



Low-Income Weatherization Program Farmworker Component Energy Audit Protocol

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Table of Contents

| | | |
|-----|---|----|
| 1 | Introduction..... | 3 |
| 1.1 | Non-Audit Measures..... | 3 |
| 1.2 | Audit Measures..... | 4 |
| 1.3 | Diagnostics..... | 5 |
| 1.4 | Health and Safety..... | 5 |
| 1.5 | Propane Fuel Switching..... | 7 |
| 1.6 | Limited Home Repair..... | 8 |
| 1.7 | Solar..... | 10 |
| 2 | Energy Audit Software..... | 10 |
| 2.1 | Energy Audit Template..... | 11 |
| 2.2 | On-Site Process..... | 11 |
| 3 | Energy Modeling and Analysis..... | 11 |
| 3.1 | Model It..... | 25 |
| 3.2 | Refine/Recommendations..... | 25 |
| 3.3 | Report..... | 27 |
| 3.4 | Measure Costs..... | 28 |
| 3.5 | Leveraging Measures..... | 30 |
| 4 | Energy Auditor Minimum Qualifications..... | 30 |
| 5 | Energy Audit SUBmittal and Quality Assurance Reviews..... | 31 |
| 5.1 | Third-Party QA..... | 31 |
| 6 | Appendix A: Image Documentation..... | 32 |
| 7 | Appendix B: Energy Audit Software Administrator Controls..... | 33 |

Low-Income Weatherization Program Energy Audit Protocol

1 INTRODUCTION

The Low-Income Weatherization Program (LIWP) is an energy efficiency (EE) program administered by California Department of Community Services and Development (CSD) to install a variety of EE measures, solar photovoltaics (PV), and solar water heater (SWH) systems (generally referred to as measures) for qualified low-income households located in disadvantaged communities (DACs). DACs have been identified by the California Environmental Protection Agency through a tool known as the CalEnviroScreen 3.0. This tool uses geographic, socioeconomic, public health, and environmental hazard criteria to identify vulnerable communities disproportionately burdened by multiple sources of pollution.

This protocol defines how to use the Snugg Pro energy audit tool to justify measures installed in the subcomponent of LIWP's Single-Family Energy Efficiency Program and Solar PV Program component focused solely on farmworker housing.

Measures in the LIWP Farmworker Program component fit into one or more of the following categories:

1. Non-Audit
2. Audit
3. Diagnostics
4. Health and Safety (H&S)
5. Propane Fuel Switching
6. Home Repair
7. Solar

These categories and the measures included are defined in the following sections.

1.1 NON-AUDIT MEASURES

Non-audit measures are measures with pre-determined deemed savings that may be installed without an energy audit. All eligible renters and homeowners may receive the following LIWP measures provided they are feasible to install. Refer to the LIWP Farmworker Installation Standards for measure feasibility requirements. Non-audit measures include:

- Ceiling fan
- Clothes washer replacement
- Cool roof
- Efficient fan controller
- Electronically commutated blower motor
- Exterior security light
- Freezer replacement

- Infiltration reduction measures: Caulking, chimney dampers, cover plate gaskets, minor/major envelop repair, fireplace glass doors, glass replacement, interior vent covers, weatherstripping, window repair, kitchen exhaust dampers, attic/crawlspace cover replacement, door repair. and door replacement (for catastrophic leakage only).
- Hot water flow restrictor, faucet restrictor
- Hot water flow restrictor, low-flow showerhead
- LED bulbs
- LED night lights
- Refrigerant charge with coil cleaning
- Refrigerator replacement
- Smart thermostat
- Thermostatic shower valve
- Thermostatic shower valve and showerhead
- Tier II advanced power strip
- Vacancy sensor
- Water heater blanket
- Whole house fan (one per dwelling)
- Ceiling insulation up to R-30 or R-38 (if existing insulation is R-19 or less)*
- Wall insulation (if existing insulation is R-0)*
- Floor insulation (if existing insulation is R-0)*

Non-audit measures marked with an asterisk (*), if feasible, may be installed without an energy audit. However, if an energy audit is required, these measures must be included in the energy audit.

1.2 AUDIT MEASURES

CSD requires an energy audit be conducted if any of the following measures will be installed:

- Cooling upgrade
- Duct insulation
- Duct replacement (requires diagnostic testing)
- Ductless mini-split heat pump
- Ductless mini-split air conditioner (AC)
- Duct sealing (requires diagnostic testing)
- Evaporative cooler replacement
- Heat pump water heater (new ENERGY STAR® HPWH)
- Heating upgrade
- Radiant barrier
- Wall/window AC replacement
- Water heater replacement
- Window replacement (may only be audited for EE—no catastrophic leak replacement)

- Ceiling insulation up to R-30 or R-38*
- Wall insulation*
- Floor insulation*

Audit measures marked with an asterisk (*), if feasible, must be included in the energy audit when an audit is required. However, if an energy audit is not required, these measures may be installed prescriptively.

The energy audit tool known as Snugg Pro is required for the LIWP program. Measures requiring an audit can only be installed when an individual measure or package of measures achieves a Savings-to-Investment Ratio (SIR) of 1.0 or greater. If a complete package of measures to be installed has a package SIR of 1.0 or greater, then all measures in the package may be installed. This includes any measures for which the individual SIR is less than 1.0. Measures (individually or packaged) can only be installed when the cost of installing a measure or package of measures will pay for itself by generating enough energy cost savings over its estimated useful life.

1.3 DIAGNOSTICS

The following diagnostic tests will be required in the LIWP Farmworker Program under the following conditions:

- CAS testing: A visual and instrumented examination of gas combustion appliances to determine if they are safe to operate. Required when combustion appliances are present that “affect” the living space.
- Duct testing (pre-/post-): Visual inspection and pressure testing to locate duct leaks that decrease duct system performance. Required when duct sealing/repair/replacement is being considered as a measure.

Contractors must follow the policy and procedures included in the Duct Test Protocol and Combustion Appliance Safety (CAS) Testing Measure Standards. Refer to Section 3: Energy Modeling and Analysis to determine how information from these tests are entered into the Snugg Pro audit.

1.4 HEALTH AND SAFETY

H&S issues are common in low-income households due to the presence of older and poorly maintained appliances. Leaking gas appliances can be deadly, as can non-functioning heating and cooling systems when temperatures dramatically rise or fall. Each dwelling is comprehensively assessed and evaluated both visually and through the use of diagnostic tools to identify H&S concerns, and to determine a suite of greenhouse gas (GHG)–reducing EE measures for installation. Remedying these H&S issues can actually cause a rise in energy use and GHG production; however, the importance of protecting the health, safety, and well-being of occupants requires that such safety hazards be promptly mitigated and not go unaddressed.

Appliance repair and replacement for H&S will be permitted in the LIWP Farmworker Housing Program component. The following condition must be met before an appliance can be repaired

or replaced with H&S funds: “Red tagged”¹, inoperable, or CAS condition identified as a hazard during CAS testing.

Appliances effected by this policy include repairs and replacements of:

- Central heating, ventilation, and AC (HVAC) replacement package units
- Central HVAC replacement split systems
- Mobile home split systems
- Ductless mini-split ACs
- Ductless mini-split heat pumps
- Wall furnaces/floor furnaces
- Forced air units
- Evaporative coolers
- Window/wall ACs
- Water heaters

Under the LIWP Farmworker Program, appliance repair due to an H&S condition is always categorized as a H&S measure. An appliance replacement due to an H&S condition may qualify as either an EE or H&S measure. The following steps are required when determining which category—EE or H&S—the measure will be billed within.

Remember: Regardless of which category the appliance is billed within, the measure repair or replacement must comply with the LIWP Farmworker Installation Standards. Assessments, diagnostics and H&S measures may only be billed to dwellings that also receive the required proportion of EE measures as defined below.

Step 1: Determine if the measure can be justified using an energy audit.

All appliances defined in Measure Bid Sheet as audit measures, must first be modeled in the Snugg Pro energy audit following the guidelines established in Section 3.0 of this document. When an appliance can be cost-effectively qualified as an EE measure, either individually or as part of a package of measures, it must be billed as an EE measure. To qualify as an EE measure, the measure, or measure package SIR must be greater than or equal to 1.0.

A measure may be billed to H&S repair or replacement only after the measure was unable to be included as part of a successful cost-effective EE package that meets or exceeds a 1.0 SIR. All options should be explored to insure measures are primarily installed as EE measures to the greatest degree, as LIWP funding is intended to reduce energy usage and carbon emissions. This may include reducing the measure cost, installing an alternative technology, or increasing the appliance efficiency.

Step 2: Utilize the LIWP H&S Budget

¹ An appliance may be “red tagged” and/or disabled by utility service personnel if a hazardous condition is found and cannot be resolved. Hazard conditions include items such as, high CO, cracked heat exchanger, gas leaks and flame roll out.

Buy-Down

If it is determined through an energy audit that an appliance with an H&S condition does not qualify as an EE measure or as part of an EE package, as identified in Step 1, contractors may use their LIWP H&S Budget to “buy-down” the cost of an appliance replacement that would not otherwise qualify based on the audit results. Buying-down the cost of a measure reduces the cost of the appliance in the energy audit, which can help the appliance replacement to qualify as an EE measure. If a H&S buy-down is used, the amount used to buy-down the appliance replacement cost to achieve a measure package SIR of 1.0 shall not exceed 50% of the appliance replacement cost. In addition, the use of H&S buy-down funds cannot increase the measure SIR to above 1.0.

Measures that qualify due to a H&S buy-down shall not be installed before or in lieu of measures that were already cost-effective before the buy-down occurred. Measures can only be considered for buy-down if all cost-effective measures in the initial audit are being installed concurrently.

Repair and Replacement

Ultimately, if H&S issues cannot be addressed/resolved through the audit or using the buy-down option, the H&S Budget can be utilized for both repair and replacement of non-operable or red-tagged appliances that meet the conditions defined in Section 1 of this policy paper above. Appliance replacement using solely the H&S budget may only be considered when repair costs exceed 50% of the replacement cost and the audit package cannot achieve an SIR rating of 1.0 or greater as calculated by the Snugg Pro energy audit.

Nonexistent primary heating or cooling systems **should not** be installed using LIWP funds, however implementers may request a wavier on a case-by-case basis.

Note: Cost caps will be used to limit expenditures associated with H&S, diagnostics, and limited home repair (LHR), both for individual measures and on a per home basis. These non-energy efficient expenditures shall not exceed 25% of a contractor’s total direct budget allocation and will be limited to less than 50% of a single dwelling’s expenditure. Measure cost caps are defined in Measure Bid Sheet of the individual contractor’s bid documents.

H&S repair is capped at 50% of the cost of replacement and to be billed on a time and materials basis using actual material costs and in accordance to Measure Bid Sheet labor rates.

Utilizing additional funding sources is always encouraged. Leveraging with other approved programs such as CSD’s Low-Income Home Energy Assistance Program (LIHEAP) or utility energy assistance programs will be required when exceeding cost caps, a contractor’s LIWP H&S budget is exhausted, or a measure does not meet all LIWP measure specifications.

1.5 PROPANE FUEL SWITCHING

Fuel switching is limited to homes in which propane fueled heating is present and will be replaced with electric heat pump HVAC; and all other propane fueled appliances, when present, will be replaced with electric appliances. For a home to be eligible for fuel switching it must meet all the following criteria:

1. Served by propane

2. Single-family
3. Owner-occupied
4. Supplied with electricity from a solar PV system or a solar PV system will be provided as part of LIWP intervention

An energy audit is required to be conducted to justify fuel switching. Measures that may be installed in conjunction with fuel switching include:

- Central heat pump replacement (ducted)
- Ductless mini-split heat pump
- Ductless mini-split AC
- Electric clothes dryer
- Electric oven
- Electric range
- HPWH
- Solar PV

Improvements for an electric clothes dryer, electric oven and electric range, will not be modelled in the energy audit, however all costs associated with their installation must be included in the total measure package cost. An improvement for Solar PV will be included in a fuel switching package. Refer to Section 3: Energy Modeling and Analysis for how to input Solar PV into the energy audit.

Fuel Switching measures can only be installed when an individual measure, or package of measures, achieves an SIR of 1.0 or greater. If a complete package of measures to be installed has a package SIR of 1.0 or greater, then all measures in the package may be installed. This includes any measures where the individual SIR is less than 1.0. EE measures requiring an audit can be included in the audit package.

1.6 LIMITED HOME REPAIR

All home repairs installed in the LIWP Farmworker Housing Program component shall have a direct association with EE measures being installed, or repaired, and are necessary for the effective performance and/or preservation of weatherization materials. The two categories of home repairs allowed in the LIWP Farmworker Housing Program component are Limited Home Repair (LHR) and Alterations and Electrical Upgrade (AEU).

1.6.1 LHR

LHR is considered a stand-alone measure and is defined as: “Activities required to: 1) facilitate the installation or preservation of LIWP Farmworker Program measures and materials or 2) mitigate a health and safety hazard.”

Numerous types of repairs are included in this measure category and if one or multiple LHRs are made, they should be billed as “Limited Home Repair.” If a measure inside of LHR is associated with an audited measure, the repair cost must be added to the measure cost inside of the energy audit. The package SIR must be equal to or greater than 1.0, including the LHR costs. A single or combined repair cost shall not exceed the LHR measure cost provided by the

administrator as part of the Measure Bid Sheet or \$1,200 dollars per dwelling, whichever is less.

Note: Cost caps will be used to limit expenditures associated with H&S, diagnostics, and LHR, both for individual measures and on a per-home basis. These non-energy efficient expenditures shall not exceed 20% of a contractor's total direct EE budget allocation and will be limited to less than 50% of a single dwelling's expenditure. Measure cost caps are defined in Measure Bid Sheet of the individual contractor's bid documents.

LHR:

- Shall be individually billed.
- Shall be billed as actual labor and materials up to the bid cost provided by administrator within Measure Bid Sheet.
- LHR cost must be added to the audited measure cost in the energy audit when LHR facilitates, preserves, and/or supports the audited measure's installation.
- If the associated measure is an audited measure, the package SIR must be ≥ 1.0 for the measure to be installed.

LHRs includes the following items:

- Floor/platform repair for heating/cooling sources or water heaters
- Minor roof repair
- Mobile home skirting repair
- Minor exterior appliance access
- Rough framing repair (doors/windows)
- Attic access enlargement
- Exhaust fan vent extension
- Kitchen exhaust repair or replacement
- Domestic clothes dryer moisture exhaust
- Make-up air for domestic clothes dryer
- Attic and crawlspace ventilation
- Incidental fuel switching cost not including AEU's

See the "Limited Home Repair Standards" for more details, installation criteria, and material specifications.

1.6.2 Alterations and Electrical Upgrade

AEU is the second component of home repair in the LIWP Farmworker Housing component. AEU's are defined as: "Those activities required to modify/upgrade the electrical system or alter the building envelope to accommodate propane fuel switching and appliance upgrades, and Solar PV." The cost (labor and materials) of upgrades:

- Shall be individually billed.

- AEU cost must be added to the audited measure cost in the energy audit when AEU supports those activities required to modify/upgrade the electrical system or alter the building envelope to accommodate propane fuel switching and appliance upgrades, and Solar PV.
- Requires a package SIR ≥ 1.0 for the audited measure and its supporting AEU to be installed.

AEUs are limited to the following activities:

- Main Distribution Panel Upgrade and Retrofits.
- Installation of a New Circuit.
- Subpanel Upgrade or Replacement.
- Providing ducted air to HPWH condenser

1.7 SOLAR

Solar measures included in the LIWP Farmworker Program include solar PV and SWH.

1.7.1 Solar PV

When a solar PV system is proposed, contractors are required to use the PVWatts[®] Calculator developed by the National Renewable Energy Laboratory (NREL)² to estimate energy production. Determining cost effectiveness for solar PV is always performed outside of the audit. When solar PV is installed in conjunction with propane fuel switching, only then, must the system be modelled in the Snugg Pro energy audit as a recommended improvement. In a fuel switching measure package, the entire package including the solar PV must achieve an SIR of 1.0 or greater.

1.7.2 Solar Water Heating

When SWH is proposed, contractors will be required to perform a SWH assessment using the system savings based on outputs from the California Solar Initiative Calculator. The SWH system is not considered a part of the Snugg Pro energy audit and shall be reported separately.

2 ENERGY AUDIT SOFTWARE

All contractors are required to use Snugg Pro to perform energy audit analysis. Snugg Pro is a cloud-based program that can be used on-site with access to Wi-Fi or phone-based data services using laptops, tablets, and smart phones. LIWP is billed directly by Snugg Pro and billing is based on each address (home) submitted for audit analysis, not by the number of reports generated or modeling runs done on each unit. This arrangement allows contractors to

² <https://pvwatts.nrel.gov/>

modify the energy audit and “model” a residence as many times as needed for each address, while only charging the program once.

Each contractor will become a Snugg Pro “administrator” for their network of subcontractors and will have real time access to all auditing work done by their subcontractors.

2.1 ENERGY AUDIT TEMPLATE

A Snugg Pro energy audit template (field sheet) has been developed for use by contractors and their subcontractors. It is designed to assist in gathering complete and accurate site-specific information to build an energy audit in the Snugg Pro energy audit tool.

2.2 ON-SITE PROCESS

Every dwelling evaluation begins with a complete assessment of the building and building systems, including all environmental, and structural checks. At their option, an energy auditor can choose to utilize either the Snugg Pro Energy Audit Field Sheet (available at www.SnuggPro.com) to gather required auditing information, or enter the information directly into their laptop, tablet or smart phone.

The on-site energy audit shall be comprised of an in-person site visit to the project by the auditor (or audit team).

3 ENERGY MODELING AND ANALYSIS

An energy model of the building’s pre- and post- weatherization energy performance is the basis for the cost-effectiveness calculation (the SIR) and shall be completed using information collected during the on-site assessment.

IMPORTANT: When performing an energy audit in Snugg Pro, to properly calculate the modeled energy savings, the auditor must input data reflecting the pre-installation conditions of the home. If, however, **any** measure recognized by the Snugg Pro energy audit tool as an energy efficient recommended improvement will be installed utilizing funding from LIWP or another leveraged program (LIHEAP, DOE, Energy Services Assistance Program [ESAP], etc.), the auditor **must** input these measures as a pre-installation condition. This will allow the energy audit program to properly allocate energy consumption based on the condition of the residence as if these energy efficient measures related to LIWP are already installed.

Non-audit measures recognized by Snugg Pro include:

- Clothes washer replacement
- Cool roof
- Freezer replacement
- LED bulbs
- Refrigerator replacement

In addition to the standard assessment, information needed to populate an energy model must be collected. The energy audit process in Snugg Pro has been simplified, and audits can be

built with minimal data collection. For LIWP measures requiring an audit, the following energy audit inputs (at a minimum) are required.

The energy modeling guidance provided in this protocol should be followed for all homes audited in LIWP. However, there may be times when existing home conditions fall outside of the protocol. In this case, CSD will work with Contractors on a case-by-case basis to ensure proper modeling. Contractors will be required obtain written permission for any modeling outside of the policy described in this document.

Snugg Pro Inputs

| | |
|---------------------------------------|---|
| <p>Settings</p> | <p>This information is for the auditor (the auditor identification is automatic at sign-in) to input for each job:</p> <ul style="list-style-type: none"> • Company (name of auditor’s company) • Program (LIWP) • Stage (refer to Attachment I: Workflow Steps for Energy Audit QA Review and Approval) • Account (agency’s assigned account number) |
| <p>Job/Contact Information</p> | <p>Fill out the job/contact information before entering any of the other information. A job number will be automatically generated.</p> <ul style="list-style-type: none"> • Appointment (date and time) of audit • First and last name of occupant/owner • Email (occupant) • Phone (occupant) • Address and ZIP code (critically important—cannot be edited once entered) • Tenancy (own or rent) |
| <p>Building</p> | <p>Complete all sections.</p> <p>The following must be input:</p> <ul style="list-style-type: none"> • Year built • Conditioned area (sq. ft.) • Basement (yes/no) • Average wall height • House length • House width |

| | |
|----------------------|---|
| | <ul style="list-style-type: none"> • Floors above grade • Number of occupants • Number of bedrooms • Type of home—Select one of the following from the dropdown: <ul style="list-style-type: none"> ○ Single Family Detached (one dwelling) ○ Single Family Attached—Duplex or townhome with shared walls (2–4 dwellings) ○ Mobile Home • # of Units in Building—Enter when “Single Family Attached” type of home is selected • Front of building orientation (typically address side of home) • Shielding (high buildings, surrounded by trees, no trees, etc.) • Floor Above Garage or Cantilevers (Yes/No) <p>Modeling Considerations</p> <ul style="list-style-type: none"> • Only multifamily units with independently metered electric and fuel can be modeled in Snugg Pro. • When modeling a multifamily dwelling (2–4 units): <ul style="list-style-type: none"> ○ Each unit will be modeled as its own Snugg Pro job ○ Specific modeling considerations will need to be applied. These will be called out in the sections below. ○ Each unit will have its own package of upgrades required have a SIR equal to or greater than 1.0 to be installed. |
| Concerns | <p>This field is used to document customer concerns. This field should not be utilized.</p> |
| Utility Bills | <p>Select the “No Bills” option. This uses average energy consumption by ZIP code.</p> <p>Electricity—These fields are not required.</p> <p>Primary Heating Fuel—This input covers a variety of fuel sources (natural gas, propane, electricity, fuel oil, wood, pellets, and solar). Select the heating fuel the household uses as its primary heat source.</p> |

| | |
|--------------------------|---|
| <p>Thermostat</p> | <p>Thermostat temperature high and low set-points must be entered based on the following policy:</p> <ul style="list-style-type: none"> • If a programmable, or smart thermostat already exists in the home, a smart thermostat will be installed in the home (measure not requiring an audit), or a thermostat will be installed as part of the installation of a new HVAC system, select “Yes” for Programmable Thermostat Installed. • Thermostat set-points shall be modeled as follows: <ul style="list-style-type: none"> ○ Cooling Low (at home/awake): 78°F ○ Cooling High (when away/asleep): 80°F ○ Heating Low (away/asleep): 65°F ○ Heating High (at home/awake): 68°F <p>Note: These set-points are also recommended by the Department of Energy (https://energy.gov/energysaver/thermostats).</p> <p>Important Restrictions:</p> <p>If the existing set-points are not set at the heating and cooling temperature set-points identified above, or if a new thermostat will be installed, then education shall be provided that highlights the energy savings and home comfort benefits of adjusting the thermostat settings to the recommended temperature set-points for heating and cooling. No improvement for temperature set-points may be modeled within Snugg Pro.</p> |
| <p>HVAC</p> | <p>Select “Add an HVAC system” and input a system name, equipment type, and upgrade action, then select “Add system and continue.” Add and fill out HVAC inputs for each heating and/or cooling system in the residence. Required HVAC inputs for the “base” case and “improved” case will change based on the selected upgrade action and will automatically display in Snugg Pro.</p> <p>Note: Snugg Pro allows a maximum of three heating systems and three cooling systems per model. If a dwelling has additional heating and/or cooling units, contractors should work with CSD on a case-by-case basis to ensure an accurate Snugg Pro model.</p> <p>Heating</p> <p>Heating inputs for the base and improved conditions include:</p> <ul style="list-style-type: none"> • Fuel Type |

- Load Percentage—This is the percentage of the conditioned area that each heating system warms.
- Is Condensing (Yes/No)
- Model Year—Enter the year the unit was manufactured.
- System Efficiency 0151For the “base” case, when the Annual Fuel Utilization Efficiency (AFUE) value is known, enter the value. If the AFUE is unknown, let the software use the default value.
- Output Capacity—If substantial energy work is or was conducted (insulation, windows, etc.) since the initial heating system was installed, the “improved” system should be sized to reflect changes to the residence.
- Manufacturer and Model #—Enter if available.

Cooling

Cooling inputs for the “base” and “improved” conditions include:

- Load Percentage—This is the percentage of the conditioned area that the cooling system cools.
- Model Year—Enter the year the unit was manufactured.
- System Efficiency—For the “base” case, when the Seasonal Energy Efficiency Ratio (SEER) value is known, enter the value. If the SEER is unknown, let the software use the default value.
- Cooling Capacity—Input the output capacity in Btu/hr., converting from tonnage if necessary. If substantial energy work is or was conducted (insulation, windows, etc.) since the cooling system was installed, the “improved” system should be sized to reflect changes to the residence.
- Manufacturer and Model #—Enter if available.

Modeling Considerations for Heating and Cooling

Heating Source Replacement (forced air unit [FAU]): If the heating system is an FAU and it qualifies as a recommended improvement, then the Heating Source Replacement, FAU measure will apply. For a central system, if a cooling source is required to be replaced due to a compatibility issue with the new heating source system but the cooling source does not qualify for replacement under the energy audit, then neither system qualifies for replacement.

Cooling Source Replacement (FAU): If the cooling system is an FAU and it qualifies as a recommended improvement, then the Cooling Replacement, AC Forced Air Unit measure will apply. For a central system, if a heating source is required to be replaced due to a compatibility issue with the new cooling source but the heating source does not qualify for replacement under the energy audit, then neither system qualifies for replacement.

Central HVAC System Replacement: If the HVAC system is a central system and both heating and cooling qualify as a recommended improvement, then the Central HVAC Replacement, Split System measure will apply.

Package Unit Replacement: If the HVAC system is a package unit and heating or cooling qualifies as a recommended improvement, then the Central HVAC Replacement, Package Unit measure will apply.

Fuel Switching: Fuel switching is only allowed if the dwelling is served by propane and either has an existing solar PV system or a solar PV system will be installed in the package of upgrades. Refer to Section 1.4 of this document for additional policy regarding fuel switching.

Upgrading to an alternative system type: If the “base” case system will be replaced with an “improved” system of a different system type, the upgrade will need to be modelled using two HVAC systems. The “base” case will need to be modeled with an upgrade action of “Remove a system permanently” and the “improved” case upgrade action set to “Install a new non-existing system.” Examples of potential upgrades are included in the table below.

| Base Case | Improved Case |
|--------------------------------------|----------------------|
| Window/wall AC/electric wall furnace | Heat pump mini split |
| Window/wall AC | Evaporative cooler |
| Central AC/furnace | Heat pump mini split |
| Central AC/furnace | Evaporative cooler |
| Central AC/furnace | Central heat pump |

Ducts

Conduct duct diagnostics first for T-24 compliance per LIWP Measure Standards.

Note: Duct testing shall be performed when either the existing ductwork will be sealed or when the existing ductwork will be replaced.

T-24 requirements when replacing HVAC system:

- 5% target leakage level for entirely new or complete replacement duct system.
- 15% target leakage for repair of existing system.

Duct inputs for the “base” and “improved” conditions include:

- Duct Location
- Leakage—Measured (CFM25) should always be used when a duct test is performed. In cases where duct testing was not performed or could not be completed, the % leakage should be selected using the following conditions:
 - 30% Very Leaky: If the ductwork could not pressurize (reach pascal level) to get an accurate reading—This entry is only allowable where duct testing is attempted.
 - 15% Somewhat Leaky: Pre-2013 HVAC equipment
 - 6% Well Sealed: 2013 or after HVAC equipment
- Insulation—Select the type of insulation installed over the existing duct work.
- Duct Efficiency—Field not required

Modeling Considerations for Ducts

Duct Sealing: For the purposes of the energy audit, duct sealing applies to both duct sealing and repair of the existing duct work. For billing purposes, the “Duct Sealing” measure would be billed.

Duct Replacement: Duct replacement applies to full replacement of existing ductwork or replacement of smaller sections of duct. However, Snugg Pro does not recognize Duct Replacement as a standalone measure. If the existing ductwork is significantly damaged and is not feasible to repair, full replacement of the existing ductwork can be audited within Snugg Pro using the “Duct Sealing” measure. However, the “Duct Replacement” measure will be billed.

Alternatively, if the existing ductwork requires abandonment and relocation to allow installation of new HVAC the duct replacement may be included within the cost of the HVAC replacement within Snugg Pro. However, for billing purposes, “HVAC Replacement” and “Duct Replacement” would be billed separately.

| | |
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| | <p>Note: New ductwork will be installed with the most current T-24 requirement based on climate zone. However, replacement of ductwork to increase R-value is not allowed within this protocol.</p> |
| Appliances | <p>Select the appropriate fuel type for appliances existing at the time of the assessment, including clothes washer type, if a dishwasher is installed and add freezers as applicable with their ENERGY STAR status. These are necessary to proportion the utility consumption between different uses.</p> <p>If fuel switching is being proposed, set all appliances to the “improved” case fuel type. All costs associated with appliance fuel switching shall be included in the total upgrade cost modeled in Snugg Pro. However, for billing purposes each appliance will be billed separately.</p> |
| Refrigerator | <p>Complete the refrigerator section for each refrigerator. Required inputs are age, size, and ENERGY STAR status of the appliance.</p> <p>Modeling Considerations</p> <ul style="list-style-type: none"> • If the refrigerator will not be replaced under the LIWP program, use the assessment information for the refrigerator that was present at the time of assessment to model the pre-installation condition within the audit. • If the refrigerator will be replaced as a non-audit measure under the LIWP or under another leveraged program, the upgraded/improved refrigerator must be modeled as part of the dwelling’s pre-installation condition. |
| Lighting | <p>Select the approximate percentage of lamps and fixtures in the home which are CFL, LED or other fluorescent lights and enter the total number of light bulbs at time of LIWP assessment.</p> <p>Modeling Considerations</p> <ul style="list-style-type: none"> • If lighting will be replaced as a non-audit Measure in LIWP or a part of another leveraged program, enter the existing lighting information based on what will be installed. • Lighting upgrades cannot be included as a recommended measure in Snugg Pro. |
| Doors | <p>Select the type (steel, hollow, wood, etc.) of each exterior door which exist at the time of LIWP assessment. If the home has more than two doors, add as many doors as needed.</p> |

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| | <p>Modeling Considerations</p> <ul style="list-style-type: none"> • If exterior doors will be replaced as a non-audit measure under the LIWP program, or another leveraged program, enter door information based on what will be upgraded/installed. • Door replacement shall only be installed prescriptively under infiltration reduction due to catastrophic leakage and should not be included as a recommended measure in Snugg Pro. |
| <p>Wall Insulation</p> | <p>Enter the characteristics of wall insulation present at time of the LIWP assessment. Additional walls should be added if there are inconsistencies in insulation or construction across the whole dwelling.</p> <p>Wall insulation inputs for the “base” and “improved” conditions include:</p> <ul style="list-style-type: none"> • Insulated? <ul style="list-style-type: none"> ○ Leave blank if the presence of wall insulation cannot be confirmed. ○ Select “Well,” “Poorly,” “Yes,” or “No” only if the condition of the referenced wall system can be confirmed • Siding—Select exterior finish material • Construction—Select they type of construction material • % of Total—Required only if there are multiple types of walls or multiple insulation conditions. Enter the percentage of walls with this construction type. Percentages must add up to 100%. <p>Multifamily Consideration</p> <p>When “Single Family Attached” type of home is selected for the model, inputs to document shared walls between the units will be available. Enter the percentage of the wall that is shared with another unit.</p> <p>Modeling Considerations</p> <ul style="list-style-type: none"> • Wall insulation is considered either a non-audit or audit measure depending if an audit is performed. <ul style="list-style-type: none"> ○ Audit performed = Audit measure ○ Audit not performed = Non-audit measure |

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| | <ul style="list-style-type: none"> • If wall insulation is included as a recommended measure in the audit, enter the information for the existing wall insulation present at the assessment as the “base” and the new wall insulation R-value as the “improved”. • If the existing insulation condition is confirmed, an actual R-value for the “base” case can be entered in the Refine section during the modeling of upgrades. |
| <p>Attic Insulation</p> | <p>Enter the depth (inches) and type of insulation present at the time of the LIWP assessment. Additional attics, including vaulted ceilings, should be added if there are inconsistencies with the insulation across the dwelling.</p> <p>Attic insulation inputs for the “base” and “improved” conditions include:</p> <ul style="list-style-type: none"> • Insulation depth • Insulation type • Vaulted ceiling or flat roof—Insulated? <ul style="list-style-type: none"> ○ Leave blank if the presence of insulation in a vaulted ceiling or flat roof cannot be confirmed. ○ Select “Well,” “Poorly,” “Yes,” or “No” only if the condition of the vaulted ceiling or flat roof insulation can be confirmed. • % of Total—Required only if there are multiple types of attics or multiple insulation conditions. Enter the percentage of attics/vault/flat roofs with this construction type. Percentages must add up to 100%. <p>Multifamily Consideration</p> <p>When “Single Family Attached” type of home is selected for the model, inputs to document shared ceilings between the units will be available. Enter the percentage of the units ceiling which is shared with another unit (must be conditioned space above unit). If there is no unit above the unit being modeled enter 0.</p> <p>Modeling Considerations</p> <ul style="list-style-type: none"> • Attic insulation is considered either a non-audit or audit measure depending if an audit is performed. <ul style="list-style-type: none"> ○ Audit performed = Audit measure ○ Audit not performed = Non-audit measure |

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| | <ul style="list-style-type: none"> • When ceiling insulation is considered a non-audit measure the existing insulation must be less than R-19 to upgrade. If ceiling insulation is present that is greater than R-19, it must be considered as an audit measure to upgrade and must be included as a recommended improvement in the audit. • When ceiling insulation is considered an audit measure, enter the information for the existing insulation present at the time of the assessment as the “base” and the new insulation as the “improved”. • Maximum insulation levels are per the Installation Standards (R-30 and/or R-38 depending on California Climate Zones). • When modelling a radiant barrier, selections will be made in the audit recommendations for the “base” and improved” conditions. If a radiant barrier will be installed, the cost of the upgrade must be added to the attic recommendation cost in Snugg Pro. • An actual R-value for the “base” case can be entered in the Refine section during the modeling of upgrades. |
| <p>Foundation</p> | <p>Allocate percentages of the foundation to the types provided. Percentages must add up to 100%.</p> <p>If the home has raised floors/crawlspace, additional information regarding the crawlspace insulation will appear. The following inputs will be required:</p> <ul style="list-style-type: none"> • Foundation Above Grade Height Average—Height of the exposed foundation • Crawlspace Insulation—Select existing insulation type • Crawlspace Type <p>Multifamily Consideration</p> <p>When “Single Family Attached” type of home is selected for the model, inputs to document shared floors between the units will be available. Enter the percentage of the unit’s floor which is shared with another unit (must be conditioned space below unit). If there is no unit below the unit being modeled enter 0.</p> <p>Modeling Considerations</p> <ul style="list-style-type: none"> • Floor insulation is considered either a non-audit or audit measure depending if an audit is performed. |

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| | <ul style="list-style-type: none"> ○ Audit performed = Audit measure ○ Audit not performed = Non-audit measure • When floor insulation is considered a non-audit measure there must be no existing insulation to upgrade. If floor insulation is present, it must be considered as an audit measure to upgrade and must be included as a recommended improvement in the audit. • When floor insulation is considered an audit measure, enter the information for the existing insulation present at the time of the assessment as the “base” and the new insulation as the “improved.” • An actual R-value for the “base” case can be entered in the Refine section during the modeling of upgrades. |
| <p>Windows</p> | <p>All windows must be measured and included in the contractor’s notes section, however only the % of window area by wall will be entered into Snugg Pro.</p> <p>Window inputs for the “base” and “improved” conditions include:</p> <ul style="list-style-type: none"> • Skylight Area—Only enter area if there are skylights present in the home. • Window Venting—Snugg Pro requires the user to indicate if the windows are used for ventilation purposes during times of mild seasonal temperatures. If windows are opened during seasons with mild temperatures, the auditor should select “Yes” at the Window Venting field; if they are not used to ventilate the home, the auditor should indicate “No”. This should be entered in the Improvement condition as well if the windows are recommended for replacement. • Window Systems—Snugg Pro uses “window systems” to categorize all the windows in a home that are the same type. <ul style="list-style-type: none"> ○ If all the windows are the same type (e.g., wooden, double-hung windows) then one window system can be used to model all windows audited for replacement. This includes sliding glass doors and doors which contain windows. ○ If windows are of different types (wooden, vinyl, and/or metal framed windows) at the same home, then create a different window system for each different window type. (Maximum of two window systems allowed in Snugg Pro.) ○ If only some of the windows are going to be modeled for replacement, create a window system that includes just |

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| | <p>those windows being considered for replacement. The auditor must also create another system for windows that will not be replaced. This allows the modeling to be attributed only to those windows being replaced.</p> <p>Modeling Considerations</p> <ul style="list-style-type: none"> • Detailed window sizing is not required in Snugg Pro if windows will not be replaced. Just indicate the type of window, frame and the percentage of area the windows occupy per side. • Window area is determined by the percentage of windows by each cardinal side (north, south, east, or west). Though not required, actual window sq. ft. can be entered in the Refine section of the model when reviewing the package of recommendations. • If windows are not used to ventilate the home during seasons with mild temperatures, but after receiving client education the tenant has agreed that they will manage their ventilation needs in this manner to reduce the HVAC load, the auditor can select “No” as the base condition and “Yes” as the improvement condition. • Replacement windows must meet Title-24 Window requirement. Make sure that the SHGC and U-factors of the actual windows match those numbers in Snugg Pro. |
| <p>Air Leakage</p> | <p>Select “Estimated” (even if a blower door test was performed).</p> |
| <p>Domestic Hot Water (DHW)</p> | <p>All water heater information must be entered into Snugg Pro. All inputs must be based on the existing water heater at the time of the assessment.</p> <p>Hot water inputs for the “base” and “improved” conditions include:</p> <ul style="list-style-type: none"> • Fuel Type • System Type • Age • Location • Temperature Settings—Select the existing temperature set-points at the time of the assessment from the list provided in Snugg Pro as follows: <ul style="list-style-type: none"> ○ Low (120–130°F) |

- Medium (130–140°F)
- High (140–150°F)
- Very High (150°F)
- Don't Know

If the home has more than one water heater, select “Add a water heater” button as needed. **(Maximum of two water heaters allowed in Snugg Pro).**

Examples of potential upgrades are included in the table below.

| Base Case | Improved Case |
|-------------------------------|---------------|
| Electric Storage Water Heater | HPWH |
| Propane Gas Water Heater | HPWH |

Modeling Restrictions:

- The recommended set-point for DHW is 120 degrees (Low setting). If the existing set-point is not set at the recommended “Low” temperature setting, or a new DHW will be installed, then education shall be provided to highlight the EE and safety benefits of adjusting the thermostat settings to the recommended “Low” temperature set-point. Once education is provided and the client agrees to the new temperature set-points, then the auditor may reflect this improvement within Snugg Pro.
- If a client does not agree to utilize the recommended improvement set-points as defined above, then the auditor must identify and enter the existing set-points.
- If current set-points are unknown, the auditor must choose the “Low” set-point as the existing temperature setting in Snugg Pro. Utilization of the “Very High” set point as the base case may never be utilized in Snugg Pro as it is unlikely and would be considered a safety hazard.
- If an improvement is to be claimed for adjustment of the existing set-point, the improvement shall not exceed 10 degrees from either the low, medium, or high settings.
- Fuel switching is allowed when a propane water heater is present, and the home has solar or will be receiving solar as part of the improvement package. For more details on fuel switching refer to Section: 1.5. The changed fuel source is modeled in Snugg Pro.

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| Pool/Hot Tub | Fields are not required. |
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| <p>Solar PV</p> | <p>If solar PV is already present or is to be installed in conjunction with propane fuel switching, enter the following information regarding the system:</p> <ul style="list-style-type: none"> • Array Size—PV array system size in kW. Calculated by taking the wattage per panel multiplied by the number of panels divided by 1000. • Array Slope—Slope of collector surface • Array Orientation—Orientation from North, South is 180 degrees. • Year Modules Manufactured <p>If solar PV will be installed as a LIWP measure, not associated with fuel switching, do not model in Snugg Pro.</p> <p>Contractors must use the PVWatts calculator to determine each system is cost-effective regardless of the type of measure package installed.</p> |
| <p>Health and Safety</p> | <p>Fields are not required.</p> |
| <p>Combustion Appliance Zone (CAZ)</p> | <p>Field is not required. Contractors are required to conduct CAZ testing and document results as specified in the General Installation Guidelines.</p> |

3.1 MODEL IT

After all required inputs have been entered, model the home by selecting the “Model It” icon. Snugg Pro will analyze the inputs and determine if there are errors effecting the model. The "Model it" button will change to "Modeled" when complete. It will be required to re-model the job if any changes are made to the inputs or recommendations.

3.2 REFINE/RECOMMENDATIONS

After the home has been successfully modeled, select the “Refine” icon on the left under the “Input” icon. Snugg Pro is designed to analyze “recommendations” for several measures, many which are LIWP measures and other which are not. When a model is run, some of these improvements are automatically added to the model and others may need to be added manually. The Refine section shows the measures to be analyzed, the status, the cost, savings, and SIR.

If any of the audit measures or “recommendations” are not going to be included in the audit package, turn off the recommended improvement by selecting “Decline” next to the measure name. If you “modeled” the residence before declining these recommendations, run the model again with the final list recommendations. If any non-audit measures or other energy efficient measures recognized as measures within the Snugg Pro energy audit tool will be installed

utilizing LIWP, or funding from another leveraged program (LIHEAP, DOE, ESAP, etc.), the auditor must input these measures as a pre-installation, “base” case condition and not model using the non-audit measure recommendations.

3.2.1 Measures

The recommendations tab should include only audit measures. Snugg Pro may automatically generate additional measures. If this occurs, simply select “Decline” in the “Status” column for that measure. Accepted Snugg Pro recommendations in the LIWP package include:

1. Upgrade Heating System
2. Upgrade Cooling System
3. Seal Duct Work (Duct Insulation, Duct Sealing, or Duct Replacement)
4. Insulate Wall (Wall Insulation)
5. Insulate Attic (Ceiling Insulation or Radiant Barrier)
6. Insulate Vault (Ceiling Insulation)
7. Insulate Crawl Space (Floor Insulation)
8. Upgrade Windows
9. Lower Water Heater Temp—customer education
10. Upgrade Water Heater (Gas and HPWH)
11. PV (Fuel Switching Only)

3.2.2 Status

Measures to be analyzed will be present in this list and have the status of “Recommended” selected. If, for example, ceiling insulation will not be recommended because it is adequately insulated, then select “Decline.” If you decline a measure by mistake it can be recovered in the “Declined” section.

3.2.3 Cost

Enter the cost of the measure in the “Cost” box. This is a critical component for determining the SIR. In some cases, the “Cost” is likely to be reflective of the price included in Measure Bid Sheet. In other situations, the contractor may be able to reduce the cost of the measure(s) in the energy audit to help a measure or package of measures meet the SIR requirements of LIWP. These cost reductions may have been realized through the utilization of installation efficiencies, or through other cost reduction strategies including additional rebates that were not accounted for initially. Reduction of measure costs based on the above strategy is allowable and encouraged. Regardless if the cost of the measure has been reduced or not, all costs used

in Snugg Pro shall match the costs associated with the measure during billing. Additional guidance on how costs shall be entered into the Snugg Pro software is described in Section 3.4.

3.2.4 Savings and SIR Columns

These columns cannot be modified and are grayed out.

3.2.5 Results

After the modeling is complete, values will appear in the Savings and SIR columns on the Recommendations page. The package cost, savings, percent savings, SIR, and MIRR are listed in the top right corner of the Snugg Pro screen. This allows the user to determine if the package of measures recommended can be installed.

- If the package SIR is 1.0 or greater the whole package may be installed.
- If the package SIR is less than 1.0, the auditor can reanalyze the measure package by removing the least cost-effective measure (lowest individual SIR) and modeling the job again. (Recommended)
- Alternatively, only measures with individual SIRs greater than 1.0 can be installed.

3.2.6 Modifying the Results

There are many factors which effect the SIR. An SIR of 1.0 or greater indicates that a measure, or package of measures has met the cost-effective ratio required in LIWP and may be installed. Snugg Pro calculates this value in the audit. If the package SIR is less than 1.0, review the measures with SIRs that are less than 1.0, starting with the measure with the lowest SIR.

- First, examine the measure installation costs. If measure costs can be lowered through leveraging, refining or re-bidding the job, enter the newly revised cost and model the job again to determine if the package SIR now qualifies.
- If the SIR for an individual measure is well below 1.0 modifying the cost may not change the outcome. In this case, “decline” the measure in the “Refine” section and model the package again. This may allow the package SIR to qualify even though other individual measures have SIRs less than 1.0. This process may need to be conducted several times to attain a qualifying package.

3.3 REPORT

The results of the modeling are presented in the “Report”. Users may customize the report to include pertinent information about the upgrades proposed in the home.

- The report is customizable by clicking on the “settings” button.
- The “Solutions” section of the report is the summary sheet for the job. It will show the measures (Details), costs, savings, and SIR. The left-hand column is the “Totals”

column and provides the total package costs, savings, and package SIR. Review this page in the report to ensure all recommendations are included.

- Review the inputs (Upgrade Details) to be certain that the information analyzed was correct for this home. There is an individual page for each upgrade.

3.3.1 Finalizing the Report

- Once the measure package is set, finalize the report and review the Solutions report with the occupants.
- A stated goal of LIWP is to install all qualified, feasible and cost-effective measures. If, however, the measure is not feasible as defined in the Measure Installation Standards, or if the residents refuse the qualified measure after the assessor or auditor has explained the measure benefits, the auditor will need to decline the measure, and remodel the job to determine how the measure SIRs and package SIR will be affected.
- It is not necessary to provide the occupants with a copy of the energy audit report.
- Place a copy of the final Snugg Pro Improvement Report in the client file along with the initial home assessment, energy bill copies, photo images and other pertinent documentation. At any time, CSD may ask bidders to provide copies of any of these documents.

3.4 MEASURE COSTS

The total cost to install each measure (materials, labor, permits, miscellaneous items, and equipment) must be calculated for each measure. If actual costs are not entered, Snugg Pro will use nationwide default costs which very likely will not represent your actual costs and will skew the results of the audit. **Your actual costs are required to be input into the model.**

To enter your actual costs, select the “Refine” section of Snugg Pro on the left-hand side of the program. All measures will be listed here. If you do not intend to install certain measures listed in the “Refine” section, decline those measures by clicking on “Decline” in the status box. The measure should disappear from the page and only those measures that you intend to install will remain.

Enter the total measure cost in the cost section.

Enter cost details in the “Notes to Contractors” section of each measure.

Note: If the actual installation costs for the audited measures are not known or available when the auditor runs an initial energy model, the auditor may utilize estimated costs to determine potential cost-effectiveness. However, once costs are determined, the auditor will be required to re-run a revised energy model to reflect the actual cost. In addition, if costs changed from the initial energy model, the auditor must revise the energy model to reflect the actual cost.

IMPORTANT: Before the project can be scheduled for installation of the audited measures, a final run of the energy audit must be conducted utilizing actual bid/install costs to determine the final measure or package SIR.

| Audited Measures | Cost Detail |
|---|--|
| HVAC Upgrades | <p>Snugg Pro separates heating equipment from cooling equipment. Even when selecting a central or package system, Snugg Pro treats these as a split system. When modeling the system within Snugg Pro, the auditor will need to proportion the cost between the heating and cooling components.</p> <p>IMPORTANT: For billing purposes, if both heating and cooling replacements qualify in the audit, the “Central HVAC System” or “Package Unit” measure would apply. If only the heating source qualifies, then the “Heating Source Replacement” would be billed. Similarly, if only cooling qualifies in the audit, then “Cooling Replacement” would be billed. Note: The Heating Source Replacement and Cooling Replacement measures cannot both be billed within the same job.</p> |
| Duct Sealing/Duct Replacement/Duct Insulation | <p>Within the audit, enter the actual cost of duct sealing, duct replacement or duct insulation separately from the heating and cooling replacement.</p> <p>Alternatively, as detailed above in Section 3 (Energy Modeling and Analysis), full replacement due to Catastrophic Leakage, or Relocation, if required, may be included within the cost of the HVAC replacement within Snugg Pro. However, for billing purposes, “HVAC Replacement” and “Duct Replacement” would be billed separately.</p> <p>Include total costs:</p> <ul style="list-style-type: none"> • To add or replace return and supply plenum(s) • Abandonment of existing ductwork • Removal and disposal of ductwork • Installation of new ductwork • Sealing and repair of existing ductwork • Addition of duct insulation to existing duct work • To manage asbestos-containing materials associated with ducts. <p>Duct testing per T-24 permit compliance.</p> |
| Wall Insulation | Use actual total cost of wall insulation including any incidental costs such as patching holes as needed to complete the installation. |
| Ceiling Insulation | Use actual total cost of ceiling insulation including any incidental costs such as attic venting if needed for installation. |
| Radiant Barriers | Use actual total cost of the radiant barrier including any incidental repair costs or alterations. |

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| Floor Insulation | Use actual total cost of floor insulation including any incidental costs such as foundation venting if needed for installation. |
| Window Replacement | Use the actual total installed cost for windows, sliding glass doors, and doors with windows. Include any limited repairs required to replace windows in the modeled costs for the audit analysis. In Contractor's Notes, list the replacement costs for: <ul style="list-style-type: none"> • Windows by size and type • Sliding glass doors by size and type • Doors with windows |
| Water Heater Replacement (Gas Only) | Include actual total cost to replace the water heater including any minor repairs, venting, and plumbing needed. |
| HPWH | Include actual total cost to replace the water heater including any minor repairs, venting, and plumbing needed and electric upgrades as needed to complete the installation. |
| Solar PV | Use actual total cost of solar PV installation including any incidental costs such as patching holes as needed to complete the installation. |

3.5 LEVERAGING MEASURES

The use of leveraged funding (or other funding sources) to assist in the installation of measures in the LIWP is encouraged. However, contractors may only leverage in the following ways:

1. Utilizing existing programs/contracts to fund the entire cost of the measure.
2. Applying the H&S buy-down strategy as outlined in Section 1.4.
3. Reducing costs through the use of rebates. For example, if a utility rebate is available for the proposed upgrade, the rebate amount is required to be subtracted from the total cost of the measure so that the total cost being charged to LIWP is reflected, and the recommendations reanalyzed to determine if the SIR is 1.0 or greater. These leveraged funds must be documented in the "Contractor's Notes" section and billing or other information included in the client file.

Any other use of leveraged funds must first be approved in writing by CSD.

4 ENERGY AUDITOR MINIMUM QUALIFICATIONS

Energy auditors must have the skillset and experience required to effectively perform Snugg Pro audits. At a minimum, an auditor or audit team shall be capable of effectively performing the following tasks:

- Energy modeling (utilizing Snugg Pro software)
- Building assessment (identifying safety, code, and energy systems issues) and field data collection
- Diagnostic testing to include CAS testing and Duct Blaster
- Feasibility analysis for the installation of energy efficient building improvements
- Construction cost estimating

5 ENERGY AUDIT SUBMITTAL AND QUALITY ASSURANCE REVIEWS

Contractors, through their quality assurance (QA) process, are required to review energy audits before they are submitted. Initially, to ensure accuracy and integrity of site-specific energy audits, and to assist contractors in improving the quality of audits, 100% of completed energy audits will be reviewed by CSD, or a CSD authorized representative.

Once a contractor submits and CSD approves a minimum of five energy audits, with minimal or no changes required, and at the sole discretion of CSD, the contractor will be notified by CSD, or a CSD authorized representative that they are advancing to Tier 2 review status. Tier 2 status means that the proposed measures or measure packages with an SIR of 1.0 or greater may be installed prior to receiving an approval from CSD.

CSD will continue to randomly sample Tier 2 audits. If it is found that submitted audits from contractors with Tier 2 status need corrections and do not meet CSD audit standards, the contractor's Tier 2 status will revert to Tier 1 review status.

Specific information regarding required audit submittal materials are explained in the sections below. Energy audit submittal shall consist of the following:

- Completed Snugg Pro energy audit data inputs
- Snugg Pro Improvement Report
- Image documentation—Photos (see Appendix A)

5.1 THIRD-PARTY QA

A copy of the final Snugg Pro Improvement Report shall be placed in the client file and be made available to third-party inspectors and CSD. Third-party inspectors will not review the energy audit for accuracy but will use it during an on-site inspection of the home to determine:

- 1) If the energy audit was conducted for measures that require an energy audit; and
- 2) Measures qualified for installation by the energy audit were installed correctly.

6 APPENDIX A: IMAGE DOCUMENTATION

These required digital images assist the auditor to establish and describe the characteristics of the dwelling under review. The additional detail provided by these images allows CSD to better understand the Snugg Pro inputs, check for accuracy and assists in answering questions which may arise during the audit review process.

Note: Image documentation for projects modeled by Tier 1 auditors must be submitted to CSD along with each audit. Tier 2 auditors are not required to submit images with each audit but will be required to submit images when requested by CSD.

All images must be kept on file digitally and in the file for each modeled dwelling. CSD may request the submittal of images at any time during the review process.

Minimum Required Justification Images:

- 1) Front View of Dwelling: Must include view of all walls, windows and any shading including but not limited to trees, other buildings, etc.
- 2) Rear View of Dwelling: Must include view of all walls, windows and any shading including but not limited to trees, other buildings, etc.
- 3) Right Side View of Dwelling: Must include view of all walls, windows and any shading including but not limited to trees, other buildings, etc.
- 4) Left Side View of Dwelling: Must include view of all walls, windows and any shading including but not limited to trees, other buildings, etc.
- 5) Close-up images of windows to determine window type. One picture is required for each window type.
- 6) Whole Attic View: Must include images that show as much attic space as possible.
- 7) Close-up view of attic insulation showing thickness of insulation or a visible R-value.
- 8) Primary Heating Source: Include an image of the unit and nameplate indicating heating source manufacturer, model number, year of manufacture, system efficiency and system capacity for the primary heating system and any secondary units for the home.
- 9) Primary Cooling Source: Include an image of the unit and condenser coil, nameplate indicating cooling source manufacturer, model number, manufacture year, system efficiency and output capacity for the primary cooling source and any secondary units for the home.
- 10) Any unusual circumstance of the dwelling which may help to explain modeling assumptions utilized.
- 11) Photos of H&S issues to justify H&S expenditures.
- 12) Photos of conditions to justify LHR expenditures.

7 APPENDIX B: ENERGY AUDIT SOFTWARE ADMINISTRATOR CONTROLS

The purpose of this Energy Audit Software Administrator policy is to maintain an adequate level of security to protect energy audit data from unauthorized access.

Snugg Pro administrator (admin) controls Only authorized administrators and users are granted access to the energy audit tool. Administrators and users are limited to specific defined roles and access rights within the Administrator hierarchy.

Access: Administrators/users will not be granted access without approval from CSD and the contractor with whom they are employed or contracted with to perform energy auditing services.

Administrators (reviewers) and users (auditors) will only be granted access to the auditing role or level that is required for them to perform their duties.

Contact CSD for contractor (admin and user) admin privileges:

Contact Person—Eric Schindell, CSD

Contact email – Eric.Schindell@csd.cs.gov

ATTACHMENT I

WORKFLOW STEPS FOR ENERGY AUDIT

QA REVIEW AND APPROVAL

DRAFT

Workflow Steps for QA Reviews of LIWP Farmworker EE Snugg Pro Audit Files

TIER 1

CSD, contractors, and RHA will leverage Snugg Pro’s stage field to manage the QA review workflow for the LIWP Snugg Pro audits. The following table summarizes the workflow steps, Snugg Pro stage field updates, and the entity (owner) required to make the corresponding updates to the audit file within Snugg Pro:

| Step # | Snugg Pro Workflow Description | Snugg Pro Stage | Status Update Owner |
|-----------------|--|-----------------|---------------------|
| 1 | Field audit by contractor | “Lead”/“Audit” | Contractor |
| 2 | Audit ready to be reviewed by RHA | “Bid Proposed” | Contractor |
| 3 | RHA begins audit review in Snugg Pro | “QA” | RHA |
| 4a | Questions/follow-up required of contractor | “Uncategorized” | RHA |
| 4b ³ | File updated by contractor | “Bid Proposed” | Contractor |
| 4c | Audit review re-started by RHA | “QA” | RHA |
| 5 | Audit review is completed and approved | “Bid Approved” | RHA |

Workflow Example:

1. **Field audit by contractor:** Prior to submitting the audit to RHA for review, the contractor should leverage the “Lead” and “Audit” Snugg Pro stage fields to manage the audit workflow status. **Note:** It is important that none of the other Snugg Pro status fields noted above in steps 1-4 are used during this stage to avoid confusion between RHA, the contractor, and CSD.
2. **Audit is ready to be reviewed by RHA:** The contractor changes the Snugg Pro stage field to “Bid Proposed.” To change the stage field, select the job by clicking on the square to the left of the home info. Once selected, a selection menu will appear on the bottom of the screen. Select, “Move” and pick the stage the job will be moved to using the drop-down selector, then click “Move.” The contractor then enters a comment into the Snugg Pro ‘Activity’ field indicating the audit is ready for review by RHA. The activity field is located at the top right corner of the screen once inside of the job.
3. **RHA begins audit review in Snugg Pro⁴.** RHA changes the Snugg Pro stage field from “Bid Proposed” to “QA.”

³ This step is only needed if the audit requires follow up from the Contractor

⁴ RHA will check Snugg Pro at 8:00am and 1:00pm every weekday to identify any audits that require review.

4. **If RHA has questions or requires follow-up from the contractor:**
 - a. RHA changes the Snugg Pro stage field from “QA” to “Uncategorized” and enters a comment into the Snugg Pro “Activity” field clarifying the required follow-up needed from the contractor.
 - b. The contractor opens the audit in an “Uncategorized” status, reviews the comments from RHA and provides the necessary updates to the Snugg Pro file. Upon completion, the contractor changes the Snugg Pro stage field from “Uncategorized” to “Bid Proposed” and updates the Snugg Pro “Activity” field to indicate the file review is ready to continue.
 - c. RHA changes the Snugg Pro stage field from “Bid Proposed” to “QA” when the review process re-starts.
5. **RHA’s review is completed, and the audit is approved.** RHA changes the Snugg Pro status field from “QA” to “Bid Approved.”

TIER 2

Once CSD has confirmed that a contractor is eligible to move from Tier 1 to Tier 2 review status, CSD will notify the contractor and RHA to classify the contractor as Tier 2 and to follow the workflow instructions below. The following table summarizes the workflow steps, Snugg Pro stage field updates, and the entity (Owner) required to make the corresponding updates to the audit file within Snugg Pro:

| Step # | Snugg Pro Workflow Description | Snugg Pro Stage | Status Update Owner |
|-----------------|--|-----------------|---------------------|
| 1 | Field audit by auditor | “Lead”/“Audit” | Auditor |
| 2 | Audit ready to be reviewed by contractor | “Bid Proposed” | Auditor |
| 3 | Begin audit review in Snugg Pro | “QA” | Contractor |
| 4a | Questions/follow-up required of auditor | “Uncategorized” | Contractor |
| 4b ⁵ | File updated by auditor | “Bid Proposed” | Auditor |
| 4c | Audit review re-started by contractor | “QA” | Contractor |
| 5 | Audit review is completed and approved | “Bid Approved” | Contractor |

Workflow Example:

1. **Field audit:** Prior to submitting the audit for review, the auditor should leverage the “Lead” and “Audit” Snugg Pro stage fields to manage the audit workflow status. **Note:** It is important that none of the other Snugg Pro stage fields noted above in steps 1-4 are used during this stage to avoid confusion between the contractor and CSD.

⁵ This step is only needed if the audit requires follow up from the Subcontractor

2. **Audit file is ready to be reviewed by the contractor:** The auditor changes the Snugg Pro stage field to “Bid Proposed”. To change the stage field, select the job by clicking on the square to the left of the home info. Once selected, a selection menu will appear on the bottom of the screen. Select, “Move” and pick the stage the job will be moved to using the drop-down selector, then click “Move”. The auditor then enters a comment into the Snugg Pro “Activity” field indicating the audit is ready for review. The activity field is located at the top right corner of the screen once inside of the job.
3. **Contractor begins review of audit in Snugg Pro.** Contractor changes the Snugg Pro status field from “Bid Proposed” to “QA.”
4. **If contractor has questions or requires follow-up:**
 - a. Contractor changes the Snugg Pro stage field from “QA” to “Uncategorized” and enters a comment into the Snugg Pro “Activity” field clarifying the required follow-up needed.
 - b. The auditor opens the audit in an “Uncategorized” stage, reviews the comments and provides the necessary updates to the Snugg Pro file. Upon completion, the auditor changes the Snugg Pro stage field from “Uncategorized” to “Bid Proposed” and updates the Snugg Pro “Activity” field to indicate the file review is ready to continue.
 - c. The contractor changes the Snugg Pro stage field from “Bid Proposed” to “QA” when the review process re-starts.
5. **Contractor’s review is completed, and the audit is approved.** Contractor changes the Snugg Pro status field from “QA” to “Bid Approved.”