



Weatherization Assistance Program Energy Audit Manual *Version 2026*



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Section 1: Scope

Indiana's State Weatherization Assistance Program uses EIS WAPLink, which connects through an API to the Oak Ridge National Laboratory Weatherization Assistant (Version 10).

IHCDA certifies that all weatherization activities, energy audits, measure installations, health and safety practices, and quality control procedures comply with the requirements of 10 CFR 440, Appendix A. All measures installed under the Weatherization Assistance Program follow the allowable measures, audit procedures, material specifications, and installation standards prescribed in Appendix A. Subrecipients must follow these standards without exception, except as noted in Table 1 below. IHCDA maintains oversight through monitoring, training, and technical assistance to ensure continued compliance.

Item	Comments
Refrigerators	Approved 1/7/2020
Heat Pump Water Heaters	Approved 1/7/2020
Spray Foam Insulation	Approved 8/18/18
Light Emitting Diode (LED) Lighting	Approved 4/6/17

Information documents and manuals are listed below:

- [IHCDA WAP Website](#)
 - WAP Policy & Procedure Manual
 - WAP Field Guide
 - WAP Energy Audit Manual
 - WAP Health & Safety Plan
 - MHEA Floor Repair Modeling Tool
- [AFUE Information for Water and Space Heating Equipment](#)
- Red Calc for Ventilation via [WAPLink](#).

Section 2: Field Procedures

IHCDA requires that all auditors follow the WAP Field Guide, which outlines the complete diagnostic protocols. In addition, Indiana employs standardized diagnostic forms to ensure that all required testing is consistently performed and documented. Energy auditors must perform:

- Blower door testing
- Duct diagnostics when applicable
- Combustion safety procedures for all combustion appliances
 - CO testing
 - Draft testing
 - Spillage testing
 - Worst case- depressurization
 - Gas leak detection
 - Venting inspection
 - Appliance operation verification
- Pressure diagnostics
- Thermal boundary evaluation
- Insulation assessment (Attic, wall, floor insulation)
- Health & safety diagnostics
- Visual inspection of all spaces
- HVAC system evaluation
- Moisture assessment

- Ventilation requirements per 62.2
- Health & safety hazards assessed

IHCDA requires QCIs at the final inspection to:

- Perform or verify all combustion safety diagnostics
- Ensure safe operation of all combustion appliances
- Confirm CO testing and draft testing
- Verify spillage, worst case- depressurization, and venting
- Gas leak detection
- Visual inspection of venting systems
- Verification of safe operation at final inspection

Ancillary items are the small materials needed to properly install a weatherization measure according to manufacturer requirements, general construction practices, and WAP standards. These are routine items used in a typical installation where no unusual or extensive repairs are required. Examples include:

- hardware
- fasteners
- adhesives
- sealants
- other minor materials necessary to complete the measures

Under 10 CFR 440.21(b), DOE defines **General Heat Waste (GHW)** as a category of weatherization materials. The regulation lists examples of GHW measures, including:

- Caulking
- Weatherstripping
- Insulation of heating ducts
- Insulation of heating pipes
- Furnace efficiency modifications (minor, low-cost)
- Water heater insulation
- Water heater efficiency measures
- General air infiltration reduction

The cost of ancillary items—and the labor to install them—must be included in the cost of the individual ECM when calculating the SIR. Enter the ancillary cost in the ‘Additional Cost’ field for each measure where it applies. For material standards related to ancillary items, refer to DOE [WPN 22-7](#), Attachment 7 (current at the time of this writing).

Major measures include air sealing, duct sealing outside the thermal boundary, and thermal-boundary insulation (attic, wall, floor/belly, foundation, sill, etc.). These high-priority, cost-justified measures cannot be skipped at any time. Therefore, the auditor must not select “none” for any major measure when modeling. If a client refuses a non-major measure, the auditor must document full justification with supporting background materials. If the client refuses a major measure—or if adequate documentation cannot be obtained—the job must be deferred. If a client refuses a higher-priority measure after work has begun, all work must stop, the unit must be inspected by a QCI, and the job must be closed out as completed.

A **package of weatherization measures** includes the total cost of all ECMs and their associated IRMs in an audit. Each ECM’s cost must include its required ancillary items. All IRM costs are added to the package when calculating the total package SIR for the project. Health and Safety (H&S) measures are exempt from cost-justification and are not included in the SIR calculation or in the ACPU for DOE funds.

The **Savings to Investment Ratio (SIR)** is calculated by dividing the present value of a measure’s lifetime energy savings by the total present value of the cost to install that measure, including discounted savings and fuel-escalation rates. Each ECM must have an SIR of 1.0 or greater to be included in the package of

weatherization measures. The entire package of weatherization measures, including IRMs, must also have a cumulative SIR of 1.0 or greater to qualify for WAP funding.

An **Energy Conservation Measure (ECM)** is any installation performed to achieve energy savings. ECM costs must include all materials, labor, and ancillary items. To be installed with WAP funds, an ECM must have a Savings to Investment Ratio (SIR) of 1.0 or greater, except for air sealing, which may be installed regardless of SIR

A **Health & Safety Measure (HSM)** is any action taken to remove or address a health or safety hazard that must be corrected either before weatherization work can be performed effectively or because of weatherization work. H&S measures do not require an SIR of 1.0 or greater, and they are not included in SIR calculations or in the Average Cost Per Unit (ACPU). For guidance on allowable H&S measures and costs, refer to the current IHEDA DOE-approved Health and Safety Plan, developed in accordance with DOE WPN 22-7.

An **Incidental Repair Measure (IRM)** is a repair necessary for the effective performance or preservation of newly installed weatherization materials but is not part of a standard installation. IRMs must be directly tied to a specific ECM or group of ECMs in the package of weatherization measures installed. IRM costs must be included in the SIR calculation for the total package of weatherization measures. Repairs made only to protect existing materials in the home are not allowable as IRMs.

The client file must include photos and a written explanation justifying each IRM and demonstrating why it is necessary for the performance or preservation of an installed ECM. IRM costs that do not meet the definitions in DOE regulations and WPN 19-5 are subject to review and may be deemed unallowable.

Section 3: LITT WAPLink & Weatherization Assistant 10-API (Wav10)

Indiana Housing and Community Development Authority (IHEDA) uses LITT's WAPLink tool, which integrates directly with the WAv10 API for reporting and energy auditing developed by the Oak Ridge National Laboratory (ORNL). The WAv10 libraries accessed through this API align with the requirements of this manual and the DOE-approved Energy Audit Memo. Any reference to NEAT or MHEA reflects the WAv10 libraries delivered through LITT's API. For guidance on using WAPLink's audit features, refer to the **IHEDA WAPLink User Guide**.

Section 4: Key Parameters

Ensure all key parameters are correct. Subgrantees may maintain only two key-parameter libraries: one for NEAT and one for MHEA. Any updates or additions must be made by expanding the existing NEAT or MHEA library rather than creating new libraries.

- Economics
 - Real discount rate 2%
 - 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
 - Each Duct Insulation added should be R-8 in the Duct Section WAPLink's NEAT run.
 - Water heater wrap added R-value R-11
- 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 are 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.)
 - If replacing a window, the file must contain photographs of the existing window in place
- Insulation values must meet SWS standards
- Density must match what is installed.
- Bag size must match the manufacturer's specifications.

Section 5: Economic Parameters

IHCDA must use economic parameters that match the current Fuel Price Indices for electricity, natural gas, and propane. Subgrantees are required to archive any outdated or unused economic parameters to ensure that only current fuel-cost data is applied

Fuel Costs

IHCDA will provide annual statewide fuel-cost averages for propane (LPG), fuel oil, and coal using data from the U.S. Energy Information Administration (EIA). LPG, kerosene, and fuel oil costs will be calculated by averaging the state's weekly heating-season prices. Wood costs will be based on the most recent economic averages provided by ORNL in WAv10. IHCDA will also provide each subgrantee with a single fuel cost for natural gas and electricity, based on the primary utility serving the majority of their territory.

In the example below, Duke would be selected as the electric fuel cost at the start of the program year because it serves the majority of households within the subgrantee's territory.

Vendor (name)	Rate (\$)	Service Population (%)
Duke	\$0.13	43%
AEP	\$0.15	34%

Sources

NG Sources
Electric Sources
Discern from CP Vectren and South
EIA State Propane
Conversion source
Electric Service Territories
Gas Service Territories
Electric Service Territories
EIA State Fuel Oil Source
EIA Coal Average for Indiana 2023
EIA US Kerosene 2022

Each one of the rates to the left are the yearly average (electricity from the IURC survey for the year of 2025, the year leading up to PY26; for NG the survey is done monthly so the annual average is based on the months from June 2025 to May 2026). All other fuel types (propane, kerosene, fuel oil, coal, wood, and other) are derived during the heating months of June to the end of May from the EIA. Their fuel rate is provided EIA, with the exception of wood (provided by ORNL US Averages).

Table A-1 - Agency Specific Fuel Cost Breakdown, Electric

Subrecipient	Provider	Cost Rate (\$/kWh)
Area IV	DUKE	\$0.16
CAGI	AES	\$0.16
BP-CANI	AEP	\$0.17

CASI	DUKE	\$0.16
CAPWI	DUKE	\$0.16
CAPE	CP	\$0.22
Tri-CAP	CP	\$0.22
HUEDC	DUKE	\$0.16
ICAP	DUKE	\$0.16
Heartland	DUKE	\$0.16
LHDC	CP	\$0.22
NCCAA	NIPSCO	\$0.23
CoAction	NIPSCO	\$0.23
OVO	DUKE	\$0.16
REAL	AEP	\$0.17
SCCAP	DUKE	\$0.16
SIEOC	DUKE	\$0.16
PACE	DUKE	\$0.16
WICAA	DUKE	\$0.16



Table A-2 - Agency Specific Fuel Cost Breakdown, Natural Gas

Subrecipient	Provider	Cost Rate (\$/MCF)
Area IV	CP (Vectren)	\$10.61
CAGI	CITIZENS	\$9.39
BP-CANI	NIPSCO	\$11.52
CASI	CP (Vectren)	\$10.61
CAPWI	CP (Vectren)	\$10.61
CAPE	CP (South)	\$13.72
Tri-CAP	CP (South)	\$13.72
HUEDC	CP (Vectren)	\$10.61
ICAP	CP (Vectren)	\$10.61
Heartland	CP (Vectren)	\$10.61
LHDC	CP (South)	\$11.66
NCCAA	NIPSCO	\$11.52
CoAction	NIPSCO	\$11.52
OVO	CP (Vectren)	\$10.61
REAL	NIPSCO	\$11.52
SCCAP	CP (Vectren)	\$10.61
SIEOC	Sycamore	\$13.28
PACE	CP (South)	\$13.72
WICAA	CP (Vectren)	\$10.61

All other fuel types listed in Table B (propane, fuel oil, coal, and wood) are derived from EIA data for the heating months of October through March, when monthly data is available. These fuel rates are provided by EIA, except for wood, which is based on ORNL U.S. averages. The sources used to determine these fuel costs are listed below.

Table B - State Fuel Costs Breakdown

Other Fuels	Cost	Unit
Propane	\$2.06	Gal.
Kerosene (2022)	\$3.31	Gal.
Coal	\$60.96	Ton
Fuel Oil	\$3.53	Gal.
Wood	\$350.00	Cord

Section 6: Fuel Switching

Subrecipients are allowed to change or convert a fuel source on furnaces or appliances on a limited, case-by-case basis, per [WPN-23.6](#). Subrecipients must receive approval from IHCD to perform a fuel switch.

Weatherization work on the unit must not continue until written fuel-switch response is issued by IHCD.

IHCD's response must be placed in the client file, whether the request was approved or not. Each request must be submitted via e-mail and contain the following documentation:

- The reason(s) the fuel switch is needed
- The current fuel source
- The new or different fuel source
- Combustion Air Zone (CAZ) testing results
- Draft testing results where applicable and digital photographs where possible
- The cost to the client based on the switch to new utility versus the cost with replacing the install
- The proposed funding source for switching the unit

Formula DOE/IIJA-Funded Fuel Switching

Formula DOE/IIJA-funded fuel switches must follow DOE rules for approval from IHCD and DOE; any other funding source used for fuel switches requires approval from IHCD. If a subrecipient determines the need to install a heat pump, as a fuel switch or otherwise, outside of DOE's SWS "Energy Star Certified or Equivalent" rating, they may do so with funding other than Formula DOE/IIJA with approval from IHCD.

Section 7: Library Measures

Library measures including pricing shall be updated annually.

Sub-grantees may only install LED lighting. CFL 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.

Section 8: 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

All measures must be consistently marked as Active or Inactive, and the same lifetimes must be applied across all libraries. Each Measure Cost library should be labeled clearly and descriptively to avoid confusion and ensure consistent use by all subgrantees.

Section 9: Itemized Cost

Do not use itemized costs to model major ECMs. Accurately determining energy savings for a specific measure is difficult without an energy modeling tool, and any savings entered in the itemized cost section will not interact with other building components. This often leads to overstated savings and inaccurate results.

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 F to 120 F with an energy factor of 0.6 for gas heaters and an energy factor of 0.9 for electric heaters. Do not replace a lower flow aerators with a higher flow aerator!

Energy saved by appliance:

- Gas - 0.328 MBtu
- Electric - 0.218 MBtu

Section 10: Insulation Types

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

Section 11: Air Conditioning Information

Air conditioning information is required to be entered into NEAT/MHEA; 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:

- Degraded Efficiency = (Base EFF) * 0.99^{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
- Degraded SEER = $10 * 0.99^{20}$
 - Use Scientific Calculator
 - Type in $10 * .99$
 - Select function button x^y
 - With the function selected, type 20

- Calculate and receive 8.17906, round to the last two decimal places
- Degraded SEER = 8.18
- To Calculate this, you will need to use the algebra function xy

Section 12: Evaluate Duct Sealing

Subgrantees must follow IHCD's instruction in this manual when measuring duct seal leakage in single-family site-built and manufactured homes by selecting the check box "Evaluate Duct Sealing" under Ducts and Infiltration Section of statewide auditing tool. The goal of addressing duct leakage should be to aim for a 300 cfm reduction of leakage. The option that is encouraged to be used to evaluate duct seal leakage is the "Whole House Blower Door Method" (WAPLink pictured below):

The screenshot shows the WAPLink software interface. At the top, the title bar reads "WAPLink Job / Area IV - Area IV-24-350 - Duck, Daisy". Below the title bar, there are buttons for "Save", "Cancel", and "Delete". The main area contains several input fields and checkboxes:

- Job Number:** Area IV-24-350
- Current Stage:** Closeout
- Assigned Auditor (*):** Boyer, David
- Assigned Inspector:** (empty field)
- Base Funding:** 2023 DOE REG Base - DOE
- Event Type:** Audit
- Agency Code:** (empty field)
- Checkboxes:** NEAT (checked), MHEA, Other, Deferral, Priority List.
- Buttons:** Work Orders, Inspection, QCI, Job Economics, Funding, Lock.

Below these fields is a grid of buttons for different categories:

- WA 10 Settings, Health & Safety, ASHRAE 62.2, Missing Items, Run WA 10 Engine
- Housing Items** (circled in red), Notes, Deferral Issues, Stage History, + WA 10 Reports

The "Housing Items" button is expanded to show a grid of categories:

- WALL, WINDOW, DOOR, UNFINISHED ATTIC
- FINISHED ATTIC, FOUNDATION, HVAC, DUCTS
- INFILTRATION** (circled in red), WATER HEATER, REFRIGERATOR, LIGHTING

On the right side, there is a "Records Found" table with the number "2" visible.

Select "Duct Leakage Method"

When evaluating duct operating pressures, use the respective following testing method:

- **Site built homes:** Using a static pressure probe and a manometer, measure the pressure before the filter on the return side and after the coil on the supply side with the air handler on. If the air handler is in an attic, crawl space, or enclosed room, take the pressure with reference to the house or pressure relieve that space.
- **Manufactured home:** Using a static pressure probe and a manometer, take the pressure to the closest supply on either side of the air handler and average the two. There are no returns in mobile homes.

It is required to input the duct pressures into WAv10/WAPLink on the infiltration screen. Target pressures should add at least 5 Pascals to the initial measurement. This step is a crucial part of the evaluation process when choosing to use the whole-house Blower door method.

Section 13: Proper Work Orders

The NEAT/MHEA “Measure Report” is not a proper Work Order. A complete Work Order must be in the client file and provided to the Weatherization Professionals performing the work. Work Orders must give crews and contractors enough detail to clearly understand the scope of work and the materials required. A Work Order may be generated from WAPLink or through another system the subgrantee uses. If using a WAPLink Work Order with notes, this constitutes a proper Work Order when paired with invoices. If using a system outside of WAPLink, all necessary details must be included and made available upon request or during monitoring.

Section 14: Actual Costs & Estimated Costs

Ensure that actual costs remain close to the estimated library costs. When actual costs differ significantly, measures that were originally cost effective may become non cost effective, which can result in a disallowed measure and potential payback. Auditors must pay close attention to measures with SIR values near 1 to ensure actual costs do not exceed library costs. If they do, use the Additional Cost fields to account for the

difference.

All runs must be reconciled when there are significant cost differences in the ECMs installed. If an ECM is removed from the run, a new run must also be performed. This will be reviewed during monitoring, and the subgrantee must be confident that the package SIR will remain above 1. Notes must also be entered explaining the reason for any measure removal or cost difference.

Section 15: Incidental Repairs

Ensure that all incidental repairs are modeled to be included in the 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 should appear as the first measures on the Recommended Measures Report when modeled correctly. If they do not, recheck your inputs—this indicates something in the inputs is incorrect.

Entering in an IRM into WAPLink

Go into the Itemized module

Base Funding
DOE

WA 10 Settings Health Safety ASHRAE 62.2 Missing Items Run WA 10 Engine
+ Housing Items Notes Deferral Issues Itemized + WA 10 Reports

Type	Last Updated	Total Records Found
Wall	04/27/2026 01:12 PM	8
Window	04/27/2026 02:34 PM	8
Door	04/27/2026 03:13 PM	2
Ducts	04/27/2026 02:12 PM	1
UnFinished Attic	04/27/2026 03:20 PM	1
Foundation	04/27/2026 03:22 PM	1
HVAC	04/27/2026 01:43 PM	1
Lighting	04/27/2026 02:29 PM	1
Air/Duct Leak	04/27/2026 02:16 PM	1
Water Heating	04/28/2026 09:50 AM	1

Check the Manual Measure button and then type in the IRM. Clearly identify the ECM that the IRM supports. Refer to WAP Policy & Procedure Manual and WAP Field Guide for full requirements.

Measure for Housing Item / CAGI - CAGI 24-535 - JACKSON, MARIETTA

New Save Cancel Delete

Location	Measure	Cost	Include SIR
Health and Safety	Bathroom Exhaust Fans - Missing	\$750.00	<input type="checkbox"/>

Measure

WAPLink Measure Manual Measure Health and Safety Itemized ECM Include in SIR IRM

Measure Description (*)
Fix roof leak around chimney — IRM to attic insul

Cost: 250 Material Cost: 100 Labor Cost: 150

Energy Savings: Energy Unit: Life: Fuel: Materials:

When an IRM is entered correctly, it will populate at the top of the Recommended Measures list and will be included in the cumulative SIR.

Audit View - CAGI-24-535

Audit Run: Section to View:

WAPLink View ORNL View Excel Export

Group	Index	Recommended	Components	Measure	Measure Cost	Measure	Cumulative
IRM	1	Fix roof leak around chimney — IRM to attic insul	IRM		\$250.00		
ECM	2	Lighting Retrofits	All	\$317.91	\$120.00	9.11	2.950
	3	Attic Insulation R49	All	\$462.89	\$1,800.00	2.88	2.890
	4	General Air Sealing		\$64.19	\$450.00	0.64	2.510
H&S	5	Bathroom Exhaust Fans - Missing	H&S		\$750.00		
Total					\$3,370.00		2.510

Section 16: Lifetime of Measures

Refer to table 9.2 in attachment 9 from [WPN 23-6](#) for all other allowed lifetimes.

Subrecipients should use the lifetime measures in the table below:

Measure	Lifetime
Attic insulation—see 1 below	30
Wall Insulation—see 2 below	30
Floor Insulation—see 3 below	20 or 30
Knee Wall Insulation—see 3 below	30
Fossil Fuel Furnaces & Boilers—see 4 below	20
Heating system replacement (NEAT): all other heating systems (except heat pumps)	18
Heat pump replacement	15

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. As WAweb does not allow a different measure lifetime dependent on which floor insulation is installed, the Grantee must use a 20-year lifetime for floor insulation. If a Subgrantee will never use fiberglass batt to insulate floors, then they may be allowed to use a 30-year lifetime.
 - a. Batt insulation for floors is not required to be installed in an airtight cavity per Indiana's Field Guide Section 6.3.3.
 - b. Loose insulation must be installed in an airtight cavity per Indiana's Field Guide Section 6.3.2.
4. Applies to standard and condensing fossil fuel fired units
 - a. In the DOE-approved energy auditing tool, this lifetime will default to 15 years.
 - b. If replacing fossil fuel fired furnaces and boilers, standard and condensing units on a single-family home (NEAT), then subgrantees must increase the lifetime to 20 when in the audit.

- c. If replacing fossil fuel fired furnaces and boilers, standard and condensing units on a manufactured home (MHEA), then subgrantees must keep the lifetime at 15 when in the audit.

Section 17: Blower Door Goals

IHCDA has adopted the following air sealing targeted goals for all units:

- If ACH50 is less than 11, the blower door reduction goal is 15%
- If ACH50 is 11-17, the blower door reduction goal is 25%
- If ACH50 is 18-22, the blower door reduction goal is 35%
- If ACH50 is greater than 22, the blower door reduction goal is 40%

EXAMPLE: A house has a blower door reading of 1550 cfm. The volume of the unit is 7,840 cubic feet. To calculate the ACH50, use the formula below:

$$\text{ACH50} = \frac{\text{CFM50} \times (\text{60 minutes/hour})}{\text{volume of unit}}$$

$$\text{ACH50} = \frac{1550 \times 60}{7840} = 11.86 \text{ (round to 12)}$$

So, for this house, the target blower door reduction is 25%. To calculate the target blower door number, use the formula below:

$$\text{BD Target} = \text{BD Reading (cfm)} \times (1 - \text{BD reduction goal \%})$$

$$\text{BD Target} = 1550 \times .75 = 1,162.5 \text{ (rounded to 1,163 cfm)}$$

The BD Target is the minimum number to achieve the 25% targeted reduction.

Section 18: Refrigerators

The following must be recorded in the client's file:

- Photo of original refrigerator, data plate, and cubic feet storage volume
- Photo of new refrigerator, data plates, and cubic feet storage volume
- Photo of the meter reading or document the use of the [Refrigerator and Freezer Database](#)

The following standards must be met:

- Cubic feet volume may not be increased
- Features may not be upgraded
- Must fit existing space of old refrigerator
- No replacement of freezer units only
- Must be Energy Star
- Must have SIR of 1 or greater
- Must be run through the approved Energy Audit tool for the associated housing type
- Can be a downgrade in cubic feet volume size if client agrees to such.
- Must be disposed of in compliance with EPA standards

Some clients use two or more refrigerators in their dwellings, and this practice results in high electricity usage. Suggest to these clients to consolidate food storage into a large single refrigerator.

Section 19: Window Leakiness Guidance

The "Leakiness" data field in the Weatherization Assistant is found under the "Windows" tab of both NEAT

and MHEA. The “Leakiness” field allows the user to describe the existing air leakage characteristics of each window entered. This input is used to calculate the energy savings due to reduced air infiltration for three window retrofit measures: window replacement, storms windows, and window weatherization (i.e., sealing). For each window retrofit measure, NEAT and MHEA add the energy savings due to reduced air infiltration to other energy savings associated with the measure to obtain the total energy savings.

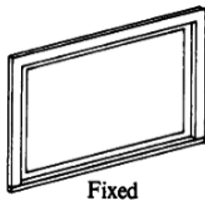
Five options are allowed under the “Leakiness” data field: Very Tight, Tight, Medium, Loose, and Very Loose. Guidance on the applicability of these options is provided below for each of the various window types that can be specified in NEAT and MHEA: Jalousie, Awning, Slider, Fixed, Door Window, Sliding Glass Door, and Skylight. The options that are typical for windows encountered in homes served by the Weatherization Assistance Program are also identified.

The guidance provided below is based primarily on the condition of the frame, sashes, and weatherstripping. Once a leakiness level is selected using the guidance below, it should be modified as follows to take into account the condition of the window panes and the presence of a storm window:

- Condition of window panes
 - No adjustment should be made if the window pane is cracked or if less than 2 sq. in. of glass is missing in the window (e.g., up to about a 1.5” diameter hole or a 1.5”x1.5” glass section).
 - Degrade the leakiness one level if 2 to 9 sq. in. of glass is missing in the window (e.g., about a 1.5” to 3.5” diameter hole or a 1.5”x1.5” to 3”x3” glass section).
 - Degrade the leakiness two levels if 9 to 25 sq. in. of glass is missing in the window (e.g., about a 3.5” to 5.5” diameter hole or a 3”x3” to 5”x5” glass section).
 - Specify the window to be Very Loose if more than 25 sq. in. of glass is missing in the window (e.g., a hole bigger than about a 5.5” diameter or a 5”x5” square).
- Presence of storm window — Upgrade the leakiness one level if a storm window in average or better condition is installed.

Fixed Window, Door Window, and Skylight

Fixed-type windows are sealed in their frames and cannot be opened. Fixed-type windows include large picture windows, decorative windows in doors, and most skylights (i.e., windows in the ceiling). *The leakiness of a typical fixed window, door window, or skylight is **Very Tight**.*



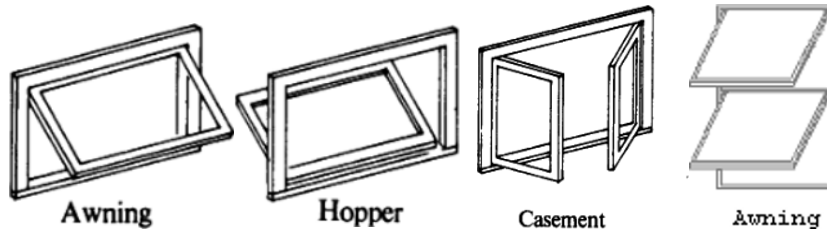
Awning Window (Including Hopper and Casement Window)

The awning window type used in NEAT and MHEA includes hopper and casement windows. Most awning, hopper, and casement windows have just a single sash, although casement windows can have two sashes and awning windows can have two or three sashes. The sash of an awning window is hinged at the top of the window frame and opens outward and upward. The sash of a hopper window is hinged at the bottom of the window frame so that the window tilts open at the top. The sash of a casement window is hinged on the side of the window frame and swings out right or left. On a casement window with two sashes, a vertical framing member is often present in the middle of the window that houses a locking mechanism (not shown in the figure below).

These types of windows are often operated by a cranking mechanism. In awning and hopper windows with two or three sashes, a common crank is usually present so that the sashes open and close together at the

same angle. When closed, the sashes press against the window frame and any installed weatherstripping to form a seal. In windows with multiple sashes, the sashes are usually designed to fit together at their interface when closed to form a tight seal. A lock or latch is usually present that further helps seal the window by drawing the sashes tightly against the frame, each other, and/or any installed weatherstripping.

Awning, hopper, and casement windows with a single sash are generally tighter than other types of moveable windows. *The leakiness of a typical single-sash awning, hopper, or casement window is **Tight**, while the leakiness of a typical multiple-sash awning, hopper, or casement window is **Medium**.*



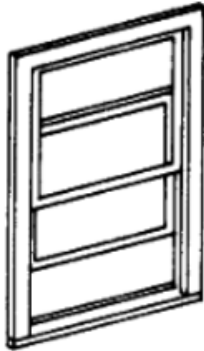
- Very Tight — The sashes and window frame fit together snugly to form a complete seal when the window is closed. The sashes and frame are in excellent condition, or they can be in average condition if weatherstripping in good condition is also present. The cranking and locking mechanisms are typically operable and assist in securely pulling the sashes and window frame together. Typical of a new window.
- **Tight (typical of a window with a single sash) — No visible gaps are observed between the sashes or between the sashes and the window frame when the window is closed. The sashes and frame are in average condition. Weatherstripping can be absent or deteriorated. The cranking and locking mechanisms are typically operable and assist in securely pulling the sashes and window frame together.**
- **Medium (typical of a window with multiple sashes) — Small gaps up to 1/8 in. are observable between the sashes and/or between the sashes and the window frame when the window is closed, even with the aid of a locking mechanism. The sashes and frame are in average to poor condition. Weatherstripping is usually absent or deteriorated.**
- Loose — Gaps up to 1/4 in. are observable between the sashes at their interface when the window is closed as much as the cranking and locking mechanism allow, and/or gaps up to 1/2 in. are observable between the sashes and the window frame when the window is closed. The sashes and frame are in poor condition, and may be warped or not square. Weatherstripping is absent or ineffective.
- Very Loose — Gaps 1/4 in. or greater are observable between the sashes at their interface when the window is closed, and/or gaps 1/2 in. or more are observable between the sashes and the window frame when the window is closes. The sashes and frame are in very poor condition and are likely warped or not square. Weatherstripping is absent or ineffective. The locking mechanism may not be able to be engaged.

Slider Window and Sliding Glass Door

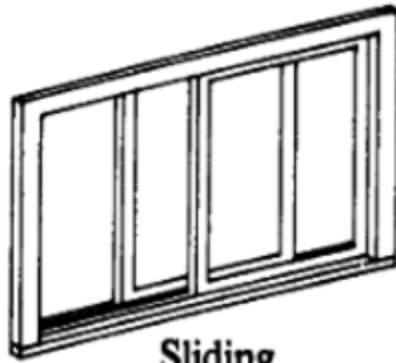
A vertical slider window has at least one sash that slides up and down within the window frame. In a double-hung slider window, both sashes slide vertically past one another. Only the bottom sash slides up and down in a single-hung slider window. A horizontal slider window (designated as “Sliding” in the figures) or sliding glass door has at least one sash that slides horizontally within the window or door frame. A locking mechanism is often present on a slider window that draws the two sashes together at their interface and helps press each moveable sash into the window frame.

Horizontal slider windows and sliding glass doors are usually in poorer condition and, thus, leakier than

comparable vertical slider windows. *The typical leakiness of an original double- or single-hung vertical slider window is **Medium** if installed in a house built in the 1960s and before, and **Tight** if installed in a house built in the 1970s and after. The leakiness of a typical horizontal slider window or sliding glass door is **Medium**.*



Double or single-hung



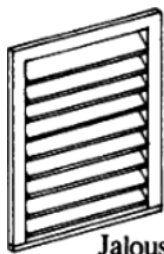
Sliding

- **Very Tight** — The moveable sashes and window frame fit together tightly as designed when the window is closed such that no gaps are present. The sashes and frame are in excellent condition. Each moveable sash is secure and tight in its track. The moveable sashes are able to be closed such that the window locking mechanism can be fully engaged. Weatherstripping is present and in good condition. Typical of a new window.
- **Tight** (typical of an original double- or single-hung vertical slider window installed in a home built in the 1970s or later) — No visible gaps are observed between the sashes or between the moveable sashes and the window frame when the window is closed. The sashes and frame are in average condition. Each moveable sash is secure in its track although some play may be present. The moveable sashes are able to be closed such that the window locking mechanism can be engaged, although perhaps not fully. Weatherstripping is present and in good to fair condition.
- **Medium** (typical of an original double- or single-hung vertical slider window installed in a home built in the 1960s or earlier, a horizontal slider window, or a sliding glass door) — Small gaps up to 1/8 in. are observable between the sashes at their interface and/or between the moveable sashes and the window frame when the window is closed. The sashes and frame are in average condition. Each moveable sash is operable in its track although some play is likely. The moveable sashes may not sit perfectly horizontal or vertical when closed. The locking mechanism may not be able to be engaged. Weatherstripping is absent or deteriorated.

- Loose — Gaps up to 1/4 in. are observable between the sashes at their interface when the window is closed, and/or gaps up to 1/2 in. are observable between the moveable sashes and the window frame. The sashes and frame are in poor condition. Each moveable sash may be loose in its track. The moveable sashes likely do not sit horizontal or vertical when closed. The locking mechanism may not be able to be engaged. Weatherstripping is absent or ineffective.
- Very Loose — Gaps 1/4 in. or greater are observable between the sashes at their interface when the window is closed, and/or gaps 1/2 in. or more are observable between the moveable sashes and the window frame. The sashes and frame are in poor condition. Each moveable sash may no longer fit in its track. The moveable sashes likely do not sit horizontal or vertical when closed. There may be considerable movement (rattling) between sashes. The locking mechanism is likely to be inoperative. Weatherstripping is absent or ineffective.

Jalousie Window

A jalousie window is made up of multiple horizontally-mounted glass louvers or slats. The glass louvers are usually 3" to 5" wide and are mounted in a metal panel. A crank typically rotates the glass louvers outward like a shutter when open. The glass louvers overlap each other slightly when closed. *The leakiness of a typical jalousie window is **Loose**.*



Jalousie

- Very Tight — Generally not applicable to jalousie windows.
- Tight — Generally not applicable to jalousie windows.
- Medium — A tight glass-to-glass seal is visually obtained at the overlap of all the glass louvers when the window is closed. The cranking mechanism is in good working order. All window panes are securely attached to the cranking mechanism. Typical of a new window.
- **Loose (typical) — Small gaps up to 1/8 in. are observable between the glass louvers when the window is closed. One or two of the glass louvers may not be securely attached to the cranking mechanism. The cranking mechanism may not be able to fully rotate the glass louvers to their fully closed position.**

Very Loose — Gaps 1/8 in. or greater are observable between the glass louvers when the window is closed. Multiple glass louvers may not be securely attached to the cranking mechanism. The cranking mechanism is likely not able to fully rotate the glass louvers to their fully closed position

Section 20: ENERGY STAR Equipment

Ensure that ENERGY STAR–rated equipment is modeled correctly in WAPLink, consistent with DOE Program Notices.

Policy Statement:

- All HVAC equipment installed must meet Energy star or equivalent rating, must be modeled in WAPLink (NEAT, MHEA, WA v10) as installed, with site-specific inputs reflecting the ENERGY STAR designation. (**Electric furnaces don't** meet Energy star or equivalent rating)
- Measure eligibility is determined by Savings-to-Investment Ratio (SIR \geq 1). ENERGY STAR designation alone does not guarantee eligibility; it must be modeled accurately to demonstrate cost-effectiveness.
- When ENERGY STAR equipment is selected, documentation must include manufacturer

specifications and ENERGY STAR certification.

- Co-funding or buy-downs involving ENERGY STAR equipment must follow **WPN 22-9**, with DOE funds applied only to the ECM portion.
- Measure lifetimes for ENERGY STAR equipment must align with **WPN 23-6** defaults unless otherwise approved by DOE.
- Monitoring staff will verify that ENERGY STAR designation is correctly modeled, documented, and supported by procurement records.

Monitoring-Ready Statement: “ENERGY STAR equipment must be modeled in DOE-approved audit tools with site-specific inputs. Documentation must demonstrate $SIR \geq 1$, compliance with WPN 19-4, 22-9, and 23-6, and adherence to 2 CFR 200.318 procurement standards. DOE funds may only be applied to the ECM portion of the measure.”