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Indiana WAP uses the Oakridge National Laboratory Weatherization Assistant User Manual ([version 10](#)) with the following clarifications and tools:

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## Definitions

**Ancillary Items** – Items necessary for the proper installation of weatherization measures as required by the material manufacturers, general construction, and/or WAP standards in order to achieve a finished product in a typical installation where no unusual or extensive repairs are needed. Ancillary items typically refer to *small* items such as hardware, fasteners, adhesive, sealant, etc. The costs of ancillary items and their installation shall be included within the cost of an individual ECM when calculating the SIR for the individual ECM. For questions related to material standards for ancillary items, see the most recent Department of Energy guidance: [WPN 22-7](#), Attachment 7 (at the time of this writing)

**Energy Conservation Measure (ECM)** – Installation procedure performed for its anticipated energy savings. ECM costs must include all material, labor, and ancillary items and must meet a Savings to Investment Ratio (SIR) of 1.0 or greater to be installed with WAP funds with the exception of airsealing, which does not require an SIR of 1 or greater.

**Health and Safety (H&S) Measure** – The actions taken to eliminate a health and safety hazard, the elimination of which is necessary to effectively perform weatherization work, or the actions are necessary as a result of weatherization work. H&S measures are **not** required to be cost-justified (SIR of 1 or greater) and are not considered in the SIR calculation or the Average Cost Per Unit (ACPU). For questions related to specific H&S issues and allowable costs/measures, refer to the current IHEDA DOE approved Health and Safety Plan as developed from DOE WPN 17-7.

**Incidental Repair Measure (IRM)** – A repair necessary for the effective performance or preservation of newly installed weatherization materials, but not part of a standard installation. IRM installations must be associated with a specific ECM or group of ECMs. IRM costs must be included the SIR calculation of the total package of weatherization measures. IRMs solely to protect existing materials in the dwelling is not an allowable cost. IRMs *must* be attached to an ECM.

- Justification for the cost of each IRM and why it is necessary for the effective performance or preservation of an ECM must be documented in the client file with photos and written explanation.
- The total cost of the package of weatherization measures including any IRMs must have a calculated SIR of 1.0 or greater.

IRM costs for any measures that **do not** meet the definitions set forth in the regulating language and WPN 19-5 are subject to investigation and could be determined to be a disallowed costs.

**Package of Weatherization Measures** – The cost of all ECMs and their associated IRMs included in an audit. The cost of each ECM includes the cost of its ancillary items. The cost of all IRMs is added to the cost of the package of weatherization measures

when calculating the total package SIR for the whole project. H&S measures are exempt from cost-justification by the audit and are not considered in the SIR calculation or the ACPU of Department of Energy funds.

**Savings to Investment Ratio (SIR)** – Result of dividing the present worth of the lifetime energy cost savings by the total present worth cost of the installed measure, including the discounted rate of the savings and fuel escalation rates. Each ECM must yield a SIR ratio of 1.0 or greater to be included in the package of weatherization measures, and the total package of weatherization measures must yield a cumulative SIR of 1.0 or greater to be allowable expenditures of WAP funds.

## Key Parameters Guidance

Ensure all key parameters are correct. **Subgrantees must have only 2 Key parameter libraries: 1 library for NEAT and 1 library for MHEA. Any addition to the libraries must result in expanding either existing NEAT or MHEA library.**

- Economics
  - Real discount rate 2% (including SCC-SIRs in the grantee fuel cost library)
  - Minimum acceptable SIR is 1
- Set-points
  - Heating set-point (daytime) 68° F
  - Heating set-point (nighttime) 68° F
  - Cooling set-point (daytime) 78° F
  - Cooling set-point (nighttime) 78° F
  - Night Setback 3° F
- Insulation values must meet SWS standards
  - Each Duct Insulation added should be R-8 in the Duct Section of their NEAT run as pictured below:

The screenshot shows the 'Duct Systems' software interface with the 'Return' tab selected. The 'Existing Equipment' section contains the following fields: Duct System Code (Return), Duct Type (Return selected), HVAC Systems Served (Heating: Furnace, Cooling: None), Duct Location (Unconditioned Crawspace/Belly), Duct Insulation (No Insulation), Use Defaults (unchecked), Surface Area (50 sq ft), Insulation R-value (0), and Number of Return Registers (1). The 'Add Insulation' section contains: Measure Number (1), Added R-value (8), and Additional Cost (\$) (0). There are 'Duct Dimensions' and 'Calculate' buttons.

- Water heater wrap added R-value R-11
  - In MHEA ensure the bag size and density are set per the manufacture recommendations
- Equipment
    - Ensure equipment values align with what is planned to be installed

- For example, heat pump default is 15.2 SEER 2.
  - Low flow shower heads is 2.50 gal/ min
- Window U-values
  - When evaluating windows, ensure the U-values are correct (this value is obtained from the specification of the window being installed.)
    - \*\*Note: If replacing a window, the file must contain photographs of the existing window in place

## Economic Parameters

Subgrantees must deactivate or delete all out-of-date or unused economic parameters. Each Economic Parameter must follow the naming convention as follows: [PROGRAM YEAR – REGION 2– UNIQUE IDENTIFIER]. For example: “PY24-Region 2-LHDC Parameters.” Each of the Economic Parameters must follow the NIST Energy Price Indices, “Residential Midwest Average Economic Factors”, that are provided by Oakridge at the start of each program year.

## Fuel Cost

Fuel costs must be updated annually. IHEDA will provide annual statewide averages for propane to subgrantees costs from the U.S. Energy Information Administration (EIA) prior to the start of the Program Year and include the modified social cost of carbon over the lifetime of the measure in the cost. Subgrantees must include the Social Cost of Carbon in fuel costs for their specific natural gas and electric fuel costs. These fuel costs include a SIR adjusted to the Social Cost of Carbon (SCC) per [WPN 22-10](#) following option 2. Fuel price indices to account for SCC over a 30 year lifetime can be calculated via the [“Fuel Price Index SCC Calculator.”](#) Subgrantees must utilize the following approach to fuel-costs:

- SCC Modified Subgrantee Specific Fuel Costs: Subgrantees must add new libraries for input of new rates and add the adjusted SCC modifier to the specific rate per WPN 22-10’s option 2 for SCC. The In utilizing this option, the naming convention must include the date and utility provider. IHEDA will monitor the implementation of the fuel cost libraries.

Fuels with extreme price fluctuations, such as LP, Oil, and K1, must use averages based on the 3 years of the fuel’s cost.

Each fuel cost in the library from the grantee and subgrantee must include in the comments the source (web address if available) from which it was derived.

## Fuel Switching

As part of IHEDA’s approval to accept or deny fuel switch analyses, the following is in effect. Each fuel switch request must include an analysis determining that the site-specific energy audit demonstrates cost-effectiveness of the fuel-switch over the life of the measure as indicated by the SIR. If to obtain approval for a fuel-switch, then subgrantees must provide

analysis of the heating/cooling annual cost for each potential fuel type without the inclusion of the SCC in the fuel prices, including any cooling costs that did not previously exist in the home due to the addition of cooling via installation of heat pump systems. The following documentation is needed as part of each fuel-switch request:

- Supporting documentation must include a copy of the client utility bill(s) which list all charges for the pre-weatherization energy source(s). Cost information must include but is not limited to; the costs charged for the current energy commodity, base and service charges, taxes, supply and transmission charges and renewable energy or energy conservation adjustments.

## **Library Measures**

Library measures including pricing shall be updated annually.

Sub-grantees may only install LED lighting. CLF lighting is not an allowable cost. Costs should reflect LED lighting prices with wattage as close as possible. Please note in the comment area that the lighting installed is LED lighting and cost and not CFL cost.

## **Active Measures**

All measures shall remain active in NEAT except the following:

- White roof coating
- Window shading (awning)
- Sunscreen fabric
- Sunscreen louvered
- Window film
- Thermal vent damper
- IID
- Electric vent damper IID
- Flame retention burner
- Evaporative cooler

All measures shall remain active in MHEA except the following:

- Wall cellulose insulation
- Wall cellulose insulation in addition
- Floor cellulose loose insulation
- Roof cellulose loose insulation
- Roof cellulose loose insulation in addition
- White coat roof
- White coat roof in addition
- Add awnings
- Add awnings in addition
- Add shade screens

- Add shade screens in addition
- Evaporative cooling

**\*\*Please note: All sub-grantees currently (11/2020) have A/C tune up and A/C replacements turned off in the software. As of 11/2020, sub-grantees will need to turn on A/C tune ups and A/C replacement in the software\*\***

**All measures must be consistently marked as Active or Inactive and that the same lifetimes are used. When labelling each Measure Cost library, they should be sufficiently descriptive to avoid confusion.**

## **Itemized cost**

Do not use itemized costs to model **major** energy conservation measures. Determining energy savings for a specific measure in a building can be challenging without the assistance of an energy modeling tool. Additionally, any energy savings entered in the itemized cost section is not interacted with the rest of the building components, so an overestimate of energy savings is likely.

### **Aerators:**

The savings are based on 1 gallon of water saved per day and the energy required to heat 365 gallons of water from an inlet temp of 55<sup>0</sup> F to 120<sup>0</sup> F with an energy factor of .6 for gas heaters and an energy factor of .9 for electric heaters. Do not replace a lower flow aerators with a higher flow aerator!

Energy saved by appliance:

- Gas - .328 MBtu
- Electric - .218 MBtu

## **Insulation types**

Ensure all insulation types utilized are added to the appropriate tab and that costs are accurate in the library.

## **Air conditioning information**

Air conditioning information is required to be entered into NEAT/MHEA and this includes window units. Air conditioning replacements and tune ups are only allowed when cost justified by NEAT/MHEA.

### **Derating Heating/Cooling Systems**

Unlike combustion appliances, air conditioners and heat pumps cannot be accurately measured for efficiency while on-site. When addressing a system that utilizes a

compressed refrigerant cycle to provide heating or cooling (does not apply to evaporative coolers), the following derating formula may be used.

$$\text{Degraded Efficiency} = (\text{Base EFF}) * .99^{\text{age}}$$

Where:

- Base EFF = Typical efficiency of Pre-Retrofit equipment when new (Seasonal Energy Efficiency Ratio (SEER), Energy Efficiency Ratio (EER), or Heating Seasonal Performance Factor (HSPF))
- Age = Age of equipment in years.

For example: An existing HVAC unit that is 20 years old, was originally rated at 10 SEER.

$$\text{Degraded SEER} = 10 * .99^{20}$$

$$\text{Degraded SEER} = 8.18$$

To calculate this you will need to use the algebra function  $x^y$

On a calculator you will enter 10 x .99 then the  $x^y$  button and then 20 (or however the old the furnace age is). This will give you the answer 8.17906 and you will round up to 8.18

## Evaluate Duct Sealing

Subgrantees must follow IHEDA [Program Guidance WAP-2023-06](#) when measuring duct seal leakage in single-family site-built homes by selecting the check box “Evaluate Duct Sealing” under Ducts and Infiltration Section of their NEAT audit in WAweb. The two options In WAweb that must be used to evaluate duct seal leakage are “Duct Blower Measurements”, placing a duct blaster on each duct, or the “Whole House Blower Door Method” (pictured below):

Step	1. Before Weatherization (Existing)	2. After Duct Sealing and Before Other Weatherization (Actual or Target)	3. After Weatherization (Target or Actual)
<b>Step to make in the field:</b>	Attach blower door to main door and take Pa measurement.	Seal each duct and measure the take blower door measurement (target or actual)-.	After Weatherization services and ducts are unseal a final Pa measurement must be entered (target or actual).

Please note, sub-grantees may only evaluate duct sealing when a duct blaster has been used to quantify the duct leakage, otherwise, the duct sealing cost should be included with infiltration with a note in the comment that it includes ducts as directed by ORNL in the training series:

[https://www.weatherizationassistanttraining.org/crs\\_MM.php?S=5&L=13&C=77&M1=265&M2=409&VID=43](https://www.weatherizationassistanttraining.org/crs_MM.php?S=5&L=13&C=77&M1=265&M2=409&VID=43)

## Proper Work Orders

The NEAT/MHEA “Measure Report” is not a proper “Work Order”. A proper Work Order must be in the file and provided to the Weatherization Professionals performing the work. Work Orders **must** provide crews and contractors with sufficient information to clearly understand the scope of work and the materials required to perform that work. The Work Order may be generated from NEAT or another mechanism the sub-grantee has in place.

## Actual Costs and Estimated Costs

Ensure that actual costs are close to estimated library costs. If they are not close, you assume the risk of measures going from cost effective to not being cost effective, thus disallowing a measure that was completed. A disallowed measure may result in a payback. As an auditor, pay close attention to measures that are close to 1 to ensure costs do not exceed library costs. If they do, use the additional cost windows to correct for the difference in costs.

## Incidental Repairs

Ensure that all incidental repairs are modeled as itemized costs without energy savings but that they are included in SIR. Per WPN 19-5, “all incidental repair measures must be modeled separately and related to a specific energy conservation measure (ECM)”. These incidental repairs will appear as the first measures on the recommended measures report when modeled correctly. If they do not appear as the first measures, recheck your inputs as this is signaling you that something is not correct on the inputs.

## Lifetime of Measures

Water heaters have a lifetime of 13 years per WPN 19-4, this is defaulted to 15 years under the hot water equipment supply tab, sub-grantees will need to correct this. **Please see table 9.2 in attachment 9 from [WPN 23-6](#) for all other allowed lifetimes.**



Sub-grantees may increase the lifetime measures following the table below

<b>Measure</b>	<b>Lifetime</b>
Attic insulation—see 1 below	30
Wall Insulation—see 2 below	30
Floor Insulation—see 3 below	30
Kneewall Insulation—see 3 below	30
Fossil Fuel Furnaces & Boilers— see 4 below	20

Notes:

1. Applies only to blown-in (e.g., cellulose, fiberglass) and batt insulation
2. Applies only to dense pack insulation, rigid insulation and full-cavity batt insulation in fully enclosed air-tight cavities
3. Applies to loose and batt insulation installed in fully enclosed air-tight cavities, and rigid insulation
4. Applies to standard and condensing fossil fuel fired units

Updated lifetime measures and how to correctly adjust these in your database can be found on the [www.intelligentweatherization.org](http://www.intelligentweatherization.org) website.

#### Appendix D

Link to AFU information for water and space heating equipment

<https://www.ahridirectory.org/Search/SearchHome?ReturnUrl=%2f>