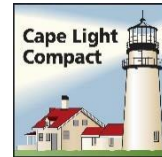




Mass Save RCD Energy Assessment Standards **Version 3.3**

Dec 27, 2022

By Program Administrators:



EVERSOURCE

nationalgrid



Table of Contents

1. Program Overview.....	4
1.1.1 Service Description	4
1.1.2 Personnel Qualifications	5
1.2 Home Energy Assessment Overview	5
1.2.1 Decarbonization & Electrification	8
1.2.2 Turnkey Services	8
2. Home Energy Assessment Visit Specifics.....	8
2.1 Customer Interview.....	8
2.2 Outside Assessment of the Home	8
2.3 Appliance Assessment	9
2.4 Combustion Safety Testing.....	10
2.5 Recommendation for Replacing Heating, DHW, & Cooling Systems	10
2.6 Recommendation for Replacing Windows	10
2.7 Assessment of the Basement, Walls, and Attic.....	10
2.7.1 Assessment of the Basement/Crawlspace	11
2.7.2 Assessment of the Exterior Walls and Enclosed Cavities.....	13
2.7.3 Assessment of the Attic	14
2.7.4 Attic Ventilation	16
2.7.5 Recessed Lights	19
2.7.6 Infrared Camera Scan	20
2.7.7 Electric Heat Thermostats.....	20
2.8 Assessing Air Sealing Potential.....	20
2.8.1 Duct Sealing/Duct Insulation.....	21
2.9 Area Calculations	22
2.10 Identifying Health & Safety and Other Barriers.....	23
2.10.1 Moisture	23
2.10.2 Knob & tube wiring	24
2.10.3 Asbestos Like Material	24
2.10.4 Combustion Safety	25
2.10.5 Other Health, Safety, or Other Barriers	25
2.11 In-Home Installation Measures	26
2.12 Creation of Reports and Contract.....	27

2.13	Presentation and Sale of Recommended Work with Incentives	27
3.	Software.....	27
4.	Reporting.....	27

1. Program Overview

Mass Save is an initiative sponsored by Massachusetts' natural gas and electric utilities and energy efficiency service providers, including The Berkshire Gas Company, Cape Light Compact, Eversource, Liberty, National Grid, and Unitil. The sponsors of Mass Save work closely with the Massachusetts Department of Energy Resources to provide a wide range of services, incentives, training, and information promoting energy efficiency, decarbonization, and electrification to help residents and businesses manage energy use and related costs.

General Overview

1.1.1 Service Description

The focus of the Mass Save® Home Energy Assessment is to deliver on-site services to residential customers to motivate the implementation of recommended energy efficiency upgrades, to decrease fossil fuel consumption, and to decarbonize through electrification and renewable energy measures.

A customer can initiate the Home Energy Assessment through a variety of mechanisms: from the Mass Save website, by calling the general Mass Save phone number, and from the marketing efforts of the Program Administrators, Program Vendors, or trade allies.

The Home Energy Assessment (HEA) includes an evaluation of relevant energy efficiency measures and renewable energy measures in the home. The HEA uses a whole-house approach based substantially on the Home Performance with ENERGY STAR® model (HPwES) and is intended to evaluate the residence including a review of the building's heating, ventilation, air conditioning (HVAC) and domestic hot water (DHW) systems, thermal envelope, and appliances. Additionally, the HEA directs clients on how to take steps to electrify their HVAC, DHW, and other appliances that utilize fossil fuels. Information beyond the typical Program offerings such as renewable energy options and transportation upgrades will also be discussed.

The Program Administrators require approved Home Energy Assessment Vendors to use the Home Energy Assessment energy modeling software tool selected by the relevant Lead Vendor.

The objective of the Home Energy Assessment is to provide the customer with an opportunity to understand the impact of relevant energy efficiency improvements that can be implemented in the home and to motivate the customer and/or homeowner to implement the measures. The Energy Specialist will offer Instant Savings Measure (ISM) incentives, Energy Efficiency Incentives, and Renewable Energy Incentives to eligible customers in conjunction with opportunities identified at the Home Energy Assessment. Customer eligibility is dependent on Program Administrator offerings and primary heating fuel.

The program is designed for the customer to accompany the Energy Specialist in the examination of the building as appropriate to allow for explanations and education to occur during the assessment. The Energy Specialist should keep the safety of the customer in mind during their visit and will not put the customer at risk unnecessarily. The customer is provided with a report and agreement (when applicable)

outlining program recommendations about efficiency upgrades for their home. The Energy Specialist will provide the necessary paperwork to process appropriate Mass Save incentives and rebates.

Third party Quality Control inspections will occur on a percentage of Home Energy Assessments to verify the Energy Specialists are providing the service as specified by the Program Administrators.

1.1.2 Personnel Qualifications

Energy Specialists must be properly trained and certified to perform a comprehensive assessment of the home. All staff will require ongoing training to update their skills and knowledge of new and evolving program elements as well as sales and presentation skills. Program administrators and/or vendors may require additional training or certifications.

❖ Training/Certification

Staff and contractor training are vital to operating a technically rigorous and effective statewide energy conservation program. The training/certification objectives for the program will consist of the following:

- Continuous staff training by vendors
- Building Performance Institute (BPI) certification
- Web resources

❖ Staff Training by Vendors

The bulk of the training for Energy Specialists is current and will continue to be delivered by program vendors. The Mass Save program will have consistent baseline standards and/or certification levels to ensure that Energy Specialists are providing a comprehensive whole-house approach, and that those utility customers, regardless of where they reside in the Commonwealth, are receiving consistent information and service.

- Building Performance Institute (BPI) certification
 - The program requires all Energy Specialists to achieve and maintain appropriate BPI Building Analyst Professional certification to support a whole house building science approach. Employees of BPI-accredited contractors have 6 months from the date they begin delivering energy assessments to achieve the certification. Employees of companies that are not BPI-accredited must earn the certification before they begin performing energy assessments.

1.2 Home Energy Assessment Overview

The Home Energy Assessment is a whole-house assessment of potential energy efficiency improvements, a screening for any health and safety barriers which may prevent weatherization work from proceeding, and a review of available opportunities for the electrification and decarbonization of the property. It is the Energy Specialist's responsibility to install or provide qualified Instant Savings Measures, as well as to inform the customer of available rebates and incentives for mechanical equipment upgrades. The Energy Specialist will specify potential weatherization opportunities and determine energy saving measures for the home using appropriate diagnostic equipment and techniques.

❖ **Program Structure and Specifications**

A Mass Save Home Energy Assessment is available to any customer eligible to participate in the program. The visit is focused on determining if the house is a good candidate for weatherization and electrification, providing information about program incentives, providing Instant Savings Measures (ISMs), as well as writing specifications for appropriate weatherization work and presenting these to the customer.

The Mass Save program provides a comprehensive assessment of a home focused on possible improvements including air sealing and insulation, upgrades to appliances, water heaters, heating systems, renewable energy opportunities, and electric transportation. All program-eligible improvements must be identified and offered to the customer. The Energy Specialist must be familiar with the “Mass Save Residential Turnkey Delivery Program Standard for Materials and Installation.”

❖ **Virtual Assessments**

Energy assessment vendors offering Home Energy Assessments must also offer Virtual Assessments when requested by customers. Program participation requires the Virtual Assessment to include the use of video-conferencing tools, data provided by the customer, and publicly available online data to provide the customer with their assessment.

❖ **Intake for Assessments**

Customers will have spoken to a Mass Save Customer Service Representative (CSR) prior to receiving a Home Energy Assessment. This CSR will ask the customer a series of questions intended to ensure that the customer is eligible for the home energy assessment. However, it is still important for the Energy Specialist to be aware of the following concerns:

○ **5+ Unit Properties**

The Mass Save® Residential Coordinated Delivery Program will serve 1-4 family residences as well as 5+ unit attached low rise (ALR) communities defined as duplexes, row homes, town homes, traditional double/triple decker (including conjoined 6-8 unit) and/or houses converted to apartments/condos, capturing stick-built buildings with minimal common area and that could be audited and weatherized similar to a single-family home. Occupants of ALR buildings are more likely to have weatherization decisions within their control as compared to AHR buildings because they're more likely to have their own entrance, attics and basements. Single Family Homeowner Associations would fall under ALR definition. Conversely, ALR buildings are likely to have less common area work than AHR buildings. In the event an ALR community has a clubhouse/common area, the appropriate Multifamily Lead Vendor shall be engaged for service of the ALR community and clubhouse/common area. 5+ unit AHR buildings will be served by the appropriate Multifamily Lead Vendor. High rise leads should be forwarded to the appropriate Multifamily Lead Vendor for service. All participating contractors are encouraged to engage and participate with Multifamily Lead Vendors for service continuity. High rise buildings can be defined as properties that do not fit into the ALR definitions and those in which occupants reach their units through common area hallways rather than through separate entrances, regardless of the number of stories or the

existence of a common heating system plant. Service to this building type is more likely to involve common areas as well as in-unit work, and more likely to require a single decision maker for weatherization decisions rather than have unit by unit weatherization work. The Multifamily Energy Services Program is best suited to treat such sites in their entirety in that they work with the existing condominium association or Property Management Company in the decision-making process.

- **Income-Eligible Customers**

The Mass Save Turnkey Services Program is not intended for low income-eligible customers (income below 60% of state or area median income or the utility discount rate). There is a network of income-eligible Community Action Programs (CAPS) that serve these customers, providing no-cost energy efficiency improvements. Customers should be referred to these agencies for services. In no situation are either a CSR, an ES, an HPC, etc., to suggest and/or encourage a customer to change their rate code from Low-Income (LI) to Residential Market Rate. Nor should customers be directed to their utility to change their rate code. Changing rate codes disqualifies customers from many other benefits that may/may not be related to energy efficiency. HPCs and Lead Vendors can contract directly with Action and ABCD to provide low-income services directly through the income eligible program.

- **Moderate Income Customers**

Customers who fall between 60%- 80% of the state or area median income range can qualify for enhanced incentives, rebates, and turnkey services. Customer services representatives and energy specialists are to make customers aware of these incentives and have customers self-identify if they fall within the range and encourage customers to get verified via the Mass Save online income qualification tool for incentives beyond weatherization.

- **Correct Program Administrator**

The Mass Save RCD program is funded by Program Administrators such as electric and gas utility companies and energy efficiency service providers. The Energy Specialist must verify that the customer is eligible for services based on their primary heating fuel and the Program Administrator funding the home energy assessment. The Energy Specialist has the final opportunity and responsibility to identify any inaccuracies in the information obtained during the initial intake and scheduling. If the home's primary heating fuel is natural gas, then the Program Administrator for the customer is the participating gas utility company or energy efficiency service provider. If the primary heating fuel is non-metered (i.e. oil, propane, etc.) or electricity, then the Program Administrator is the participating electric utility or energy efficiency service provider. The HEA may only be conducted if the Program Vendor is under agreement to provide services to that PA. If there are any concerns, the Energy Specialist must contact the appropriate CSR or Lead Vendor before proceeding with the Home Energy Assessment. If the customer is being served by a non-participating Program Administrator, the Energy

Specialist should direct the customer to check with their local municipality for their eligible energy efficiency program offers.

1.2.1 Decarbonization & Electrification

Many homes utilize fossil fuels for heating, hot water, cooking, clothes drying, lawn equipment, and transportation. When appropriate, the Energy Specialist shall recommend replacing any fossil fueled systems with electric equipment or appliances.

While it is the Program's goal to help customers eliminate fossil fuel usage, we must be aware of making recommendations that will increase the energy expense burden to the customer. For example, homes that heat with newer (condensing) natural gas heating systems may find that their total energy expenses will increase if they switch to heat pumps. Additional examples include but are not limited to homes that cannot be properly weatherized, related health and safety issues, and homes that require upgrades with costs far more than the future savings of switching to a heat pump.

In addition to the demand side improvements that have always been the focus of the Program, Energy Specialists will be able to provide customers with supply side guidance including renewable energy sources, community choice initiatives, electrical service upgrades, and electrical panel upgrades.

1.2.2 Turnkey Services

Qualifying customers will have the opportunity to enroll in Mass Save Turnkey Services. This optional service aims to streamline the customer's participation experience with weatherization and the implementation of recommended decarbonization measures. This is accomplished by providing additional incentives for measures such as the clearing of roadblocks preventing weatherization and specific electrification measures such as heat pumps. Roadblocks include all measures listed in section 2.10 that prevent Program eligible measures from being installed. To participate customers must meet the Moderate-Income guidelines as defined by the Program Administrators. Customers must verify their income level using the Online Income Qualification Tool.

2. Home Energy Assessment Visit Specifics

2.1 Customer Interview

Important information must be gathered about the residence during the initial customer interview. This information must include:

- Property information
- Utility account numbers / Rate code
- Historical energy use
- Number of occupants

During the customer interview the Energy Specialist will explain to the customer the steps included in the visit and the approximate time it will take to complete those steps. The Energy Specialist will also ask the customer what their specific concerns are about receiving the energy assessment and be sure to address those concerns during the visit.

2.2 Outside Assessment of the Home

The goal of an outside assessment of the home is to gain a detailed footprint of the home to create accurate calculations of the areas to be insulated. These diagrams and calculations will be used to aid the insulation contractor during installation and need to be as accurate as possible.

The Energy Specialist will complete one full loop around the building. The Energy Specialist will take measurements and draw a diagram of the home at this time. The following shall be checked from the outside of the home:

- ❖ Siding types on all sides and levels of the building where wall insulation is recommended must be evaluated. Determine if there are multiple layers of siding by checking at the bottom edge and around windows and asking the customer if there are multiple layers of siding. Assume all pre-1978 homes have lead paint.
- ❖ If there are attic insulation opportunities and the attic needs more ventilation, look for ways to add ventilation to the attic. Check for ventilation that was unnoticed from the attic. Assess roof condition and materials for compatibility with ventilation and solar measures.
- ❖ Look for evidence of water intrusion into the building, such as steep valleys with brush caught in them, rotten siding or trim, lack of or poorly installed gutters, peeling paint, or incorrectly flashed areas.
- ❖ Look for depressions in the ground near the foundation, adequate slope away from the foundation, dampness of the ground around foundation, and type of vegetation (moss, grass, shrubs, etc.).
- ❖ Check window wells and bulkhead door for signs of water entry or water damage.
- ❖ Condition of siding, grade and other site conditions that may affect installation.

2.3 Appliance Assessment

2.3.1 Refrigeration

Residential electric customers with refrigerators and freezers that have an inside measurement between 10 and 30 cubic feet are eligible to recycle their old inefficient units. A recommendation shall be made to recycle old inefficient units and customers shall be directed to the Mass Save Appliance Recycling Program.

2.3.2 Clothes Washing Machine

Top loading clothes washers with agitators are eligible for incentives to upgrade to Energy Star certified electric clothes washers. This recommendation should be made whenever the qualifying existing conditions are met.

2.3.3 Clothes Dryers

A recommendation to replace natural gas and propane fueled dryers with a corresponding electric resistance or heat pump dryer shall be made at all homes with existing fossil fueled dryers.

2.3.4 Stovetops

A recommendation to replace natural gas and propane cooktops with a corresponding induction cooktop shall be made at all homes with existing fossil fuel cooktops.

2.3.5 Lawn Equipment

Customers shall be guided to any incentives available to replace fossil fueled lawn equipment (such as mowers, leaf blowers, trimmers, and chain saws) with equivalent electric or battery powered equipment.

2.3.6 Transportation

Customers shall be directed to any available Program rebates and technical resources related to replacing gasoline and diesel fueled automobiles with electrically fueled equivalents.

2.3.7 Renewable Energy Sources and Battery Storage

Customers shall be directed to any available Program rebates and technical resources related to residential renewable energy sources such as wind and solar power. Any customer with existing renewable energy sources at their home and any customer interested in adding renewable energy sources shall also be directed to corresponding incentives for battery storage.

2.4 Combustion Safety Testing

A house must successfully pass all applicable combustion safety tests prior to installing weatherization measures in the home. The combustion safety evaluation shall be performed in accordance with applicable Building Performance Institute Building Analyst standards. This includes testing all combustion heating and hot water systems along with ovens and dryers. For more information, please reach out to your lead vendor. Energy Specialists shall follow any notification protocols set in place by the Program Administrator for combustion failures.

2.5 Recommendation for Replacing Heating, DHW, & Cooling Systems

The Energy Specialist shall inform the customer of available rebates and the process to obtain them based upon the sponsoring Program Administrator once all system evaluations have been completed. ES must enter all recommendations into the program software tools.

Customers with delivered fuels or electric resistance should be encouraged to replace them with Heat pumps and Heat Pump DHW when appropriate.

2.6 Recommendation for Replacing Windows

Energy Specialist must document the number of single-paned windows. Recommend replacement of windows using the HEAT loan incentive and/or rebates if the existing windows are single-paned, with or without storm windows. When making the recommendation to replace windows, the Energy Specialist should inform the customer that replacement windows may only be included in a HEAT Loan application if all eligible weatherization recommendations are completed. For the rebate the new windows must be ENERGY STAR® Most Efficient certified windows to qualify.

2.7 Assessment of the Basement, Walls, and Attic

The goal of assessing all the major parts of the home is to determine the location and performance of the existing thermal envelope and whether it can be effectively improved through appropriate air sealing and insulation measures. The thermal envelope is the barrier between conditioned and either unconditioned space or the outdoors. It is important that the thermal envelope continuously encase the entire house when possible because heat loss is always dominated by the areas with the least insulation/air sealing. The Energy Specialist will determine if insulation is needed and possible through the Mass Save program based on actual depths and measurements that can be reasonably obtained during the

assessment. The customer will be provided with a written proposal to install the recommended insulation measures.

2.7.1 Assessment of the Basement/Crawlspace

The Energy Specialist shall evaluate the basement area for potential energy efficiency improvements. If a component is eligible for improvement, the Energy Specialist will measure the area of each component and determine the depth of framing cavities. Refer to Section 2.9 for more information about calculating areas.

The Energy Specialist must determine how the basement is used by the customer and its relation to the building envelope to evaluate the potential for thermal improvements.

Generally, basements are semi-conditioned and should be considered inside the thermal boundary as most basements are below grade with air leakage points located at the above grade rim joist area.

Attempts to reduce heat loss by separating the basement from the home are usually unsuccessful. Exceptions may include some crawlspaces or basements with large openings to the outside. In these rare cases where the basement is outside the thermal envelope (such as a vented crawlspace), eligible measures to recommend include:

❖ Heating System Distribution Improvements:

- **Duct Sealing** – Recommend that all ducts located outside the thermal envelope be sealed with mastic or mastic tape to form a durable, tight seal. Duct sealing shall be recommended in conjunction with duct insulation. See section 2.8.1.
- **Duct Insulation** – Recommend fiberglass duct insulation with a vapor retarder on all heating ducts located outside of the thermal envelope. Duct insulation shall be recommended in conjunction with duct sealing. See Duct sealing section.
- **Hydronic and Steam Pipe Insulation** — Recommend pipe insulation for all heating pipes located outside the thermal envelope.

❖ Basement / Crawlspace Ceiling Insulation:

If the basement / crawlspace is located outside of the thermal envelope, ceiling insulation can be used to complete the thermal envelope.

- **Fiberglass Insulation** – If the ceiling joists are spaced appropriately, fiberglass insulation shall be recommended. For crawlspaces only, installation of rigid foam board in addition to the fiberglass may also be recommended.
- **Dense pack cellulose** – If minimal to no pipes or wiring are present, the basement is very dry, and the joists are unevenly spaced, recommend ceiling densepack cellulose. If the space is already enclosed, recommend densepack cellulose. If the space is not enclosed, reinforced mesh or rigid foam board would need to be specified to hold the cellulose in place. Pay close attention to how difficult it may be to install cellulose in the space and if it is possible.
- **Rigid Foam Board**— To be used to encapsulate insulation from the exterior air temperature and humidity. It should be recommended when minimal potential roadblocks

such as pipes or wiring exist that can make it difficult to achieve the program required thermal boundary.

❖ **Basement Stairwell Insulation:**

Insulating the stairwell and door shall be recommended as necessary to complete the thermal envelope if the basement is considered outside of the thermal envelope and basement ceiling insulation is recommended.

- **Fiberglass Insulation** — If the framing is evenly spaced and open, recommend fiberglass insulation.
- **Cellulose** — If the joists are unevenly spaced and open, recommend reinforced mesh or rigid foam board and cellulose.
- **Dense pack Cellulose** — If the stairwell is already enclosed, recommend dense pack cellulose.
- **Stairwell Door** – Insulate the back of the stairwell door with rigid foam board in conjunction with basement stairwell insulation. Recommend weatherstripping and door sweeps as necessary.

❖ **Basement Rim Joist Insulation:** *(materials may vary by program administrator)*

For basements located inside the thermal envelope, rim joist insulation can be used to complete the thermal envelope.

- **Fiberglass Insulation** – Recommend fiberglass insulation for the rim joist area in basements that are within the thermal envelope. A recommendation to air seal an uninsulated rim joist must be made in conjunction with fiberglass batt insulation to provide an aligned air barrier and thermal boundary.
- **Spray Foam Insulation** – Check with your PA for materials used.
- **Rigid Foam Board** – Can be recommended in special circumstances. Check with your PA for appropriate situations.
- **Insulate Basement Exterior Door** – Recommend that rigid foam board be applied to the back of uninsulated exterior basement doors, in good condition, present along the thermal boundary. Recommend weatherstripping and door sweeps as necessary.
 - NOTE: Rigid Foam Board is not approved in these areas:
 - Above grade framed walls
 - Basement foundation walls
 - Walkouts
 - Any space used as living space
 - Garage ceilings

❖ **Above Grade Open Framed Basement Walls:**

- These may be insulated using batt material only if the wall cavity is empty
- Always remind the customer that batt insulation will be installed without a vapor barrier.

❖ **Dirt Floors:**

- All accessible dirt floors or portions of dirt floors shall be recommended for coverage with 6+ mil polyethylene plastic sheeting.
- **Exception:**
 - A vapor barrier is not required if an accessible dirt floor area is vented per code.
 - A vapor barrier is not required if installing rigid foam board on a crawlspace ceiling or existing closed cell foam (not open cell foam) is present and has no communication to the basement area.
 - A vapor barrier is not required if the entire crawlspace is inaccessible with no existing moisture issues having been identified in any other areas of the home. If moisture issues are present, a moisture evaluation must be completed to rule out the crawlspace as a contributing source before continuing with work.
 - Definition of inaccessible
 - Less than 2.5 ft of headroom across the entirety of the crawlspace.
 - Obstructions to the access point to the extent it makes the access impassable.

2.7.2 Assessment of the Exterior Walls and Enclosed Cavities

All exterior walls, overhangs, and enclosed cavities must be fully insulated to create a proper thermal envelope. The Energy Specialist may use an IR camera to help verify the existence or absence of insulation within wall cavities in addition to drilling a test hole to be sealed by the Energy Specialist. The Energy Specialist shall measure the area of each component and determine the depth of framing cavities. Refer to Section 2.9 for more information about calculating areas.

Wherever enclosed cavities cannot be accessed, assume that insulation types and depths are similar to the cavities that are accessible.

All enclosed cavities with air leakage paths that cannot be air sealed shall be insulated with densepack cellulose. At least three inches of free space must exist for the cellulose hose to fit into the cavity for the cavity to be properly insulated. The structure of cavity must be able to withstand the installation of densepack cellulose for the improvement to be recommended. The following measures are the specific types of wall insulation measures available through the Mass Save program.

❖ Exterior Wall Insulation:

- **Exterior Blow** – Recommend an exterior blow if the house has removable siding.
- **Interior Drill and Blow** – Recommend an interior drill and blow if the home has stucco, brick, or masonry, even if under another type of siding. When specifying wall insulation in homes with masonry exteriors, make sure there is sheathing behind the masonry as cellulose should not be installed directly in contact with masonry.
 - Asbestos siding - Walls with asbestos siding can be treated from the exterior or interior depending on the condition and removability of the siding. Be sure to obtain all proper permitting and follow all disposal rules for broken pieces of siding.
- **Interior Walls** - Recommend that interior walls separating conditioned space from unconditioned space, such as a stairwell to attic, or garage common wall, be insulated with densepack cellulose using the interior drill and blow method.

- **Overhangs** - Recommend any overhangs that are not insulated or are insufficiently insulated and have at least 3 inches of empty cavity space available, be insulated with dense pack cellulose either from the outside, if possible, or through an accessible rim joist or floor joist.
- **Garage Ceilings** - Recommend enclosed garage ceilings be insulated using densepack cellulose if hidden distribution pipes and plumbing will be properly protected from cold temperatures and there is at least 3 inches of empty cavity space available. Proper protection requires installing a larger R-value between the pipes and the exterior than between the pipes and the interior of the home.
- **Other Cavities** - Recommend dense pack cellulose insulation for uninsulated or insufficiently insulated enclosed cavities as described in the Material & Installation standards when you have at least 3 inches of empty cavity space available. These areas shall be insulated either from the interior living space or from the exterior, depending upon accessibility.

2.7.3 Assessment of the Attic

Insulating an attic shall be recommended anytime the average existing level of insulation is less than the depths listed below by existing insulation type.

Existing Material	Fiberglass Batts or Loose Rock Wool	Cellulose	Blown Fiberglass (low density)
Existing Depth	Scoped Amount	Scoped Amount	Scoped Amount
1	14	14	14
2	13	13	14
3	12	12	14
4	11	11	14
5	10	10	13
6	9	9	13
7	8	8	12
8	7	7	11
9	6	6	10
10	5	5	9
11	4*	4	8
12	4*		7
13			6
14			5
15			5
*Don't spec if cross-batt fiberglass existing			

The Energy Specialist shall determine the average existing depth of all insulation in a space without downgrading the material and use the predominant type to establish a base R-value from, referencing Program Insulation Depth Scoping Charts. The Energy Specialist will base the existing R-value on the most commonly recurring low spot throughout the given attic space. If needed, the attic will be divided into multiple sections to more accurately recommend insulation specifications. The Energy Specialist

shall measure the area of each component and determine the depth of framing cavities. Refer to Section 2.9 for more information about calculating areas.

Wherever attics cannot be accessed, assume that insulation types and depths are like the attics that are accessible.

The following is a list of eligible attic recommendations:

❖ **Open Attic Flat and Knee wall Flat**

Recommend blown cellulose for all open attic spaces, including behind the kneewall, as necessary to reach a final insulation level of R-49.

❖ **Attic Slope**

Recommend dense pack cellulose for this space if no insulation is present within an attic slope. Recommend densepack cellulose to fill the entire cavity if the cavity has inadequate preexisting insulation, and there are at least three inches of free space, and the cellulose can be applied to the cold side of the assembly.

❖ **Floored Attic and Floored Knee wall Floor**

The floored cavity can be densepacked with insulation as long as three inches of freespace exist. The densepack cellulose will compress any preexisting insulation. If it can be determined that there are no air leakage penetrations below the floored area, then densepacking is not required and should not be recommended due to the higher cost; enclosed cellulose should be specified.

❖ **Attic Knee wall**

Recommend insulating the attic kneewall in conjunction with adequately insulating the kneewall floor if there are no heating or water pipes in the kneewall area and the attic kneewall needs to be sealed off from the living space.

- Fiberglass Insulation – If the kneewall studs are spaced appropriately, fiberglass insulation shall be recommended. Installation of rigid foam board in addition to the fiberglass should also be recommended.
- Cellulose - If the kneewall studs are unevenly spaced and open, recommend reinforced mesh or rigid foam board and cellulose.
- Transition Treatment- Determine location of the transition area that will be treated. Mark specific area being treated on the plan view diagram. Measure the linear feet to determine work specifications.
- Enclosed Kneewall Floor Treatment- If the kneewall floor is floored with at least 3 inches of space and transitions are being treated, the recommendation should be enclosed cellulose.
- Densepack Cellulose - If the attic kneewall floor is already enclosed, has at least 3 inches of empty cavity space available, and there are air leakage penetrations below the floored area.

❖ Attic Knee wall Slope

Recommend this measure in most cases even if the kneewall and kneewall floor can be insulated. If kneewall slope insulation already exists, or other existing conditions such as mechanical systems and/or distribution systems exist, bringing the kneewall inside the thermal envelope is always preferred.

- Fiberglass Insulation – If the kneewall rafters are spaced appropriately, fiberglass insulation may be recommended. Installation of rigid foam board in addition to the fiberglass should also be recommended if accessibility allows. If rigid foam board is not installed, an FSK ignition barrier must be.
- Densepack Cellulose - If the attic kneewall slope is already enclosed and has three inches of free space existing, recommend densepack cellulose so long as existing insulation will not create air pockets on the cold side of the assembly. If the space is not enclosed, reinforced mesh or rigid foam board would need to be specified in order to hold the cellulose in place. If rigid foam board is not installed, an FSK ignition barrier must be.
- There should be no recommendation when the area is full of insulation and has an effective air barrier.

❖ Pipe Tenting

When encountering water pipes in an area that will be brought outside the thermal envelope as part of the work scope, it is important to adequately protect those pipes from freezing by including pipe tenting in the scope of work. When specifying, measure the liner length of pipe needing tenting.

❖ Insulate Attic Hatch or Door

Recommend that rigid foam board be applied to the back of all attic hatches and doors present along the thermal boundary. Weatherstripping is included in the price of hatch insulation but weatherstripping and door sweeps need to be recommended separately for doors. Some LVs have sperate measures.

❖ Insulate Attic Pull-Down Stairs

Recommend the installation of an insulated attic-side cover with fastener for all attic pull-down stairs. Additional carpentry may be needed in some cases. If an insulated attic stair cover cannot be installed given the style of pull-down stairs or other restrictions, an Attic Tent should be recommended. If an Attic Tent cannot be installed, the pull-down stairway shall be weather-stripped to prevent air and moisture leakage into the attic.

❖ Additional Attic Accesses

Recommend creating additional attic access if there is no existing way of entering the attic area is present. Inform customers of the extent of finish work provided with these accesses, per the M&I standards.

2.7.4 Attic Ventilation

Do not recommend insulation in an attic space unless adequate and permanent ventilation is present or can be included in the work scope.

Adequate cross-ventilation shall be maintained above all attic insulation by providing both low and high vents or gable end vents where possible. One square foot of net-free vent area (NFA) shall be provided for every 300 ft² of attic area that has a vapor barrier present with 50% to 60% of the vent area located near the roof ridge and 40% to 50% located near the eaves.

When cross/lower venting is not possible due to roadblocks, one square foot of net-free vent area (NFA) shall be provided for every 150 ft² of attic area. All recommended ventilation must be achieved by installing high ventilation options.

❖ Acceptable Roadblocks to not installing lower ventilation:

- 3rd story soffits
- Steep/ uneven grade for ladders
- Soffits with open rafter tails
- Soffits that are too narrow for vents
- Aluminum soffits
- Non-perforated vinyl soffits
- Cellulose already blown into soffits
- Call your LV for other reasons

NOTE: Although the use of window vents is allowed, the vents must be permanently fixed and must meet the minimum requirements for net free vent area as noted above.

Ventilation should be improved wherever reasonable and practical to meet current code requirements when attic insulation is installed. The details of the types of vents and where they may be practically installed in each specific house varies. Consideration should be given to the type and location of vents to provide as much cross ventilation as possible for the specific application depending on existing conditions and retrofit options.

❖ Options for achieving high ventilation include:

- Ridge Vent
- Gable Vent
- Window Gable Vent
- Roof Vent
- Turbine

❖ Options for achieving low ventilation include:

- Soffit Vents
- Gable Vent

Ventilation options may vary by Program Administrator.

❖ Ridge Vent:

These vents are installed at the roof ridge and stick up a few inches above the roof. Contractor installation restrictions such as the inability to install ridge vents in slate or tin roofs may apply.

Preexisting ridge vent can be counted towards the 1/150 calculation only if the low ventilation options are not blocked.

For homes with preexisting ridge vent where there is the ability to install low ventilation use the 1/300 calculation and install low ventilation to meet half that calculation.

❖ Gable Vents:

Gable vents are generally rectangular and made from aluminum, vinyl or wood. Gable vents cannot be installed through asbestos siding. Contractor installation restrictions such as the inability to install gable vents in aluminum siding may apply.

❖ Soffit Vents:

Soffit vents are generally made from aluminum. Contractor installation restrictions may apply such as the inability to install soffit vents in aluminum soffits.

❖ Vent Chutes:

Recommend at least one vent chute with each existing soffit vent and for every proposed soffit vent to allow for proper air transfer. For continuous soffit vents or ventilated drip edges, vent chutes shall be recommended for every rafter bay. Additional vent chutes may be required to provide adequate airflow at each soffit vent such as with roof truss or other 24 OC spaced construction. The vent chute recommendation includes the wind baffle.

❖ Vent Chute Half:

Recommend only when needed to maintain at least 1" insulation clearance from the top of the vent chute.

❖ Window Vents:

When attics cannot be ventilated by other means and windows exist, recommend gable vents to be installed in the existing window sash. Plywood will be constructed around the gable vent which is then fitted into the place of one of the window sashes.

❖ Roof Vents:

Roof vents are typically made of metal. Contractor installation restrictions may apply such as the inability to install roof vents in slate, tin, or flat roofs. Follow manufacturers' recommendations related to minimal roof pitch requirements for each specific roof vent.

❖ Turbine Vents:

Turbine ventilators, also known as whirlybirds, have an NFA of 4.0 sq. ft. This type of vent should only be recommended when upper ventilation of 3 sq. ft or more is required.

❖ Vent Bath Fan to the Outside:

All bathroom exhaust fans venting to the attic must be vented outside with insulated duct.

Contractor installation restrictions may apply such as the inability to vent the bath fan to the gable end wall if asbestos, stucco, or other prohibitive siding is present or in venting through the roof due to specific roof materials. Venting through the roof is the preferred option when possible.

2.7.5 Recessed Lights

The preferred treatment for recessed lights is to insulate them. Insulating over recessed lights is only allowed for enclosures that are deemed Insulation Contact (IC) rated by a licensed electrician. Customers with more than 6 IC rated recessed lights should be strongly encouraged to obtain the sign off. Follow your LVs process for obtaining the electricians' sign off.

If the sign off is not finalized at the time of contracting the ES may include recessed light boxes on the contract while they wait for an electrician to sign off. A change order may be conducted if that sign off comes in before the installation. Installers should be cognizant of the customers' efforts to secure a sign-off before installing the work.

- ❖ The Energy Specialist should attempt to obtain a Recessed light sign off if more than 6 recessed lights are present and they are believed to be IC rated. Boxes should be recommended when 6 or fewer recessed lights exist. Boxes for IC rated lights greater than 6 are not eligible for the incentive. Incentivized boxes are not eligible when there is a sign off. Customers with greater than 6 IC lights can have a sign-off or pay the cost of the boxes. The non-incentive part should be used in these cases. A recessed light sign-off is always required if the recommendation is to blow over the lights.
- ❖ If Energy Specialist determines the lights are non-IC rated, boxes can be spec'd. It is the responsibility of the Energy Specialist and the auditing company to ensure sign offs are obtained as often as possible and boxes are only recommended when needed. Quality Assurance efforts will focus on ensuring boxes are incentivized correctly.
- ❖ Energy Specialist should evaluate the clearances available at each location to determine if installation of the box is feasible. All inside surfaces of the box must be 3" away for the recessed light enclosure, wiring compartment or ballast. There also must be enough height clearance so that the top of the box will be able to be at least 1" above the finished insulation depth. The Energy Specialist should take these clearance requirements and box material thickness into account when looking for obstructions and the ability to construct a recessed light box in a specified area.
 - Recessed lights that are not eligible for boxes should be spec'd for damming.
 - Damming should not be added when recessed light boxes are recommended.
 - Recessed lights boxes should only be recommended in areas where weatherization or Air sealing work is taking place.
 - Air sealing only jobs that are beyond exception hours are allowed to have recessed light boxes recommend for both non-IC rated lights and IC rated lights regardless of the quantity. Attention should be given to the customer's plan or opportunity for weatherization in the future. Blowing over lights is still the preferred path; it may be prudent not to install boxes if the customer intends to insulate at a later date and is believed to have IC rated lights.
 - Recessed light boxes will be 100% incentivized in all cases of non-IC rated lights, and for up to 6 IC rated lights, when sign offs can't be obtained, or for air sealing only work.

Customers may request recessed light boxes if they have IC rated lights greater than 6. These boxes will not be incentivized by the program. In that case the non-incentivized IC light box should be added to the weatherization contract.

- If an electrician is being sent to the home for a K&T sign off, take advantage of that visit and have the Recessed Lights signed off at the same time and at a lower cost
- Bathroom fans and fans with lights will not be eligible for light boxes and should be dammed.

2.7.6 Infrared Camera Scan

An infrared (IR) scan may be performed to learn more about the insulation present in the home. It is helpful for the customer to watch this part of the home energy assessment so they can see the images on the screen. If the Energy Specialist will be running a blower door test, the infrared camera should be used first so that the blower door does not eliminate the needed temperature difference. Per manufacturer specifications, a minimum temperature difference between the inside of the home and the outside of the home is recommended to get a clear picture of the heat loss. When using the IR camera from inside the home and the temperature outside is cold, the wall framing should appear warmer than the cavities if there is no insulation in the walls. If the walls are insulated, the wall framing should appear cooler than the cavities.

The Energy Specialist must be careful of situations where the walls may be warmed by the sun or other heat source as well as older reflective foil insulation, which could blur or reverse the images. Infrared scans are best done in the morning while it is still cold outside and before the sun shines on the building. Energy Specialists should be especially careful when viewing the south and west wall in the afternoon.

Infrared images of ceilings rarely reveal good information because the attic or roofs are often warm compared to the outdoors. Infrared images of metal surfaces or glass surfaces can be meaningless since they tend to reflect other infrared light rather than emit their own. It is important to keep in mind that IR imaging generally does not show the quantity of insulation present, but rather only whether or not there is any.

2.7.7 Electric Heat Thermostats

In the case of electrically heated homes, replacing old thermostats with new, programmable thermostats can provide significant energy savings. A minimum number of electric thermostats may need to be achieved according to Program Administrator requirements. Existing thermostats must be wall mounted. Thermostats in bathrooms should not be replaced due to possible moisture issues. Check with your Lead Vendor for eligibility.

2.8 Assessing Air Sealing Potential

During the visit, the Energy Specialist must determine the number of hours of air sealing needed in the home to achieve cost-effective energy savings. Most homes could benefit from some amount of air sealing work. Spray foam, caulking, metal flashing, door sweeps, and weatherstripping are used to seal the home. Air sealing must be completed before insulation work can begin if attic insulation is a recommendation. Attic air sealing should be emphasized since that is where convective heat loss is strongest. Attic air sealing can also have a large impact on energy savings and reduce attic moisture concerns. Below is a list of significant air sealing features:

- ❖ open chimney chases
- ❖ open wall cavities such as found in balloon framing
- ❖ attic kneewalls
- ❖ ducts in the attic (requires sealing between duct boots and drywall)
- ❖ open duct chase or other chase
- ❖ multiple doors or hatches that need to be weather-stripped
- ❖ multiple attic spaces or unheated basements
- ❖ recessed lights (airtight insulation barrier boxes that meet program Material & Installation Standards can be installed over these)
- ❖ floored attic areas and transition areas where densepack cellulose is not going to be installed.
- ❖ plumbing and electrical penetrations
- ❖ rim joist / wall plate seams

If the attic has floored areas that cannot be densepacked then it should be recommended that the floor be removed and air sealed at a minimum to treat all major bypasses such as chimney chases, plumbing chases, wet walls, dropped soffits, etc. NOTE: To be considered technically and cost effective air sealing requires a minimum of 60% of the attic area to be air sealed along with all plumbing and chimney by-passes.

- ❖ Insulation of vertical surfaces without air seal or ventilation requirement:

The following attic locations can be insulated without requiring air sealing or ventilation to be completed, provided the insulation will have minimal effect on attic temperatures.

- Skylights
- Walk-up walls
- Level changes

2.8.1 Duct Sealing/Duct Insulation

Only duct systems where 30% or more of the ductwork is in unconditioned space (measured by linear feet of ducts) should be evaluated for duct sealing and duct insulation. Ducts located in semi conditioned spaces like basements have proven to have marginal payback. Therefore, only ducts in vented attics and crawlspaces should be sealed and insulated. All the openings in the duct system should be sealed using program approved materials.

- Evaluate the ducts visually for air leakage and decide whether duct sealing is needed.
- Only duct systems with some observable leaks or significant leaks are eligible for duct sealing.
- Only duct work that has properly attached connections and whose air flow has not been compromised due to crushed ducts.

NOTE: If the duct system has ducts that are crushed or improperly attached/disconnected to the point that the Energy Specialist believes that the system cannot be adequately sealed without first fixing ductwork, then refer the customer to a HVAC contractor to evaluate the duct system's condition.

Additional duct systems that should not be specified for duct sealing:

- Systems made of duct board.
- High-velocity systems.
- Systems insulated with radiant bubble wrap are not eligible for duct sealing, unless the bubble wrap is deemed by the energy specialist to have an effective R-value less than R-3. In this case, the bubble wrap would be removed, and the ducts would be re-insulated to R-8.
- Systems requiring repair work using HVAC industry tools and materials other than a cable tie (Zip Tie) tensioner should be referred to as an HVAC contractor.

❖ Evaluating Duct Air Leakage

Ductwork in unconditioned space with some observable leakage or significant leakage will be eligible for duct sealing. This means that joints are not sealed with an approved sealant and there are gaps at most of the seams. Duct insulation shows discoloration at most joints. Duct leakage within the thermal boundary or in semi-conditioned spaces like basements will not qualify to be duct sealed.

Duct Sealing Hours

	Less than 200'	Greater than 200'
Uninsulated Ducts	4 hours	6 hours
Insulated Ducts	8 hours	12 hours

Duct Insulation

Existing duct insulation greater than R2:	Sealing only
Existing duct insulation less than R2:	Remove + Seal + Insulate
No existing insulation:	Seal + Insulate
Rectangular Duct	Linear ft * (Height * width/144) =
Round Duct	Linear ft * Multiplier =

Multiplier Round Duct Insulation

4" Pipe	1.05
5" Pipe	1.31
6" Pipe	1.57
7" Pipe	1.83
8" Pipe	2.09
9" Pipe	2.35
10" Pipe	2.62
11" Pipe	2.88
12" Pipe	3.14

2.9 Area Calculations

The Energy Specialist will draw a diagram of the home and calculate area and volume whenever energy efficiency improvements are recommended. All measurements shall be made to the nearest six inches. Area calculations are needed for any component of the thermal envelope to be improved. Wall insulation measurements will be gross measurements and therefore subtraction of windows and doors will not be needed.

2.10 Identifying Health & Safety and Other Barriers

A primary objective during the HEA is to identify all health and safety concerns and other barriers preventing the installation of energy efficiency upgrades. The main health and safety barriers for weatherization are moisture, knob & tube wiring, asbestos-like material, and combustion safety problems. Electric service panel concerns are a barrier to decarbonization measures.

2.10.1 Moisture

To insulate a home, it is important to confirm that the insulation will not become wet and that the insulation will not exacerbate any existing moisture problems. Moisture can be a barrier for some or all measures in the home depending on the severity. Here are some guidelines for deciding when there is too much moisture for insulation or air sealing to occur:

❖ General:

If the framing cavities are wet insulation cannot be added. This is a barrier only for the area of the home that is wet but typically the entire measure should be put on hold until the problem is resolved. For example, if one wall of the house is too wet to insulate, it is a good idea to leave all the walls uninsulated. Wet framing cavities can be identified by severely peeling paint, mold growth, moss, mushrooms, rot, moisture content, or by touch.

❖ Basements:

All basements have an elevated level of moisture compared to the living space because concrete absorbs moisture from the ground. Excessive levels of moisture in the basement shall stop the installation of insulation in the basement. Signs of elevated moisture include staining, mold growth, and dirt floors. If the level of moisture in the basement is especially high, then no insulation or air sealing should occur in the home. Very moist basements may have pools of water or streams running through them, signs of flooding, or rotten framing.

❖ Attics:

Attic moisture problems are usually caused by roof leaks, ice damming, or condensation.

- Roof leaks - Any roof leaks that have not been repaired are a barrier to any insulation work in the attic, including cellulose and fiberglass. In most cases air sealing shall not occur until after a roof leak is addressed by the homeowner. If the source of moisture in an attic cannot be determined, it should be assumed that the source is a roof leak.
- Ice damming - Ice damming is generally caused by excessive heat escaping from the home into the attic and melting the snow on the roof, which then re-freezes when the temperature drops as the water reaches a lower point on the roof. The water seeps into the

- attic from the outside of the roof. Air sealing, insulation, and venting the attic may reduce ice damming and may reduce moisture intrusion. Therefore, ice damming should not be considered a barrier if measures within the program exist to address the source. The Energy Specialist should assess the source of the heat loss causing any ice dams and specify relevant measures.
- Condensation - Condensation is generally caused by warm, moist air escaping from the home and condensing on the cold roof deck. Liquid water forms on the underside of the roof decking and in severe cases the water will freeze on the underside of the roof decking and form icicles. Air sealing and venting of bath fans will reduce condensation and may reduce moisture intrusion. Air sealing work must be completed before insulation is added.

2.10.2 Knob & tube wiring

Knob & tube wiring should always be suspected in pre-1955 houses. Energy Specialists need to look carefully for this old style of wiring which involves individual wires that are run through walls and ceilings, with ceramic “knobs” and “tubes” to prevent contact with wood framing. Additional signs of knob & tube wiring are rotary, two-button, or porcelain switches. If any evidence of knob & tube wiring is found in the home, no insulation may be installed until a licensed electrician addresses the wiring. Knob and tube wiring may or may not appear to be active - remember that knob & tube wiring may be a concern even if the electrical panel has been replaced. If knob & tube wiring is present, it is a barrier to all insulation in the home except for areas where fully visible, uninsulated open cavities allow the Energy Specialist to visually verify that no knob & tube wiring is present. Air sealing, duct sealing, pipe insulation, and duct insulation may occur in a home with knob & Tube wiring as long as the work can be completed without disturbing it.

When signs of knob & tube wiring are found, the Energy Specialist shall inform the customer how to proceed with getting the knob & tube decommissioned, noting the specific areas where insulation is recommended. The customer will need to have a licensed electrician certify that the home is free of all active knob & tube wiring in any areas where work is being recommended before insulation and/or any air sealing that may contact the wiring can be done.

2.10.3 Asbestos Like Material

If the Energy Specialist finds asbestos-like material on the pipes, ducts, or in a basement or attic, it is a barrier to any work occurring in that area for fear of disrupting the material. The Energy Specialist must check where pipes go into floors or walls as asbestos-like material is commonly missed in these areas. Embossed or smooth paper on ducts could potentially be asbestos-like material. Basement air sealing and basement ceiling insulation may not proceed if there is a risk of disturbing asbestos-like material on pipes in the basement.

Sometimes small amounts of air sealing or rim joist insulation can be completed if the asbestos-like material will not interfere with these measures. The work must be road blocked if there appears to be any risk that a worker would disturb the asbestos-like material.

Blower door testing should not be completed in any home where asbestos like material is identified or suspected except for asbestos siding.

The Energy Specialist can assume that any vermiculite insulation contains asbestos-like material, even though not all vermiculite contains asbestos. Cellulose cannot be blown into or on top of an attic area that contains vermiculite insulation.

- ❖ Vermiculite Insulation - No attic space, wall cavity, or other area containing vermiculite can have additional insulation installed. Any vermiculite found in the home must be assumed to contain asbestos.

Due to health concerns, Energy Specialists must not dig through vermiculite insulation in the attic.

Asbestos can also be found in board-like form. This would typically be located directly above the heating system and resemble drywall. If a board has been installed near the heating system with asbestos-like material, it shall be considered a barrier to any work that would be done within close proximity.

The Energy Specialist should give the customer the appropriate health and safety information. When informing the customer, the Energy Specialist should take care to emphasize the need for professional removal, testing, and certification. He or she should avoid saying anything that may give the customer the idea that they can solve the problem on their own. The work can proceed after professional removal or encapsulation of the asbestos-like material.

2.10.4 Combustion Safety

Energy specialists must follow all applicable BPI guidelines for checking combustion safety in the home. Any combustion safety problem that is identified as a “stop work” or “emergency” situation per BPI standards is a barrier to any tightening measures on the home, including air sealing, insulation, and window replacement. Unvented fossil fuel space heaters will always stop work until they are removed or vented properly.

2.10.5 Other Health, Safety, or Other Barriers

Some issues listed below are conditional and should be assessed based on the Energy Specialist’s best judgment. Additional barriers include:

- ❖ Access to house - Occasionally a home is too far from the road, or the walls are inaccessible due to trees, shrubbery, or proximity to other buildings. Work that requires access to areas that are blocked by shrubbery or trees may not be possible.
 - Houses that test below 70% of the BPI Building Airflow Standard (BAS) must have mechanical ventilation installed in order to proceed with any shell tightening measures. Required mechanical ventilation can be determined by using RedCalc software (<https://basr.pnnl.gov/redcalc>). If a contractor brings a home below 70% of BAS it’s their responsibility to install mechanical ventilation.
- ❖ Structural problems - Occasionally the structure to be insulated cannot hold the weight of the insulation. This is true for freestanding ceiling tiles. In this case, the area cannot be insulated, or air sealed until customer installs proper drywall/sheetrock.
- ❖ Inability to vent - Occasionally an attic needs insulation but cannot be ventilated properly (for example, a home with slate roof, asbestos shingles, and aluminum soffits). For more information on this topic, refer to Section 2.7.4 “Attic Ventilation”.

- ❖ No Carbon Monoxide Detector Present -At least one carbon monoxide detector must be present in the home by the time work is completed in homes with any type of combustion appliance and/or an attached garage. A carbon monoxide detector is not required in entirely electrically heated homes unless the home has an attached garage.
 - Unvented bath fans, plumbing stack pipes, dryers, and/or kitchen exhaust fans - Any exhaust fan venting directly into the attic must be vented to the outside before work is completed. This must be performed either through the scope of work or by means outside of the Mass Save program. Any dryer not vented to the outside is a barrier for work. Filters that recirculate dryer exhaust into the home are not considered to be vented to the outside.
- ❖ Minimum Workspace Clearance – All workspaces must have adequate clearance for workers to install the relevant energy efficiency measures.
- ❖ Floored Attics – To insulate floored attics, either the floorboards must be removed or the cavities under the floored attics must be dense-packed. It is preferred to remove floorboards allowing for the attic to be air sealed and loose blown cellulose to be installed on top of existing insulation. The customer is responsible for floorboard removal. To effectively densepack the cavities underneath the floorboard, a minimum of 3” cavity space may be required to allow room for the cellulose installation hose.
- ❖ Heavy Storage Use and Accessibility - Areas with excessive storage prevent work in that area until the items are moved, and access is gained. This includes access to areas of the basement and attic where air sealing and/or insulation measures are recommended.
- ❖ Tile or tongue and groove wood ceilings – These types of ceilings must have a continuous vapor barrier on the back side and be structurally capable of supporting the insulation recommended.
- ❖ Electrical Service Upgrades – Replacing fossil fuels with electrical equivalents will increase the total load on the electrical panel. The auditor will be responsible for providing information about the electrical panel and electrical service in the home. This information will be necessary to confirm whether or not an electrical service and/or panel upgrade will be necessary to complete the recommended electrification measures.

2.11 In-Home Installation Measures

The Energy Specialist will have the opportunity to install items that lead to immediate energy savings during the HEA. These items are referred to as Instant Savings Measures (ISMs) and save electricity and/or heating and domestic hot water fuel. These products include programmable or wireless enabled thermostats, showerheads, faucet aerators, and advanced power strips. For a complete list of approved ISMs, check with your Lead Vendor. Measures shall be installed and verified. Virtual assessments may ship ISMs.

If Home Performance Contractor (HPC) or Lead Vendor (LV) audit staff is found leaving instant savings measures behind that are not eligible to be done so, the HPC or LV is issued a warning, the job is considered a failed inspection, and the company will not be paid for the ineligible instant savings measures or installation fee. The individual energy specialist who left the ineligible instant

savings measures will be suspended from all program work (for all program administrators statewide) for 2 weeks for first offense and 6 months for second offense. Other penalties may be applied at PA discretion.

All installed products will meet the warranty guidelines outlined in corresponding participation agreements.

2.12 Creation of Reports and Contract

The Energy Specialist must provide a record of installed measures to the customer containing a list of installations completed during the visit as well as a report containing recommendations based on the existing conditions. If no health, safety, or other barriers are present, the Energy Specialist should leave an agreement/contract for work with the customer unless otherwise dictated by the customer. If barriers are present, the Energy Specialist shall make clear to the customer what needs to be done to resolve the barriers to proceed with installation of recommendations. Once all pre-weatherization barriers are cleared, an agreement for work can be sent to the customer to proceed.

2.13 Presentation and Sale of Recommended Work with Incentives

After all data has been entered the Energy Specialist will present a proposal to the customer for any recommended work. The Energy Specialist must clearly explain all recommended measures and leave the customer with appropriate handouts for proceeding with and preparing for the work. Follow-up information shall be provided to the customer on how to proceed. The Energy Specialist must also clearly explain what incentives are available for the customer, as well as savings estimates and anticipated simple payback. For a comprehensive list of available incentives, contact your Lead Vendor.

3. Software

Collected data, proposed measures, receipts, and agreements produced at each Home Energy Assessment must be entered into appropriate home energy assessment software approved by Program Administrators. An approximate savings in fuel will be generated for each measure proposed.

4. Reporting

Information gathered at each home and savings proposed and achieved will be reported to the participating Lead Vendor per requirements set forth by the Program Administrator. This will be a combination of electronic data recorded in the software and hard copy documentation.