model Data - Windows

INPUT

- Building
- Concerns
- Utility Bills
- Thermostat
- HVAC
- Appliances
- Refrigerators
- Lighting
- Doors
- Walls
- Attic
- Foundation
- Windows**
- Air Leakage
- Hot Water (DHW)
- Pools
- PV
- Health & Safety

Windows

Skylight Area ft²

Window Venting Used
 Yes No

WINDOW SYSTEM 1

Type

Frame

Window Area

NORTH (FRONT)	EAST (LEFT)	SOUTH (BACK)	WEST (RIGHT)
<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %

Enter the % of window area for each wall orientation. Example: If a quarter of the southern walls are windows, enter 25%. Unlike foundations, these fields don't need to add up to 100%.

Complete the *Windows* section using values from the Energy Audit Field sheet. If the home has more than one type of window click the *Add a window system* button and add a window system as needed (a maximum of two window systems are allowed), fill-out the *Windows* section for each additional window section added. For additional information regarding window systems and how to enter their values consult Snugg Pro's Context Pane or the Knowledge Base:

<https://snuggpro.com/help/article/modeling-windows-glass-doors-sky-lights> and

<https://snuggpro.com/help/article/multiple-window-systems>

Input Screen Values – Windows:

Window Venting Used	Yes
---------------------	-----

"Yes" must be selected for Window Venting unless the utility bill calibration method is used.

14. Initial Model Data - Air Leakage

Enter the measured blower door value from your manometer with the *Tested* button selected. If a hazardous condition impedes the ability to perform a blower door test-in, use the default Air Leakage value from the *Vintage Default Table*. Be sure to select the *Tested* button and calculate the default value respective to home vintage.

Input Screen Values – Air Leakage:	
Blower Door Test Performed	Select "Tested"
Blower Door Reading	Measured blower door value, *If hazardous conditions or safety concerns prohibit blower door testing, convert Vintage Table Default SLA Value to Default Air Leakage in CFM50): $(\text{default SLA value} \times \text{CFA} \div 3.819 = \text{default CFM50})$

15. Initial Model Data - Hot Water (DHW)

If the home has more than one type of water heater click the *Add a water heater* button and add a water heater as needed (a maximum of two water heater systems are allowed), fill-out the Hot Water (DHW) section for each additional water heater added.

Input Screen Values – Hot Water (DHW):	
DHW Temperature Setting	Low (120 - 130 F)

16. Initial Model Data - Pools

Select "No" for *Swimming Pool* and *Existing Hot Tub* regardless if there is a pool or a hot tub.

Input Screen Values – Pools:	
Swimming Pool	No
Existing Hot Tub	No

17. Initial Model Data - PV

From the *PV (Photo Voltaic)* selection select "No" regardless if the home has solar panels.

Input Screen Values – PV	
Has PV?	No

18. Initial Model Data - Health and Safety

It is not required to fill out the Health & Safety section on the Main Pane. These inputs have no bearing on the modeled energy-savings of the project. You may complete this section if you deem it necessary for your report.

19. Initial Model Data - CAZ

It is not required to fill out the CAZ (Combustion Safety) section on the Main Pane. These inputs have no bearing on the modeled energy-savings of the project. When submitting a project for review, submit separate CAZ testing form.

Step 2: Model the Project

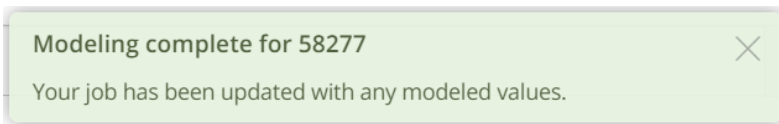
Once all the building elements on the input screen have been completed click the "Model it" button located in the Primary Navigation Screen.



Modeling will take approximately 30 seconds depending on the model. The "Model it" button in the Primary Navigation Pane will change to "Modeled" when complete.



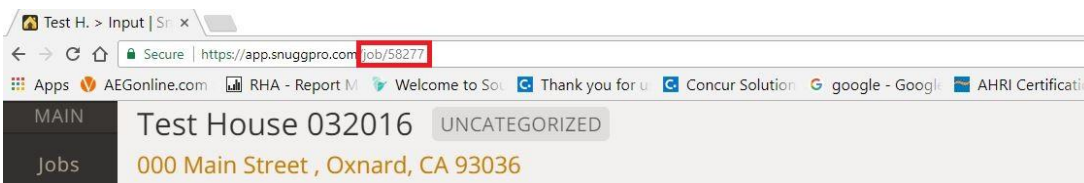
A green box will appear near the bottom of the screen stating "Modeling complete for #XXXXX." In the image below # 58277 is Snugg Pro's identifier for this project. Snugg Pro creates a unique numerical project number to track the project within their system in addition to the homeowner's name and address.



Each time you make any changes to the model after you have initially modeled it you must model it again. The following warning box will appear to remind you to model the project again.



If you need support from Snugg Pro on a project, include the homeowner's name and address along with the project number. The project number appears in the web address of your browser, as well as in the list of jobs you have access to.

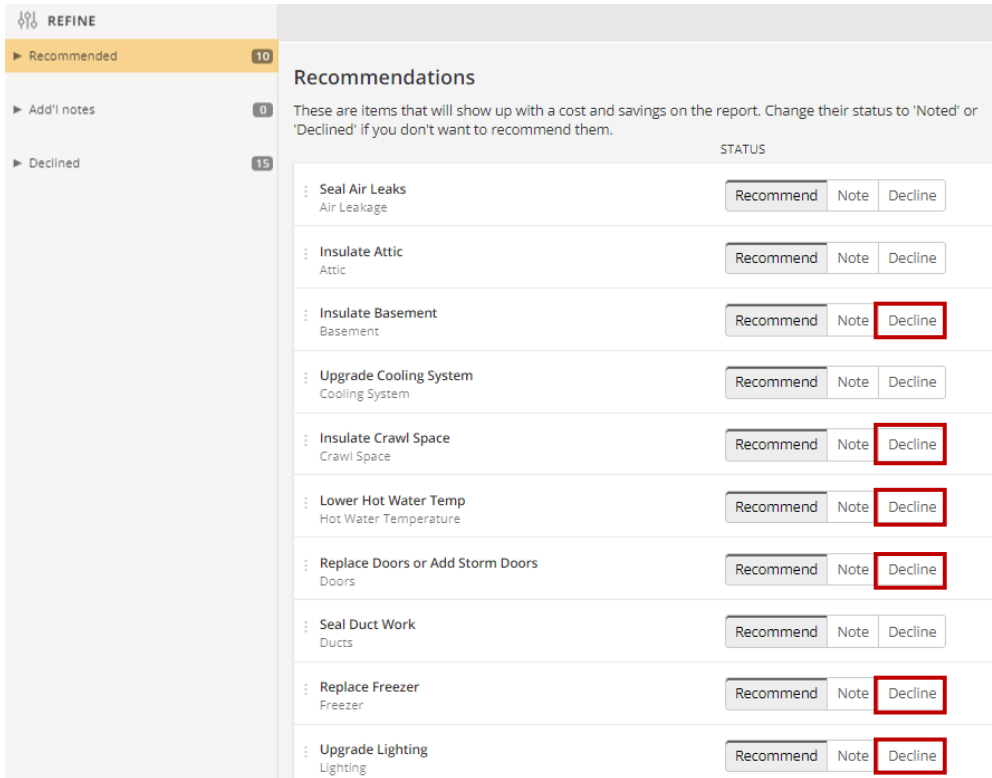


Step 3: Refine the Model to Reflect the Scope of Work

Once the project has been modeled select "Refine" on the Primary Navigation screen.

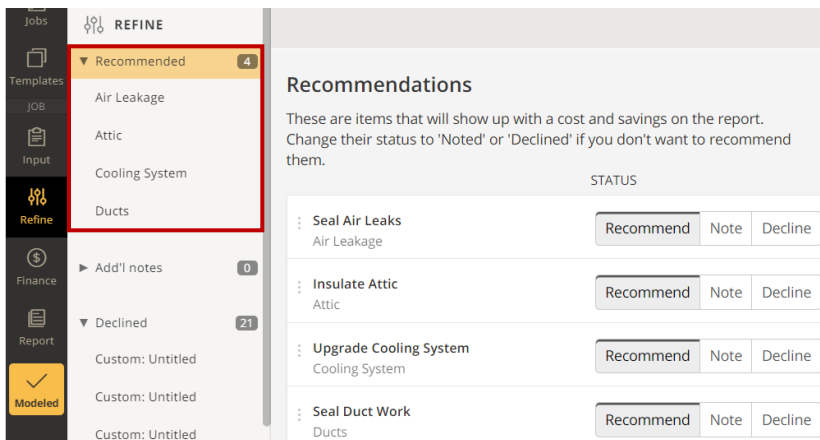


The Main Pane is where the scope of work on your project will be indicated. The Main Pane initially lists all the "Recommended" measures from the Secondary Navigation Pane. All of these measures listed may not be part of the contractor's scope of work, and other measures may not be approved by the Program.



Select "Decline" for all program measures not included in the scope of work and for any measure not approved by the Program.

The Secondary Navigation screen shows measures that will be included in the energy model based on Snugg Pro's calculations.



The scope of work for this project includes the following:

- Seal Air Leaks
- Insulate Attic
- Upgrade Cooling System
- Seal Duct Work

All other recommendations have been "Declined".

With the correct scope of work items displayed under Recommendations of the Main pane you will notice a dialogue box stating "This job has unmodeled changes and may not be accurate. Please model it for best results." Click the "Model it" button.

Step 4: Refine Measures

With the Refine icon selected in the Primary Navigation Pane, select the energy-efficiency measure in the scope of work in the Secondary pane. Fill-out the "Improved" section of the Main Pane for each of the measures included in the scope of work, in this case a new cooling system. For most measures the system will fill in some data after the the project has been modeled the first time. Also, complete the values shown in the following Refine Measures images for items not part of the scope of work.

The screenshot shows the 'REFINE' section of the software interface. The sidebar on the left contains navigation options: Jobs, Templates, JOB, Input, Refine (highlighted), Finance, Report, Model it, Settings, and Support. The 'REFINE' section is expanded to show 'Recommended' (4 items), 'Cooling System' (highlighted), 'Ducts', 'Attic', 'Air Leakage', 'Add'l notes' (0 items), 'Declined' (18 items), and various other measures like 'Frame Floor', 'Thermostat', 'Heating System', 'Freezer', 'Dishwasher', and 'Clotheswasher'. The main pane displays the 'Cooling' section with four measures: 'Load Percentage', 'Model Year', 'System Efficiency', and 'Cooling Capacity'. Each measure has a 'BASE' value and an 'IMPROVED' value field. The 'IMPROVED' fields are highlighted with red boxes, indicating they need to be filled out.

Measure	BASE	IMPROVED
Load Percentage	100 %	
Model Year	1982 #	
System Efficiency	10 SEER	
Cooling Capacity	36,000 BTU/h	

Follow this procedure for each of the items in the scope of work.

1. Refine Measures data - Building Air Leakage

REFINE

▼ Recommended 11

Air Leakage >

Attic

Cooling System

Crawl Space

Water Heater

Ducts

Frame Floor

Heating System

Walls

Windows

Vaulted Ceiling

Now and Goal:

Blower Door Test Performed

BASE Tested Estimate IMPROVED Tested Estimate

Blower Door Reading

BASE 3,981 CFM50 IMPROVED CFM50

Conditioned Air Volume

13,744 ft³

Wind Zone

4 ▼

Refine Screen Values – Building Air Leakage	
Wind Zone	4

3. Refine Measures data - Cooling

REFINE

▼ Recommended 11

Air Leakage

Attic

Cooling System >

Crawl Space

Water Heater

Ducts

Frame Floor

Heating System

Walls

Windows

Vaulted Ceiling

System Efficiency

BASE 10 SEER IMPROVED SEER

Cooling Capacity

BASE 36,000 BTU/h IMPROVED BTU/h

Manufacturer

BASE Lennox ▼ IMPROVED ▼

Model #

BASE 10ACC-036-230 IMPROVED

Refine Screen Values – Cooling	
BASE Model Number	SEER, Cooling Capacity and Model number are required. If model number is not legible, enter "unknown."
IMPROVED Model Number	If Cooling System is upgraded, above highlighted fields must

be populated with values of installed cooling equipment.

4. Refine Measures data - Heating

REFINE

▼ Recommended 11

- Air Leakage
- Attic
- Cooling System
- Crawl Space
- Water Heater
- Ducts
- Frame Floor
- Heating System >
- Walls
- Windows
- Vaulted Ceiling

System Efficiency

BASE IMPROVED

75 ✎ AFUE

Output Capacity

BASE IMPROVED

56,000 BTU/h

Manufacturer

BASE IMPROVED

Goodman ▼

Model #

BASE IMPROVED

unknown

Refine Screen Values – Heating	
BASE Model Number	AFUE, Output Capacity and Model number are required. If model number is not legible, enter “unknown.”
IMPROVED Model Number	When Heating System is upgraded, above highlighted fields must be populated with values of installed heating equipment.

5. Refine Measures data - Ducts

Ducts

Duct Location	
BASE	IMPROVED
<input type="text" value="Attic (unconditioned)"/>	<input type="text" value="Attic (unconditioned)"/>
Leakage	
BASE	IMPROVED
<input type="text" value="Measured (CFM25)"/>	<input type="text" value="Measured (cfm25) - add cost manually"/>
Leakage Value	
BASE	IMPROVED
<input type="text" value="261"/> CFM25	<input type="text" value="98"/> CFM25
Insulation	
BASE	IMPROVED
<input type="text" value="Measured (R Value)"/>	<input type="text" value="Measured (R Value) - add cost manually"/>
Insulation Value	
BASE	IMPROVED
<input type="text" value="4.2"/> R Value	<input type="text" value="8.0"/> R Value

Refine Screen Values – Heating

IMPROVED Leakage	Select “Measured (CFM25) - add cost manually” from the drop-down
IMPROVED Leakage Value	Enter tested Leakage to Outdoors value in CFM25

6. Refine Measures data - Water Heater

REFINE

▼ Recommended 11

Air Leakage

Attic

Cooling System

Crawl Space

Water Heater >

Ducts

Frame Floor

Heating System

Walls

DHW 1

Fuel

BASE

IMPROVED

Type

BASE

IMPROVED

Energy Factor

BASE EF

IMPROVED EF

Refine Screen Values – Water Heater

Energy Factor BASE	Use model number on existing DHW equipment to determine efficiency value. If DHW is not part of the scope of work, decline this measure from the “refine” tab and leave “improved” section blank.
Energy Factor IMPROVED	When DHW is part of the SOW, update all highlighted fields above.

7. Refine Measures data - Walls

Attic

Cooling System

Crawl Space

Water Heater

Ducts

Frame Floor

Heating System

Walls

Windows

Vaulted Ceiling

Wall 1

Modeled Area

BASE

2,907 ft²

IMPROVED

2,907 ft²

Cavity Insulation

BASE

0 R Value

IMPROVED

R Value

Continuous Insulation

BASE

(leave blank) R Value

IMPROVED

R Value

Refine Screen Values – Walls

Cavity Insulation BASE	Use Vintage Table Default Value
Continuous Insulation BASE	Leave Blank

8. Refine Measures data - Windows

Walls

Windows

Vaulted Ceiling

Windows

Vaulted Ceiling

► Add'l notes 0

Window Venting Used

BASE

Yes No

IMPROVED

Yes No

BASE

0.58 U Value

IMPROVED

U Value

Solar Heat Gain Coefficient

BASE

0.65 SHGC

IMPROVED

SHGC

Refine Screen Values – Windows

Window Venting	Select "Yes" for BASE (and IMPROVED if selected as a measure)
BASE U-Value	Use U-Factor from Table 110.6-A1
BASE Solar Heat Gain Coefficient	Use SHGC from Table 110.6-B1
IMPROVED U-Value	Use data from NFRC window stickers or manufacturer specifications if included as a measure.
IMPROVED SHGC	Use data from NFRC window stickers, or manufacturer specifications if included as a measure.

9. Refine Measures data - Frame Floor

Ducts
Frame Floor
 Heating System
 Walls
 Windows

Modeled Floor Area
 1,250 ft²

Floor Cavity Insulation
 BASE R Value
 IMPROVED R Value

Refine Screen Values – Frame Floor

Floor Cavity Insulation BASE	Enter R-value of existing floor cavity insulation observed at time of test-in.
Floor Cavity Insulation IMPROVED	Enter value of newly installed cavity insulation.

10. Refine Measures data - Clothes Washer

Hot Water Temperature
 Doors
 Freezer
 Lighting
 Refrigerator
 Thermostat
 Pool Pumps
 Dishwasher
Clotheswasher

Type
 BASE Top Load
 IMPROVED No Improvement

Integrated Modified Energy Factor
 BASE 1.29 IMEF

ENERGY STAR
 BASE Yes No

The above values must be set in all models, even though this measure must be declined.

Refine Screen Default Values – Clothes Washer

BASE Type	Top load
IMPROVED Type	No Improvement
Integrated Modified Energy Factor	1.29
ENERGY STAR® - BASE	No

11. Refine Measures data - Dishwasher

Dishwasher Installed?

BASE

Yes No

IMPROVED

No Improvement Yes No

ENERGY STAR

BASE

Yes No

Energy Factor

BASE

0.62 EF

The above values must be set in all models, even though this measure must be declined.

Refine Screen Default Values – Dishwasher

Dishwasher Installed?	No Improvement
ENERGY STAR®	No
Energy Factor	0.62

12. Refine Measures data - Refrigerator

Refrigerator 1

Usage

BASE

691 kWh/yr

IMPROVED

IMPROVED

IMPROVED

ENERGY STAR

BASE

Yes No

IMPROVED

Yes No

The above values must be set in all default models, even though this measure must be declined.

Refine Screen Default Values – Refrigerator

ENERGY STAR®	No
Energy Factor	0.691

13. Refine Measures data - Thermostat Set Points

Refine Screen Default Values – Thermostat Set Points	
All Heating and Cooling Set Points	Decline this measure in the Refine Section

14. Refine Measures data - Hot Water Temperature

Refine Screen Default Values – Thermostat Set Points	
Existing DHW Temperature	Regardless of whether a new DHW is installed set this to 120° F then decline this measure in the Refine screen.
IMPROVED DHW Temp	Leave blank

Advanced Custom Path Projects

Advanced Custom path projects and Advanced Custom path projects with utility bill calibration are modeled similarly.

For projects following the Advanced Custom path (with or without utility bill calibration), the user would not use defaults, but would instead use the actual values gathered at the test-in audit for all the following applicable items:

1. Insulation

Chapter 4:

- a. Roof/Ceiling
- b. Wall (Use the vintage default unless wall insulation levels can be directly observed)
- c. Raised Floor
- d. Duct insulation

2. Leakage

- a. Building Air Leakage (Convert vintage default to CFM25 value if a hazardous situation prevents blower door testing)
- b. Duct Leakage (Convert vintage default SLA to CFM50 value if a hazardous situation prevents duct testing)

3. Space Heating Efficiency

- a. Gas Furnace (Central) AFUE
- b. Gas Furnace (Room) AFUE
- c. Hydronic/Comb Hydronic
- d. Heat Pump HSPF
- e. Electric Resistance HSPF
- f. Electric Resistance Radiant HSPF

4. Space Cooling Efficiency

- a. All Types SEER

5. Water Heating

- a. Energy Factor EF

For equipment such as furnaces, AC condensers, water heaters, heat pumps etc. that have missing or unreadable nameplates, use efficiency values from the vintage table. For refrigerators, clothes washers, and dishwashers with missing or unreadable nameplate data or missing manufacturer specifications, use the values listed in the Refine Section Default Values table (see Appendix B) for these appliances.

Advanced Custom path projects use the same thermostat setpoints as Default path projects.: *Programmable Thermostat Installed "No", Heating Setpoint High "68", Heating Setpoint Low "68", Cooling Setpoint Low "75", Cooling Setpoint High "75" and water heater temperature Low "120°F - 130°F".*

Advanced Custom path projects shall also select "Yes" for Window Venting and "No" for Has PV?

Advanced Path Custom Projects with Utility Bill Calibration

For projects following the Advanced Custom path with utility bill calibration, the modeling process is very similar to the Advanced Custom path, although there are slight yet impactful differences. The first difference is the Utility Bills screen. The user has the choice of inputting Simple utility bills, or Detailed utility bills.

Detailed Utility Bill Entry - Electric

Utility Bills

Bill Entry Type

Detailed Simple No Bills

ELECTRICITY

Electric Utility Provider Name

SDG&E abc

Electric Bill Units

kWh

Start Date Electric Bill 1
Oldest bill first

End Electric Bill 1

End Electric Bill 2

To enter Detailed utility bills, select "Detailed," enter the name of the electric utility provider, enter the date the meter was read for 12 consecutive current electric bills. Be certain you are entering the meter read date not the billing date. Snugg Pro utilizes normalized weather data calculations, for that reason it is very important not to use the billing date, doing so will render the utility bill calibration useless. For each month entered fill out the kWh section with the actual kWh used for that month. Do this for all 12 months. For more information refer to <https://snuggpro.com/help/article/utility-bills-training-video>.

Detailed Utility Bill Entry - Fuel

PRIMARY HEATING FUEL

Primary Heating Fuel Type

Natural Gas

Fuel Utility Provider Name

SDG&E

abc

Fuel Bill Units

Therms

Start Date Fuel Bill 1

Oldest bill first

Increment dates

mm/dd/yyyy

End Fuel Bill 1

mm/dd/yyyy

Therms

End Fuel Bill 2

mm/dd/yyyy

Therms

Enter the name of the primary fuel provider, Fuel Bill Units then enter the date the meter was read for 12 consecutive current fuel bills. Be certain you are entering the meter read date not the billing date. For each month entered fill out the Fuel Bill Units section with the actual amount of fuel used for that month. Do this for all 12 months. If the primary heating fuel is propane enter the entire amount of propane used over the year on the line "End Fuel Bill 1." For more information refer to <https://snuggpro.com/help/article/utility-bills-training-video>.

Custom Path projects with Utility Bill Calibration - Additional details

Custom path projects with utility bill calibration use actual values for all applicable values in Snugg Pro.

As with Custom projects without utility bill data the user may enter Default table values for blower door testing results and duct leakage testing results (for the BASE condition) if a hazardous condition is present that would prevent diagnostic testing. The hazard must be remediated prior to issuance of an incentive.

For equipment such as furnaces, AC condensers, water heaters, heat pumps etc. that have missing or unreadable nameplates, use values from the Vintage table in the software. For refrigerators, clothes washers, and dishwashers use the default values listed in the modeling procedure portion of this document.

Advanced Custom path projects with utility bill calibration may select Programable Thermostat Installed "Yes" or "No" depending on what is installed in the home. For thermostat setpoints, enter the actual setpoints programed into the thermostat.

For Window Venting select either "Yes" or "No" based on how the homeowner operates the HVAC system in conjunction with the windows. For more information refer to <https://snuggpro.com/help/article/window-venting> and <https://snuggpro.com/help/article/video-appendix-9-window-venting>.

If the home is equipped with a solar PV array, select "Yes" then complete the cells that relate to the size and arrangement of the solar array. Completing this section accounts for electricity generated and used on-site that is not reflected in the electric bills. If the home does not have solar PV, select "No" for this option.

Appendix A: Default Values for the Input Screen

The Following *Input Section Default Values* table is designed to give users information on specific data that must be included in the Snugg Pro energy model. The items described in the *Use These Values* column on the right must be entered in the Input Fields tab of each applicable building feature section. All other Snugg Pro input field values not shown in the table below require the Actual (measured or observed) values to be input.

Input Section Default Values	
BUILDING FEATURE	USE THESE VALUES
Building Section	
Shielding	Normal
Utility Bills Section	
Bill Entry Type	No bills
Thermostat Section	
Programmable Thermostat	No
Thermostat Heating Setpoint	68 High (at home), 68 Low (not at home / sleeping)
Thermostat Cooling Setpoint	75 High (not at home), 75 Low (at home)
Heating and Cooling Section	
System 1:/System 2:/Etc.	Click on name this system and enter a name, do this for each system
Heating	
Is Condensing	No
System Efficiency	Use model number on existing heating equipment to determine existing efficiency value. If hazardous condition or inability to read model number prevents ability to determine actual value, use Vintage Table Default value in AFUE. When you click on the grey box "System Efficiency Base a warning box will appear, select Edit Field Anyway and input default value
Cooling	
System Efficiency	Use model number on existing cooling equipment to determine existing efficiency value. If hazardous condition or inability to read model number prevents ability to determine actual value, use Vintage Table Default value in SEER. When you click on the grey box "System Efficiency Base a warning box will appear, select Edit Field Anyway and input default value
Ducts	
Duct Leakage	Select Measured (CFM25)

Leakage Value	Measured Leakage to Outdoors value OR if hazardous conditions or safety concerns prohibit duct testing convert Vintage Table Default % leakage to default leakage in CFM25: (default percentage x total system airflow = leakage in CFM25)
Insulation (Duct)	Measured R-Value
Insulation Value	Input actual R-value of duct insulation observed on-site.
Appliance Section	
Clothes Washer Type	Top load (if clothes washer is present)
Energy Star Clothes Washer	No
Energy Star Dishwasher	No
Refrigerator Section	
Age (in years)	15-21
Size (in cubic ft.)	19-21
ENERGY STAR®	No

Input Section Default Values

BUILDING FEATURE	USE THESE VALUES
Dishwasher	
Installed	As observed
Energy Star Dishwasher	No
Lighting Section	
% of CFLs or LEDs	51-75%
Total # of Light Bulbs	Leave blank
Walls Section	
Insulated?	Choose "Yes" only if you are sure insulation is installed. Only choose "Well" OR "Poorly" if you have actually seen the insulation, otherwise leave blank
Attics/Vaulted Ceiling Section	
Vault 1	Choose "Yes" only if you are sure insulation is installed. Only choose "Well" OR "Poorly" if you have actually seen the insulation, otherwise leave blank. Use + <i>Add vaulted ceiling</i> tab for additional vaulted ceilings if necessary
Foundation Section	
Foundation Makeup	Select actual percentage of each type of foundation; total must equal 100%
Window Section	
Window Venting Used	"Yes"
Air Leakage	
Blower Door Test Performed	"Tested"
Blower Door Reading	Measured blower door value, OR if hazardous conditions or safety concerns prohibit blower door testing, convert Vintage Table Default SLA Value to Default Air Leakage in CFM50): (default SLA value X CFA ÷ 3.819 = default CFM50)
Domestic Hot Water (DHW) Section	
DHW Temperature Setting	Low (120 - 130 F)
Pools and Hot Tub Section	
Swimming Pool	No

Existing Hot Tub	No
PV	
Has PV?	No

Appendix B: Default Values for the Refine Screen

The Refine Screen table is designed to give users information on specific data that must be included in the Snugg Pro energy model. All of the applicable items described under *Use These Values* must be entered in the Refine screen after the project has initially been modeled. All values for improved building details included in the SOW must be entered in the appropriate fields. Not every possible upgrade from the refine screen is listed in the table since many of the upgrades are not approved for use by the program, or there is no specific data that must be entered for a particular upgrade.

Refine Section Default Values	
BUILDING FEATURE	USE THESE VALUES
Clothes Washer	
Energy Factor	1.29
Dishwasher	
ENERGY STAR®	No
Energy Factor	0.62
Refrigerator	
Existing Usage	691 kWh/yr.
Existing ENERGY STAR®	No
Walls	
Cavity Insulation BASE	Use Vintage Table Default Value
Continuous Insulation BASE	Leave Blank
Attic	
Insulation BASE	Use Vintage Table Default Value
Vault or Flat Roof	
Cavity Insulation BASE	Use Vintage Table Default Value
Continuous Insulation BASE	Leave Blank
Frame Floor	
Floor Cavity Insulation BASE	Use Vintage Table Default Value
Crawl Space	
Floor Cavity Insulation BASE	Use Vintage Table Default Value

Refine Section Default Values

BUILDING FEATURE	USE THESE VALUES
Windows¹	
Existing Efficiency	Use Proper U-Factor from Table 110.6-A1
Existing Solar Heat Gain Coefficient	Use proper SHGC from Table 110.6-B1
IMPROVED Efficiency	Use window manufacturer's values from NFRC window stickers, or manufacturer specifications.
IMPROVED SHGC	Use window manufacturer's values from NFRC window stickers, or manufacturer specifications.
Seal Air Leaks	
Wind Zone	4
Thermostat Set Points	
All Heating and Cooling Setpoints	Decline this measure in the Refine screen
Lower Hot Water Temperature	
Existing DHW Temperature	Regardless of whether a new DHW is installed set this to 120° F then decline this measure in the Refine screen.
IMPROVED DHW Temp	Leave blank
Upgrade Heating System	
BASE Model Number	Model number is required, if unknown enter unknown
IMPROVED Model Number	If Heating System is upgraded to minimum Program specifications, model number must be entered for new equipment
Upgrade Cooling System	
BASE Model Number	Model number is required, if unknown enter unknown
IMPROVED Model Number	If Cooling System is upgraded to minimum Program specifications, model number must be entered for new equipment
Seal Duct Work	
IMPROVED Leakage	Measured (CFM25) - add cost manually from the drop-down
IMPROVED Leakage Value	Enter tested leakage in CFM25
Water Heater	
Energy Factor BASE	Use Vintage Table Default Value

¹ All existing windows must have their U-Factor, and SHGC values manually entered into Snugg Pro under the BASE value. If the window(s) are being replaced with window(s) that meet minimum program specifications, the U-Factor, and SHGC values must also be entered under the IMPROVED values. Included in this document are two separate charts designed to determine the U-Factor and SHGC value of most window configurations. Use Table 110.6-A to determine the correct U-Factor, and Table 110.6-B to determine the correct SHGC. When entering the U-Factor, and SHGC for the IMPROVED window(s) use the specifications from the window manufacturer. Refer to Appendix C for Table 110.6-A and Table 110.6-B

Appendix C: Windows

U-Factor:

Table 110.6-A Default Fenestration Product U-Factors

FRAME	PRODUCT TYPE	SINGLE PANE ^{3,4} U-FACTOR	DOUBLE PANE ^{1,3,4} U-FACTOR	GLASS BLOCK ^{2,3} U-FACTOR
Metal	Operable	1.28	0.79	0.87
	Fixed	1.19	0.71	0.72
	Greenhouse/Garden Window	2.26	1.40	N/A
	Doors	1.25	0.77	N/A
	Skylight	1.98	1.30	N/A
Metal, Thermal Break	Operable	N/A	0.66	N/A
	Fixed	N/A	0.55	N/A
	Greenhouse/Garden Window	N/A	1.12	N/A
	Doors	N/A	0.59	N/A
	Skylight	N/A	1.11	N/A
Non-Metal	Operable	0.99	0.58	0.60
	Fixed	1.04	0.55	0.57
	Greenhouse/Garden Window	0.99	0.53	N/A
	Doors	1.94	1.06	N/A
	Skylight	1.47	0.84	N/A

SCB 3/1/2016

¹ For all dual-Glazed Fenestration products, adjust the listed U-factors as follows:

- a. Add 0.05 for products with dividers between panes if spacer is less than 7/16 inch wide.
- b. Add 0.50 to any product with true divided lite (dividers through the panes).

² Translucent or transparent panels shall use glass block values when not rated by NFRC 100.

³ Visible transmittance (VT) shall be calculated by using reference Nonresidential Appendix NA6.

⁴ Windows with window film applied that is not rated by NFRC 100 shall use default values from this table.

SHGC:

Table 110.6-B Default Solar Heat Gain Coefficient (SHGC)

FRAME TYPE	PRODUCT	GLAZING	FENESTRATION PRODUCT SHGC		
			SINGLE PANE ^{2,3} SHGC	DOUBLE PANE ^{2,3} SHGC	GLASS BLOCK ^{1,2} SHGC
Metal	Operable	Clear	0.80	0.70	0.70
	Fixed	Clear	0.83	0.73	0.73
	Operable	Tinted	0.67	0.59	N/A
	Fixed	Tinted	0.68	0.60	N/A
Metal, Thermal Break	Operable	Clear	N/A	0.63	N/A
	Fixed	Clear	N/A	0.69	N/A
	Operable	Tinted	N/A	0.53	N/A
	Fixed	Tinted	N/A	0.57	N/A
Non-Metal	Operable	Clear	0.74	0.65	0.70
	Fixed	Clear	0.76	0.67	0.67
	Operable	Tinted	0.60	0.53	N/A
	Fixed	Tinted	0.63	0.55	N/A

SCB 3/1/2016

¹ Translucent or transparent panels shall use glass block values when not rated by NFRC 200.

² Visible transmittance (VT) shall be calculated by using reference Nonresidential Appendix NA6.

³ Windows with window film applied that is not rated by NFRC 200 shall use default values from this table.

Appendix D: Default Btuh Ratings

When the Btuh Input rating cannot be obtained from the manufacturer's nameplate, the following default values may be used:

Forced Air Furnaces	25,000 Btuh per burner
Wall Furnaces	Single Sided: 35,000 Btuh Double-Sided with two burners: 60,000 Btuh
Floor Furnaces	Standard: 30,000 Btuh (22" wide or smaller) Large: 60,000 Btuh (wider than 22")
Free-Standing Heaters	Small (up to 25" wide): 25,000 Btuh Standard (26" to 32" wide): 50,000 Btuh Large (34" or wider): 60,000 Btuh
Water Heater (Storage Type)	1,000 Btuh per gallon
Cooktop Burner/s	10,000 Btuh per burner
Ovens	20,000 Btuh per burner

Appendix E: Formulas

Building Leakage in CFM50	$CFM50 = \text{Default SLA} \times \text{Conditioned Floor Area} \div 3.819$
Total System Airflow Based on Nominal Cooling Method	$\text{System Airflow} = \text{AC Tonnage} \times 400 \text{ CFM/ton}$
Duct Leakage Based on Nominal Cooling Method (default percentage to CFM25)	$\text{Nominal Cooling Total System Airflow} \times \text{Default Duct Leakage Percentage}$
Total System Airflow based on Nominal Heating Method	$\text{System Airflow} = \text{Furnace BTU/Output} \times 21.7 \div 1000$
Duct Leakage Based on Nominal Heating Method (default percentage to CFM25)	$\text{Nominal Heating Total System Airflow} \times \text{Default Leakage Percentage}$

Appendix F: Vintage Default Table

	BEFORE 1950	1950- 1977	1978- 1983	1984- 1991	1992	1993- 1998	1999- 2000	2001	2002- 2003	2004- 2005	2006 AND LATER
Leakage											
Building (SLA) – Home Upgrade	7.1	7.1	5.2	5.2	5.2	4.6	4.6	4.6	none	none	none
Building (SLA) – Advanced Home Upgrade	10.2	8.0	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Duct Leakage Percentage	28%	28%	28%	28%	28%	28%	28%	22%	22%	22%	22%
Space Heating Efficiency											
Gas Furnace (central) AFUE	0.75	0.75	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Gas Heater (room) AFUE	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Hydronic/ Combined Hydronic	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Heat Pump (HSPF)	5.6	5.6	5.6	6.6	6.6	6.6	6.8	6.8	6.8	6.8	7.4
Electric Resistance Radiant (HSPF)	3.413	3.413	3.413	3.413	3.413	3.413	3.413	3.413	3.413	3.413	3.413
Space Cooling Efficiency											
All Types (SEER)	8.0	8.0	8.0	8.9	9.7	9.7	9.7	9.7	9.7	9.7	13.0
Water Heating											
Gas Heater (EF)	0.525	0.525	0.525	0.525	0.525	0.525	0.575	0.575	0.575	0.575	0.575
Insulation R-Value											
Roof/Ceiling	R-11	R-11	R-19	R-19	R-19	R-19	R-19	R-19	R-19	R-19	R-19
Wall	none	none	R-11	R-11	R-13	R-13	R-13	R-13	R-13	R-13	R-13
Raised Floor – Crawl Space	none	none	none	none	R-13	R-13	R-13	R-13	R-13	R-13	R-13
Raised Floor – No Crawl Space	none	none	none	none	R-13	R-13	R-13	R-13	R-13	R-13	R-13
Duct Insulation	R-2.1	R-2.1	R-2.1	R-2.1	R-4.2	R-4.2	R-4.2	R-4.2	R-4.2	R-4.2	R-6

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