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# ATTACHMENT 1
# ENERGY AUDIT TOOL SUBMITTAL REQUIREMENTS

## BASIC OUTLINE FOR EXPEDITED AUDIT SUBMISSION

Grantees must submit the following documentation for all Expedited audits listed in Attachment 3. Standard audit submittals include these items and the additional items outlined in Section IV.

1. A formal request (e.g., email, letter) to DOE for approval of the specific audit tool for use in the WAP program including the dwelling type it will be used for.
2. A list of all measures considered by the audit for installation as Energy Conservation Measures (ECMs) including:
    a. Lifetimes used to analyze the cost-effectiveness of each installed measure
    b. Discount rate used in future savings estimates
    c. Statement of compliance with 10-CFR 440 Appendix A
    d. Any Special Materials Requests as outlined in Attachment 6
3. Any Special Audit Procedure requests (e.g., Grantee administered fuel-switching, solar photovoltaics (solar PV), etc.)
4. Fuel cost for all fuel types considered by the energy audit including Grantee's procedure for updating fuel costs.
5. A list of General Heat Waste (GHW) measures (if any).
6. Energy Audit Policies and Procedures, including:
    a. Field operations manual
    b. Field data collection forms
    c. Combustion safety protocols
    d. Ventilation calculator
    e. Health and safety plan
    f. Energy audit software user's manual
    g. Technical standards for energy auditors

## DETAILED DESCRIPTION OF SUBMITTAL REQUIREMENTS

The following requirements from 10 CFR 440.21 apply to ALL submittals for energy audit tool approval or reapproval. For audit tools listed in Attachment 3: Expedited Energy Audit For WAP, no other requirements apply. For all other energy audit tool submissions, additional requirements are found in section VI (Analytic Method) below.

### I. Modeling Software Analysis

*A.* *Measures Considered*: Pursuant to 10 CFR 440.21(d), provide a complete list of the weatherization measures typically enabled for evaluation by the energy audit tool which includes the expected lifetime used in the savings to investment ratio (SIR) calculation of each measure. Provide an explanation of how WAP funded Incidental Repair Measures (IRM), GHWs, and H&S Measures will be categorized, recorded, and entered in the energy audit software and the work order.

B. *Fuel Costs*: Pursuant to 10 CFR 440.21(d), provide the base fuel costs used for evaluation of measures by the energy audit tool and cost modifiers as allowed by DOE guidance (e.g., Social Cost of Carbon).
C. *Discount Rate:* Pursuant to 10 CFR 440.21(d), provide the discount rate percentage used in the future cost-savings estimates used by the energy audit tool, including fuel price indices utilized.

## II. Field Procedures

A. *Field Procedures and Protocols*: Pursuant to 10 CFR 440.21(f)4, provide field assessment policies and procedures (e.g., field operations manual, field data collection forms, technical standards) used for data collection. Procedures are required for each building type the energy audit tool will serve. The following criteria is used to determine compliance:
   1. Do field assessment policy and procedures require sufficient field data collection to accurately model dwelling units?
      - All required energy audit tool data entries are visually and/or diagnostically field verified and documented?
      - Building diagnostics address all measures considered by the energy audit?
      - Combustion safety testing procedures cover all combustion appliances?
   2. How do energy auditor assessments affect the auditor's actions and recommendations?
      - Is policy and procedure provided to correctly identify the thermal and pressure boundary of the dwelling unit?
      - Is policy and procedure provided to ensure consistent measure selection including target values (e.g., infiltration and duct sealing targets, insulation R-value targets, etc.)?
   3. What advanced diagnostic and assessment techniques are routinely used by the energy auditor and/or crew?
      - Is policy and procedure provided to ensure accurate building diagnostics are performed for every dwelling unit?
      - Are combustion safety testing procedures complete?
   4. Are energy audit policy and procedures tailored for the building type being served?

## III. Energy Modeling Procedures

A. *Modeling Procedures:* Pursuant to 10 CFR 440.21(f)6, provide a detailed description of the energy modeling policy and procedure (e.g., Grantee-specific energy audit tool user's manual) which details how energy auditors are to complete all aspects of data entry to satisfy both Grantee and DOE requirements.
B. *Documentation for Non-Energy Conservation Measures:* Pursuant to 10 CFR 440.21(d), explain how DOE funded IRMs, GHW and H&S measures are to be entered into the energy audit tool. For any of these categories, if entry into the energy audit is not required, describe how and where these measures will be documented. For IRMs not entered in the audit, explain how compliance with 10 CFR 440.21(d) is ensured.
C. *Building Model True-up with Actual Energy Bills:* Pursuant to 10 CFR 440.21(f)2, provide policy and procedures for trueing up multifamily buildings through actual dwelling unit energy bills. For all other dwelling types, DOE encourages Grantees to utilize energy modeling true-up using site-specific utility bills but does not require it.

## IV. Work Orders & Materials

A. *Energy Audit Based Work Scope Development:* Pursuant to 10 CFR 440.21(f)6 and WPN 22-4, provide policy and procedures for work order requirements which demonstrate energy audit results are accurately integrated into a complete scope of work including:
   1. Detailed performance and installation requirements/objectives to be included in crew/contractor work orders from the completed energy audit, including R-values, U-values, installed equipment efficiencies, infiltration and duct sealing targets, Grantee's DOE approved Field Guides and/or SWS, etc.
   2. List of all measures performed, the funding category (e.g., ECM, IRM, H&S, GHW etc.) for each, and the funding source for each (i.e., DOE WAP, LIHEAP, etc.).

B. *Weatherization Materials Installed*: Pursuant to 10 CFR 440.21(b), provide a formal statement for each major building type (e.g., site-built single family, manufactured housing, multifamily) that acknowledges only weatherization materials that meet or exceed the standards listed in 10 CFR 440 - Appendix A will be installed in eligible dwelling units.
   1. On a Grantee-by-Grantee basis DOE may approve additional non-Appendix A weatherization materials determined appropriate for WAP. The requirements to gain such approval(s) are set forth in Attachment 6 (Special Approval of Energy Conservation Materials).
   2. This statement must include a list of any weatherization materials not in Appendix A that have been approved for Grantee use per 10 CFR 440.21(b). This list should only contain materials installed as ECMs. Ancillary materials, IRM materials as defined in WPN 19-5, as well as H&S materials, are not defined as weatherization materials, therefore are not required to be listed.

C. *GHW Reduction Lists*: Pursuant to 10 CFR 440.21(h), provide a complete list of the GHW reduction measures that the Grantee allows to be installed in eligible dwellings. DOE has determined these weatherization materials to be cost-effective, and do not require justification by a site-specific energy audit. GHW reduction materials are intended to be low-cost items that are quickly and easily installed. Total GHW measure costs (including labor) must not exceed $250. Grantees must provide procedures guiding the installation of GHW materials. DOE has approved, the following measures as GHW**:**
   1. Water heater tank wrap (i.e., insulating blanket).
   2. Water heater pipe insulation (on first six feet of hot water pipe exiting water heater).
   3. Faucet aerators.
   4. Low flow showerheads.
   5. Limited weather stripping and caulking to increase comfort (does not include major air sealing work, which should be guided by blower door testing); and
   6. Furnace or air conditioner filters.

   Grantees may request approval to install GHW materials not listed above by providing documentation of their cost-effectiveness from a representative number of site-specific energy audits or sample energy calculations. DOE may also accept reputable analytic reports or published articles that are generally accepted by the weatherization community to document the cost-effectiveness of potential GHW materials. A GHW material approval request may be submitted at any time; however, this request may not be included in the State Plan, or Annual Application submittal. Previously approved Grantee specific GHW

materials must be included in the GHW Reduction List submitted with the Energy Audit Approval request each 5-year cycle.

## V. Administrative Requirements

*A.* *Health and Safety*: Pursuant to 10 CFR 440.21(f)5, provide a description of how the approved H&S plan is implemented in the field (e.g., field operations manual, field guide, technical standards, installation standards, installation guidelines). Each major dwelling type must be addressed as applicable.

*B.* *Energy Audit Procedures Required for Each Building Type Served*: Pursuant to 10 CFR 440.21(f)(7), Grantees shall use DOE-approved energy audit procedures that are specific to each major dwelling type representing a significant portion of the Grantee's weatherization program (i.e. site-built single-family, manufactured housing, low-rise multifamily, and large multifamily). This requirement acknowledges the varying energy audit requirements of different dwelling types. DOE requires energy audit procedures to be approved specifically for use on single-family dwellings and manufactured housing at a minimum for all Grantees (except for the limited instances where manufactured housing is rare or prohibited).

1. For energy audit purposes, DOE considers multifamily buildings to be those containing five dwelling units or more (see clarifying definitions in WPN 23-04). Multiple single-family energy audits can be used in buildings with one to four dwelling units, or in vertically connected dwellings such as row homes or townhomes regardless of total number connected. Some single-family energy audits may qualify for use in low-rise multifamily dwellings, however, single family approval of a tool by itself does *not* constitute approval to use this tool in low-rise multifamily buildings. Grantees must undergo the same approval process for multifamily dwellings per this Attachment.

*C.* *Annual Review of Measure and Energy Costs*: Pursuant to 2 CFR 200, provide policies and procedures regarding the methods and frequency of measure and fuel cost updates. This update does not require the audit or priority list(s) to be re-approved more often than every five years. However, changes in measure costs or fuel prices affect the selection and order of measures.

*D.* *Software Maintenance*: Pursuant to 10 CFR 440.21(i), if a Grantee adopts an updated version of its DOE-approved energy audit software, the Grantee must submit to DOE the name and version of the updated software, and must provide at minimum:

1. Summary of the changes in the updated version, and
2. Sufficient details to determine the engineering soundness of the revision[s]. DOE may contact the software developer to determine what changes have been made. If the energy estimating methods remain essentially unchanged (or have been improved) and the software still complies with program regulations, DOE will approve its use.

**STANDARD ENERGY AUDITS: ADDITIONAL SUBMITTAL REQUIREMENTS**
Any request for DOE approval of an audit tool not listed in Attachment 3 is classified as a Standard request. The request must include the following additional information:

## VI. Analytic Methods

*A. Energy Estimating Methodology*: Pursuant to 10 CFR 440.21(f), describe the methods used by the energy audit software to estimate annual energy use of the dwelling unit and the potential energy savings. The description must provide enough detail to determine the engineering soundness of the technical approach. The Grantee may provide this description narratively or reference the appropriate sections of a users' manual for the energy audit software or other technical support documents. Whether described narratively or referenced from another document, the Grantee's submittal must answer the following questions:

1. What energy estimating method is used (e.g., modified degree-day, variable base degree day, ASHRAE bin, ASHRAE modified bin).
2. What format of climatic data is used (e.g., degree-day, bin, or hourly data)? If degree-day weather data is used, what base temperature is used and why? Which weather data sites are used by different Subgrantees?
3. Are existing energy use and energy requirements of the dwelling unit determined from actual energy bills, by generally accepted engineering calculations, or both?
4. Does the energy audit address all significant heating and cooling needs?
5. How are conductive, convective, and radiative heat losses (or gains) estimated?
6. How does the energy estimating method treat sensible and latent heat gains from internal sources?
7. How is the energy consumption of heating and cooling equipment estimated (e.g., steady-state efficiency, part-load curve) during the audit for pre- and post-weatherization?
8. How are blower door readings and the results of other tests (e.g., duct leakage) used by the energy estimating method?
9. How does the energy audit software address domestic hot water and/or household appliance measures?
10. Are estimated fuel/energy cost savings discounted to net present value?
11. For multifamily audits, what internal verification feature, such as trueing-up the model with actual energy consumption, does the audit use to validate each audit, or how does the Grantee otherwise ensure that the building is properly modeled?

*B. Measure Interaction:* Pursuant to 10 CFR 440.21(e)1, provide the following information to satisfy this requirement:

1. Describe how the energy audit tool accounts for the interaction between architectural (e.g., insulation, air sealing) and mechanical (e.g., furnace replacement, programmable thermostat) measures.
2. Provide audit results of a sample dwelling unit to document that, when moving from an architectural to a mechanical measure (or vice versa), the energy audit tool adjusts the estimated fuel cost savings of measures with lower, non-interacted SIRs. The sample audit results must show the interacted and non-interacted energy savings and SIR for at least one architectural measure and one mechanical measure. Provide a statement that the energy audit procedures will eliminate from consideration for DOE-funded installation any measure that has an interaction-adjusted SIR of less than one.

C. *Cost-effectiveness Requirements*: Pursuant to 10 CFR 440.21(d), provide the following information to satisfy this requirement:

1. Describe how SIRs are calculated for all individual weatherization measures and for the overall package of measures installed in a dwelling unit. This must include details of how fuel/energy cost savings are discounted to net present value.
2. Describe how energy conservation measures will be assigned priority in descending order of their cost-effectiveness and how those that are not cost-effective (other than air sealing) will be eliminated from the audit DOE-funded recommended measures.
3. Explain how the cost of air sealing, as an energy saving measure, is included in the SIR for the package of weatherization measures. Air sealing is the exclusive energy conservation measure that is not required to show a post-weatherization individual SIR of 1.0 or greater. The package of weatherization measures, including costs and projected savings for air sealing, must have a post-weatherization SIR of 1.0 or greater.
4. Include a description of how user-defined measures will be allowed, including who will be allowed to develop measures, the procedures for development, and how Grantee will monitor the cost-effective use of user-defined weatherization measures.
5. Describe how all incidental repair costs are included in the cost of the overall package of weatherization measures and the overall SIR (See WPN 19-5, Weatherization Assistance Program Incidental Repair Measure Guidance for more details).

# ATTACHMENT 2
# PRIORITY LIST SUBMITTAL REQUIREMENTS

## OVERVIEW

DOE is responsible for ensuring that only cost-effective weatherization measures are installed with DOE funds. Each Grantee must use advanced energy audit procedures to ensure cost-effectiveness of the WAP and treat each weatherized building as a whole system.

Priority List (PL) requirements for the WAP are described in the regulations governing the Program (10 CFR 440.21(g)). Priority List(s) are secondary to a Grantees' Energy Audit Submittal. Priority Lists cannot be approved until a Grantee has an approved energy audit for the specific housing type. See *Attachment 1* for Energy Audit Submittal Requirements.

## PRIORITY LIST DEVELOPMENT CONSIDERATIONS

***Subset of Similar Homes***: Grantees that want to use a Priority List must review eligible housing stock to determine which building characteristics dictate the selection and order of recommended weatherization measures. For example, upon evaluation, a Grantee may find that the list of recommended measures for a typical one-story ranch is different than the list for a three-story Victorian house.

The number of sample audits required to support the proposed Priority Lists depends on how clearly the Grantee defines the set of similar dwelling units for the Priority List(s). For example, if the Grantee intends to use one Priority List for all site-built single-family dwellings when there is significant variation in housing stock, climatic conditions, fuel choices, heating/cooling equipment choices, or measure costs; then a substantial number of sample audits are required to ensure measures are properly ranked.

Measures in each sample audit must be prioritized from the highest to lowest savings to investment ratio (SIR), and the overall (cumulative) SIR must be at least 1.0.

***Circumstances where the priority list does not apply and when a site-specific audit is required:***

1. If an auditor determines a measure should be considered for a dwelling, and that measure is not on the approved Priority List for that building type.
2. If an auditor determines the incidental repair measures (IRM) have a cost greater than the current limit for the Priority List.
3. Anytime fuel-switching is considered (see *Attachment 5*).

***Incidental Repair Costs*:** A cost limit for incidental repairs (WPN 19-5) must be established for each Priority List. This cost limit must be included during Priority List development and must be consistent with the total job cost, including all incidental repairs, having an SIR of at least 1.0. The sample audits required to support the proposed Priority List(s) must include costs for typical anticipated IRM to justify a maximum per unit cost of IRM for each Priority List.

**DESCRIPTION OF SUBMITTAL REQUIREMENTS**

At a minimum, any Grantee Priority List submittal must address these items:

- Describe how each Priority List was developed.
- Identify the housing characteristics of the dwellings that each list applies to.
- Describe how the subset of similar homes was determined.
- Define the circumstances that will require site-specific audits rather than the use of the Priority List.

To accomplish this, provide all input data, assumptions, and audit results (recommended measures) for dwelling units, which must include:

1. Description of the home type that the Priority List applies to, (e.g., site-built, 1- and 2-story, natural gas heated, centrally air-conditioned homes with basements that have between 1,000 and 2,500 square feet of conditioned space).
2. Complete list of the weatherization measures typically "enabled" for evaluation by the energy audit tool that was used to produce the Priority List, material and labor costs for each measure, and the expected lifetime of each measure used in the SIR calculation.
3. Fuel prices used in developing the Priority List including an evaluation of historical fuel prices to determine the minimum fuel price that should be used to ensure weatherization measures are always cost-effective.
4. Description of the circumstances in which fuel and/or materials price changes invalidate the submitted Priority List.
5. Complete printouts of the data entry into the energy audit tool.
6. Recommended measures report from the audit tool showing the entire measure cost, first-year savings, SIR for each measure, total job cost and overall (cumulative) SIR.
7. Total incidental repair cost limit that triggers a site-specific audit.

# ATTACHMENT 3
# EXPEDITED ENERGY AUDITS FOR WAP

To be on the expedited energy audit list, a software tool must be independent third-party verified for energy modeling accuracy and is currently approved for usage on DOE WAP projects.

| | **Single Family (1-4 units)** | **Manufactured Housing** | **Low-Rise Multifamily (5+units, 3 stories or less, No central mechanical systems)** | **Large Multifamily (25+ units/building of 4 stories or more, or 5+ units/building with central mechanical systems)** |
|---|---|---|---|---|
| **OptiMiser** | Developer: OptiMiser LLC, Denver, CO | | | |
| | YES | YES | NO | NO |
| **REM** | Developer: NORESCO, LLC, Boulder, CO | | | |
| | YES | YES | YES | YES |
| **TREAT** | Developer: Performance Systems Development (PSD), Ithaca, NY | | | |
| | YES | YES | YES | YES |
| **Weatherization Assistant (NEAT, MHEA, MulTEA)** | Developer: Oak Ridge National Laboratory (ORNL), Oak Ridge, TN | | | |
| | NEAT approved | MHEA approved | NEAT and MulTEA approved only for buildings with individually heated and cooled dwelling units | MulTEA approved only for buildings with individually heated and cooled dwelling units |
| "YES" means that the audit tool has been previously approved for this housing type<br>"NO" means that the audit tool has not been previously approved for this housing type or that it is not designed for this housing type | | | | |

# ATTACHMENT 4
# SOLAR PHOTOVOLTAIC (PV) IMPLEMENTATION

## OVERVIEW

This attachment serves to:

- Inform Grantees of existing regulations related to the integration of renewable technologies.
- Outline the DOE approval process for including solar PV within the WAP.
- Identify resources that will assist Grantees in the approval process.

Grantees must work with their DOE Project Officer (PO) to ensure that all materials required for approval and implementation of solar PV technologies with WAP funding are complete. Based on initial documentation provided to DOE, additional information may be requested from the Grantee.

## SOLAR PV TECHNOLOGY APPROVAL

To integrate solar PV or other renewable technologies into the WAP, Grantees must follow the standard path for non-Appendix A technology approval as described in *Attachment 6* of this guidance. This includes demonstrating that the technology *can* achieve a Savings to Investment Ratio (SIR) of 1.0 or greater in the Grantee service area, inclusion of the technology in the Grantee's Annual Plan, and a demonstration that the Grantee can integrate the technology into its energy audit protocol for the specific housing type such that a project-level analysis of the technology can generate an accurate SIR calculation.

## NEPA APPROVAL

Per the National Environmental Policy Act (NEPA) of January 1, 1970, federal agencies must assess the environmental effects of their proposed actions prior to making decisions. However, NEPA has granted a Categorical Exemption for WAP PV installations: When the PV system size is 60kW or less and the PV panels are mounted on the roof or otherwise attached to the dwelling, the system qualifies for a Categorical Exception and additional NEPA review and approval is not required. Any other PV installation in WAP requires a NEPA impact assessment, which can be coordinated with the DOE PO.

## APPROVAL PROCESS

A request to approve solar PV can be made at any time. The Grantee should provide the following items to their PO as part of the official request:

- A written request to include solar PV as an approved measure in the Grantee's program and which housing types will be considered.
- A completed Special Materials Request (Attachment 6), including maximum PV system size and installation location (i.e., roof mounted, ground mounted, or other).
- Grantee written policies applicable to solar PV energy modeling, installation, inspections, and monitoring, including:
    - A description of the process for including leveraged funds in the SIR calculation.
    - Meeting compliance with Historic Preservation requirements.
    - Requirements for Grantee, Subgrantee, and/or contractor training, qualifications, or certification.
- A sample analysis that includes solar PV as a measure in the energy modeling and cost-effectiveness calculations.
    - The analysis must be based on accurate inputs for your service territory, including applicable utility net metering rates and/or renewable energy credit (REC) rates, and measure lifespans (refer to Attachment 9 for DOE maximum lifespan).
    - The DOE Solar SIR tool can be used for this analysis (see the "Resources" section below).

- A declaration that the proposed solar PV system type or types are eligible for the NEPA categorical exclusion; OR a written process for NEPA impact assessment for solar PV installation if it is not eligible for the Categorical Exemption as described above.

It is important for Grantees to have a thorough understanding of these issues before implementing Solar PV. If a Grantee currently lacks the technical expertise to address these points accurately, it is imperative that this expertise is acquired via training or the assistance of an outside consultant before submitting a request to DOE. However, no amount of technical assistance by DOE can substitute for technical knowledge at the Grantee level.

Any questions regarding these items should be directed to the Grantee's PO. Once written approval is granted via a revised energy audit approval memo, the Grantee may begin implementation of Solar PV.

**RESOURCES:**

- **Solar PV SIR Calculator** WAP has worked with the DOE Solar Energy Technologies Office to develop an online Solar PV SIR calculator that will allow Grantees to produce a defensible analysis of the potential cost effectiveness of solar PV within their territory. Links to the analysis tool and a blog posting providing more details are below:
    - **https://www.energy.gov/eere/slsc/downloads/savings-investment-ratio-calculator-renewables**
    - **https://www.energy.gov/eere/articles/new-analysis-shows-national-potential-solar-power-low-income-communities**

# ATTACHMENT 5
# FUEL-SWITCHING SUBMITTAL REQUIREMENTS

**OVERVIEW**

Pursuant to 10 CFR 440.21(b), DOE "may approve an unlisted material upon application from any State." With prior DOE approval, fuel-switching is allowed when cost-effective or when justified for H&S reasons as required by 10 CFR 440.21(d). DOE approval for fuel switching can be achieved in two ways, either on a case-by-case basis or as a policy administered by the Grantee.

**CASE-BY-CASE FUEL SWITCHING APPROVAL**

For case-by-case fuel-switching approval, the Grantee must submit the following to its Project Officer (PO) for DOE approval:

1. A description of the proposed fuel-switch as an ECM and/or H&S and the reason for doing so.
2. A complete site-specific energy audit with all supporting documentation that either:
    a. Demonstrates fuel-switching is cost-effective when interacted with all other appropriate energy conservation measures for the building, or
    b. Properly supports the proposed switch as a H&S measure.
3. Supporting documentation must include the initial site assessment, all available photos, proposed equipment details (type, capacity, efficiency, etc.), the entire cost of the installation including ancillary equipment necessary for the fuel-switch (e.g., new natural gas lines and additional or upgraded electrical equipment), fuel costs used in the energy audit, the energy audit's input record (all costs must be modeled in the ECM evaluation), and selected measures report.

**GRANTEE ADMINISTERED FUEL SWITCHING APPROVAL**

To assume responsibility for administering the fuel-switching policy, the Grantee must submit the following information to its PO.

1. A statement in the Energy Audit Procedures section of the Grantee's Annual Plan that fuel-switching is allowable when the site-specific energy audit demonstrates the cost-effectiveness of the fuel switch over the life of the measure as indicated by the SIR.
2. A statement that if a heat pump or other combined heating-and-cooling system is to replace a heating-only (or cooling-only) system, no savings will be attributed to the previously non-existent cooling (or heating) system, but that all the costs of running the system throughout the year will be included in the audit.
3. The audit libraries that contain:
    a. All utility cost information to provide accurate data for the fuel-switch analysis
    b. The escalation rate of energy prices used in the energy audit over the life of the new measure
    c. All related charges associated with fuel-switching (e.g., permits and new or improved utility connections)
4. Demonstration of Capability: In addition to accepting the administrative burden associated with making decisions about fuel-switching, the Grantee must also demonstrate ability to analyze the information provided by the Subgrantee when a request for fuel-switching is submitted. To demonstrate this internal capability to DOE, the Grantee must submit the following documents as part of their fuel-switching policy:
    a. One complete sample audit for each type of fuel-switching scenario anticipated (e.g., one sample audit for switching from an oil furnace to a heat pump, one sample audit for switching from a gas furnace and central air conditioning combination to an electric heat

pump, etc.) with all supporting documentation that demonstrates fuel-switching is cost-effective when interacted with all other appropriate energy conservation measures for the dwelling.

b. 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.

5. If the Grantee opts to implement an internal fuel-switching policy prior to the next energy audit procedures approval cycle, the above information associated with the Grantee fuel-switch policy must be submitted as supplemental information to their respective P.O

**IMPORTANT:** A site-specific computerized energy audit must be used to demonstrate the cost effectiveness of fuel-switching and ensure that the program requirement contained in 10 CFR 440.21(d) is met to provide greater energy efficiency and reduction of energy costs for low-income clients.

# ATTACHMENT 6
# REQUEST FOR SPECIAL APPROVAL OF ENERGY CONSERVATION MATERIAL

Only the materials listed in Appendix A to CFR Part 440 are approved to use in the WAP. These materials and their specifications are listed in Attachment 7. The Department of Energy (DOE) must approve other materials. To gain approval for other materials fill out the following form completely, attach any additional information required, and send the package to your PO for review.

| 1. Grantee Contact Information | |
|---|---|
| Grantee: | Click or tap here to enter text. |
| Grantee Representative: | Click or tap here to enter text. |
| Grantee Contact Email: | Click or tap here to enter text. |

| 2. Material Request Information |
|---|
| Material requested for approval |
| Click or tap here to enter text. |
| List standard(s) that apply to material's selection. These may include ASTM, ANSI, UL, NFPA, etc. Optionally, you may attach a product cut sheet or spec sheet for review |
| Click or tap here to enter text. |
| ☐ - Alternatively, I have attached information pertaining to standards. |

| 3. Audit Justification |
|---|
| Any ECM that is to be installed with WAP funds must be cost-justified by the Grantee's computerized audit tool. To demonstrate this, Grantee must provide at least 2 audits that include the specific material listed in section 2 of this form. The submitted audits must contain the fuel costs, accurate material installation costs, lifespan of installation, and SIR of the installed material at a minimum. For some installations, other information may be required. |
| ☐ - I have attached 2 audits with all requested information. |

| 4. Priority Lists |
|---|
| Does Grantee use Priority List(s)? Yes ☐ No ☐ |
| Will the material be included in any Priority List(s)? Yes ☐ No ☐ |
| If you answered "Yes" to the second question, you must submit at least 5 computerized audits showing the materials position on each Priority List where this material is used by the Grantee. These audits must be representative of the housing stock that matches the Priority List previously approved by DOE for Grantee use. These audits must use the Grantee's currently approved audit tool. The submitted audit results must contain the fuel costs, accurate material installation costs, lifespan of installation, and SIR of the installed material at a minimum. For some installations, other information may be required. |
| ☐ - I have attached 5 audits for each priority list per instructions. |

# ATTACHMENT 7
# APPENDIX A TO PART 440
# STANDARDS FOR WEATHERIZATION MATERIALS

[58 FR 12529, MAR. 4, 1993, AS AMENDED AT 69 FR 18803, APR. 9, 2004]

## APPENDIX A TO PART 440—STANDARDS FOR WEATHERIZATION MATERIALS

The following Government standards are produced by the Consumer Product Safety Commission and are published in title 16, Code of Federal Regulations:

Thermal Insulating Materials for Building Elements Including Walls, Floors, Ceilings, Attics, and Roofs Insulation—organic fiber— conformance to Interim Safety Standard in 16 CFR part 1209;

Fire Safety Requirements for Thermal Insulating Materials According to Insulation Use—Attic Floor—insulation materials intended for exposed use in attic floors shall be capable of meeting the same flammability requirements given for cellulose insulation in 16 CFR part 1209;

Enclosed spaces—insulation materials intended for use within enclosed stud or joist spaces shall be capable of meeting the smoldering combustion requirements in 16 CFR part 1209.

The following standards which are not otherwise set forth in part 440 are incorporated by reference and made a part of part 440. The following standards have been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. These materials are incorporated as they exist on April 5, 1993 and a notice of any change in these materials will be published in the FEDERAL REGISTER. The standards incorporated by reference are available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: http://www.archives.gov/federallregister/codeloflfederallregulations/ibrllocations.html.

The standards incorporated by reference in part 440 can be obtained from the following sources:

Air Conditioning and Refrigeration Institute, 1501 Wilson Blvd., Arlington, VA 22209; (703) 524–8800.

American Gas Association, 1515 Wilson Blvd., Arlington, VA 22209; (703) 841–8400.

American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018; (212) 642–4900.

American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017; (212) 705–7800.

American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103; (215) 299–5400.

American Architectural Manufacturers Association, 1540 East Dundee Road, Palatine, IL 60067; (708) 202–1350.

Federal Specifications, General Services Administration, Specifications Section, Room 6654, 7th and D Streets, SW, Washington, DC 20407; (202) 708–5082.

Gas Appliance Manufacturers Association, (703) 525–9565.

National Electrical Manufacturers Association, 2101 L Street, NW, Suite 300, Washington, DC 20037; (202) 457–8400.

National Fire Protection Association, Batterymarch Park, P.O. Box 9101, Quincy, MA 02269; (617) 770–3000.

National Standards Association, 1200 Quince Orchard Blvd., Gaithersburg, MD 20878;
(301) 590–2300.
(NSA is a local contact for materials from ASTM).

National Wood Window and Door Association, 1400 East Touhy Avenue, Des Plaines, IL 60018; (708) 299–5200.

Sheet Metal and Air Conditioning Contractors Association, P.O. Box 221230,
Chantilly, VA 22022–1230; (703) 803–2980.

Steel Door Institute, 712 Lakewood Center North, 14600 Detroit Avenue, Cleveland, OH 44107; (216) 899–0100.

Steel Window Institute, 1230 Keith Building, Cleveland, OH 44115; (216) 241–7333.

Tubular Exchanger Manufacturers Association, 25 North Broadway, Tarrytown, NY 10591; (914) 332–0040.

Underwriters Laboratories, Inc., P.O. Box 75530, Chicago, IL 60675–5330;

(708) 272–8800.

More information regarding the standards in this reference can be obtained from the following sources:

Environmental Protection Agency, 401 M Street, NW, Washington, DC 20006;

(202) 554–1080.

National Institute of Standards and Technology, U.S. Department of Commerce, Gaithersburg, MD 20899, (301) 975–2000

Weatherization Assistance Programs Division, Conservation and Renewable Energy, Mail Stop 5G–023, Forrestal Bldg, 1000 Independence Ave, SW, Washington, DC 20585; (202) 586–2207.

## THERMAL INSULATING MATERIALS FOR BUILDING ELEMENTS INCLUDING WALLS, FLOORS, ATTICS, AND ROOFS

(Standards for conformance)

| | |
|---|---|
| Insulation-mineral fiber: | |
| Blanket insulation | ASTM C665-98. |
| Roof insulation board | ASTM C726-00a. |
| Loose-fill insulation | ASTM C764-99. |
| Insulation-mineral cellular: | |
| Vermiculite loose-fill insulation | ASTM C516–80 (1990). |
| Perlite loose-fill insulation | ASTM C549–81 (1986). |
| Cellular glass insulation block | ASTM C552–88. |
| Perlite insulation board | ASTM C728–89a. |
| Insulation-organic fiber: | |
| Cellulosic fiber insulating board | ASTM C208–72 (1982). |
| Cellulose loose-fill insulation | ASTM C739–88. |
| Insulation-organic cellular: | |
| Preformed block-type polystyrene insulation | ASTM C578–87a. |
| Rigid preformed polyurethane insulation board | ASTM C591–85. |
| Polyurethane or polyisocyanurate insulation board faced with aluminum foil on both sides | FS HH-I–1972/1 (1981). |
| Polyurethane or polyisocyanurate insulation board faced with felt on both sides | FS HH-I–1972/2 (1981). And Amendment 1, October 3, 1985. |
| Insulation—composite boards: | |
| Mineral fiber and rigid cellular polyurethane composite roof insulation board | ASTM C726–88. |
| Perlite board and rigid cellular polyurethane composite roof insulation | ASTM C984–83. |
| Gypsum board and polyurethane or polisocyanurate composite board | FS HH–I–1972/4 (1981). |
| Materials used as a patch to reduce infiltration through the building envelope | Commercially available. |

## THERMAL INSULATING MATERIALS FOR PIPES, DUCTS, AND EQUIPMENT SUCH AS BOILERS AND FURNACES

(Standards for conformance)

| | |
|---|---|
| Insulation—mineral fiber: | |
| Preformed pipe insulation | ASTM 1 C547–77. |
| Blanket and felt insulation (industrial type) | ASTM C553–70 (1977). |
| Blanket insulation and blanket type pipe insulation (metal-mesh.covered) (industrial type) | ASTM C592–80. |
| Block and board insulation | ASTM C612–83. |
| Spray applied fibrous insulation for elevated temperature | ASTM C720–89. |
| High-temperature fiber blanket insulation | ASTM C892–89. |
| Duct work insulation | Selected and applied according to ASTM C971–82. |
| Insulation—mineral cellular: | |
| Diatomaceous earth block and pipe insulation | ASTM C517–71 (1979) |
| Calcium silicate block and pipe insulation | ASTM C533–85 (1990). |
| Cellular glass insulation | ASTM C552–88. |
| Expanded perlite block and pipe insulation | ASTM C610–85. |
| Insulation—Organic Cellular: | |
| Preformed flexible elastomeric cellular insulation in sheet and tubular form | ASTM C534–88. |
| Unfaced preformed rigid cellular polyurethane insulation | ASTM C591–85. |
| Insulation skirting | Commercially available. |

## Fire Safety Requirements for Insulating Materials According to Insulation Use

| | |
|---|---|
| Attic floor | Insulation materials intended for exposed use in attic floors shall be capable of meeting the same smoldering combustion requirements given for cellulose insulation in ASTM C739–88. |
| Enclosed space | Insulation materials intended for use within enclosed stud or joist spaces shall be capable of meeting the smoldering combustion requirements in ASTM C739–88. |
| Exposed interior walls and ceilings | Insulation materials, including those with combustible facings, which remain exposed and serve as wall or ceiling interior finish, shall have a flame spread classification not to exceed 150 (per ASTM E84–89a). |
| Exterior envelope walls and roofs | Exterior envelope walls and roofs containing thermal insulations shall meet applicable local government building code requirements for the complete wall or roof assembly. |
| Pipes, ducts, and equipment | Insulation materials intended for use on pipes, ducts and equipment shall be capable of meeting a flame spread classification not to exceed 150 (per ASTM E84–89a). |

(Standards for conformance)

## Storm Windows

(Standards for conformance)

| | |
|---|---|
| Storm windows: | |
| Aluminum insulating storm windows | ANSI/AAMA 1002.10–83. |
| Aluminum frame storm windows | ANSI/AAMA 1002.10–83. |
| Wood frame storm windows | ANSI/NWWDA I.S. 2–87. (Section 3) |
| Rigid vinyl frame storm windows | ASTM D4099–89. |
| Frameless plastic glazing storm | Required minimum thickness windows is 6 mil (.006 inches). |
| Movable insulation systems for windows | Commercially available. |

## Storm Doors

(Standards for conformance)

| | |
|---|---|
| Storm doors—Aluminum: | |
| Storm Doors | ANSI/AAMA 1102.7–89. |
| Sliding glass storm doors | ANSI/AAMA 1002.10–83. |
| Wood storm doors | ANSI/NWWDA I.S. 6–86. |
| Rigid vinyl storm doors | ASTM D3678–88. |
| Vestibules: | |
| Materials to construct vestibules | Commercially available. |
| Replacement windows: | |
| Aluminum frame windows | ANSI/AAMA 101–88. |
| Steel frame windows | Steel Window Institute recommended specifications for steel windows, 1990. |
| Wood frame windows | ANSI/NWWDA I.S. 2–87. |
| Rigid vinyl frame windows | ASTM D4099–89. |

## Replacement Doors

(Standards for conformance)

| | |
|---|---|
| Replacement doors—Hinged doors: | |
| Steel doors | ANSI/SDI 100–1985. |
| Wood doors: | |
| Flush doors | ANSI/NWWDA I.S. 1–87. (exterior door provisions) |
| Pine, fir, hemlock and spruce doors | ANSI/NWWDA I.S. 6–86. |
| Sliding patio doors: | |
| Aluminum doors | ANSI/AAMA 101–88. |
| Wood doors | NWWDA I.S. 3–83. |

## CAULKS AND SEALANTS

(Standards for conformance)

| | |
|---|---|
| Caulks and sealants: | |
| Putty | FS TT–P–00791B, October 16, 1969 and Amendment 2, March 23, 1971. |
| Glazing compounds for metal sash | ASTM C669–75 (1989). |
| Oil and resin base caulks | ASTM C570–72 (1989). |
| Acrylic (solvent types) sealants | FS TT–S–00230C, February 2, 1970 and Amendment 2, October 9, 1970. |
| Butyl rubber sealants | FS TT–S–001657, October 8, 1970. |
| Chlorosulfonated polyethylene sealants | FS TT–S–00230C, February 2, 1970 and Amendment 2, October 9, 1970. |
| Latex sealing compounds | ASTM C834–76 (1986). |
| Elastomeric joint sealants (normally considered to include polysulfide, polyurethane, and silicone) | ASTM C920–87. |
| Preformed gaskets and sealing materials | ASTM C509–84. |

## WEATHERSTRIPPING

(Standards for conformance)

| | |
|---|---|
| Weatherstripping | Commercially available. |
| Vapor retarders | Selected according to the provisions cited in ASTM C755–85 (1990). Permeance not greater than 1 perm when determined according to the desiccant method described in ASTM E96–90. |
| Items to improve attic ventilation | Commercially available. |
| Clock thermostats | NEMA DC 3–1989. |

## HEAT EXCHANGERS

(Standards for conformance)

| | |
|---|---|
| Heat exchangers, water-to-water and steam-to-water | ASME Boiler and Pressure Vessel Code, 1992, Sections II, V, VIII, IX, and X, as applicable to pressure vessels. Standards of Tubular Exchanger Manufacturers Association, Seventh Edition, 1988. |
| Heat exchangers with gas-fired appliances | Conformance to AGA Requirements for Heat Reclaimer Devices for Use with Gas-Fired Appliances No. 1–80, June 1, 1980. AGA Laboratories Certification Seal. |
| Heat pump water heating heat recovery systems | Electrical components to be listed by UL. |

## BOILER/FURNACE CONTROL SYSTEMS

(Standards for conformance)

| | |
|---|---|
| Automatic set back thermostats | Listed by UL. Conformance to NEMA DC 3–1989. |
| Line voltage or low voltage room thermostats | NEMA DC 3–1989. |
| Automatic gas ignition systems | ANSI Z21.21–1987 and Z21.21a-1989. AGA Laboratories Certification Seal. |
| Energy management systems | Listed by UL. |
| Hydronic boiler controls | Listed by UL. |
| Other burner controls | Listed by UL. |

## WATER HEATER MODIFICATIONS

(Standards for conformance)

| | |
|---|---|
| Insulate tank and distribution piping | (See insulation section of this appendix). |
| Install heat traps on inlet and outlet piping | Applicable local plumbing code. |
| Install/replace water heater heating elements | Listed by UL. |
| Electric, freeze-prevention tape for pipes | Listed by UL. |
| Reduce thermostat settings | State or local recommendations. |
| Install stack damper, gas-fueled | ANS1 Z21.66–1988, including Exhibits A&B, and ANSI Z223.1–1988. |
| Install stack damper, oil-fueled | UL 17, November 28, 1988, and NFPA 31–1987. |
| Install water flow modifiers | Commercially available. |

## WASTE HEAT RECOVERY DEVICES

(Standards for conformance)

| | |
|---|---|
| Desuperheater/water heaters | ARI 470–1987. |
| Condensing heat exchangers | Commercially available components and in new heating furnace systems to manufacturers' specifications. |
| Condensing heat exchangers | Commercially available (Commercial, multi-story building, with teflon-lined tubes institutional) to manufacturers' specifications. |
| Energy recovery equipment | Energy Recovery Equipment and Systems Air-to-Air (1978) Sheet Metal and Air-Conditioning Contractors National Association (SMACNA). |

## BOILER REPAIR AND MODIFICATIONS/EFFICIENCY IMPROVEMENTS

(Standards for conformance)

| | |
|---|---|
| Install gas conversion burners | ANSI Z21.8–1984, (for gas or oil-fired systems), ANSI Z21.17–1984, ANSI Z21.17a-1990, and ANSI Z223.1–1988. AGA Laboratories Certification seal. |
| Replace oil burner | UL 296, February 28, 1989 Revision and NFPA 31–1987. |
| Install burners (oil/gas) | ANSI Z223.1–1988 for gas equipment and NFPA 31–1987 for oil equipment. |
| Re-adjust boiler water temperature or install automatic boiler temperature reset control | ASME CSD–1–1988, ASME CSD–1a-1989, ANSI Z223.1–1988, and NFPA 31–1987. |
| Replace/modify boilers | ASME Boiler and Pressure Vessel Code, 1992, Sections II, IV, V, VI, VIII, IX, and X. Boilers must be Institute of Boilers and Radiation Manufacturers (IBR) equipment. |
| Clean heat exchanger, adjust burner air shutter(s), check smoke no. on oil-fueled equipment. Check operation of pump(s) and replacement filters | Per manufacturers' instructions. |
| Repair combustion chambers | Refractory linings may be required for conversions. |
| Replace heat exchangers, tubes | Protection from flame contact with conversion burners by refractory shield. |
| Install/replace thermostatic radiator valves | Commercially available. One pipe steam systems require air vents on each radiator; see manufacturers' requirements. |
| Install boiler duty cycle control system | Commercially available. NFPA 70, National Electrical Code (NEC) 1993 and local electrical codes provisions for wiring. |

## HEATING AND COOLING SYSTEM REPAIRS AND TUNE-UPS/EFFICIENCY IMPROVEMENTS

(Standards for conformance)

| | |
|---|---|
| Install duct insulation | FS HH-I–558C, January 7, 1992 (see insulation sections of this appendix). |
| Reduce input of burner; derate gas-fueled equipment | Local utility company and procedures if applicable for gas fueled furnaces and ANSI Z223.1–1988 (NFPA 54–1988) including Appendix H. |
| Repair/replace oil-fired equipment | NFPA 31–1987. |
| Replace combustion chamber in oil-fired furnaces or boilers | NFPA 31–1987. |
| Clean heat exchanger and adjust burner: adjust air shutter and check CO2 and stack temperature. Clean or replace air filter on forced air furnace | ANSI Z223.1–1988 (NFPA 54–1988) including Appendix H. |
| Install vent dampers for gas-fueled heating systems | Applicable sections of ANSI Z223.1–1988 (NFPA 54–1988) including Appendices H, I, J, and K. ANSI Z21.66–1988 and Exhibits A & B for electrically operated dampers. |
| Install vent dampers for oil-fueled heating systems | Applicable sections of NFPA 31–1987 for installation and in conformance with UL 17, November 28, 1988. |
| Reduce excess combustion air: | |
| A: Reduce vent connector size of gas-fueled appliances | ANSI Z223.1–1988 (NFPA 54–1988) Part 9 and Appendices G & H. |
| B: Adjust barometric draft regulator for oil fuels | NFPA 31–1987 and per manufacturers' (furnace or boiler) instructions. |
| Replace constant burning pilot with electric ignition device on gas-fueled furnaces or boilers | ANSI Z21.71–1981, Z21.71a-1985, and Z21.71b-1989. |
| Readjust fan switch on forced air gas or oil-fueled furnaces | Applicable sections and Appendix H of ANSI Z223.1–1988 (NFPA 54–1988) for gas furnaces and NFPA 31–1987 for oil furnaces. |
| Replace burners | See power burners (oil/gas). |
| Install/replace duct furnaces (gas) | ANSI Z223.1–1988 (NFPA 54–1988). |
| Install/replace heat pumps | Listed by UL. |
| Replace air diffusers, intakes, registers, and grilles | Commercially available. |
| Install/replace warm air heating metal ducts | Commercially available. |
| Filter alarm units | Commercially available. |

## REPLACEMENT FURNACES, BURNERS, AND WOOD STOVES

(Standards for conformance)

| | |
|---|---|
| Chimneys, fireplaces, vents and solid fuel burning Appliances | NFPA 211–1988. |
| Gas-fired furnaces | ANS1 Z21.47–1987, Z21.47a–1988, and Z21.47b–1989. ANSI Z223.1–1988 (NFPA 54–1988). |
| Oil-fired furnaces | UL 727, August 27, 1991 Revision and NFPA 31–1987. |
| Liquified petroleum gas storage | NFPA 58–1989. |
| Ventilation fans: | |
| Including electric attic, ceiling, and whole house fans | UL 507, August 23, 1990 Revision. |

## AIR CONDITIONERS AND COOLING EQUIPMENT

(Standards for conformance)

| | |
|---|---|
| Air conditioners: | |
| Central air conditioners | ARI 210/240–1989. |
| Room size units | ANSI/AHAM RAC–1–1982. |
| Other cooling equipment: | |
| Including evaporative coolers, heat pumps and other equipment | UL 1995, November 30, 1990. |

## SCREENS, WINDOW FILMS, AND REFLECTIVE MATERIALS

(Standards for conformance)

| | |
|---|---|
| Insect screens | Commercially available. |
| Window films | Commercially available. |
| Shade screens: | |
| Fiberglass shade screens | Commercially available. |
| Polyester shade screens | Commercially available. |
| Rigid awnings: | |
| Wood rigid awnings | Commercially available. |
| Metal rigid awnings | Commercially available. |
| Louver systems: | |
| Wood louver systems | Commercially available. |
| Metal louver systems | Commercially available. |
| Industrial-grade white paint used as a heat-reflective measure on awnings, window louvers, doors, and exterior duct work (exposed) | Commercially available. |

# ATTACHMENT 8
# MEASURE SKIPPING CLARIFICATION

**"Measure skipping"** is defined as follows: *Not installing, in order of decreasing Savings to Investment Ratio (SIR), the cost-justified Energy Conservation Measures (ECMs) and related Incidental Repairs Measures (IRM) included in the work scope produced by the Department of Energy (DOE) approved energy audit tool or priority list. This could also be the result of failure to evaluate all applicable energy saving measures for the dwelling.*

**"Major measure"** is defined as follows: *A high priority measure, which if skipped, would result in "partial" weatherization of a unit. Major measures are as follows: air sealing, duct sealing outside the thermal boundary, thermal boundary insulation (attic, wall, floor or belly, foundation, sill, etc.)*

***Measure skipping*** **of cost-justified *major measures* is not permitted at any time.**

***Alteration of the cost-justified work order must be addressed in the following ways:***

*Funding limitations:* If all funds available to be spent on the job will not cover the entire work scope, then measures may be removed from the work order starting with the lowest SIR measure and working up the list from there. The work order must remain overall cost-effective, or the job must be deferred. Necessary Health and Safety (H&S) measures may NOT be removed from the work order, however, ECMs can be removed.

*Client refusal-prior to work beginning*: Client education is important to inform a client of planned measures and material use. Resistance from a client to install any measures and/or materials planned because of an energy audit-directed work order or priority list should be addressed with either additional education and/or re-running the energy audit with a different - but acceptable - material to determine if the substitute material is cost effective. If no cost-effective option for the material can be identified, the auditor should again explain and discuss the situation with the building owner or occupant. If the building owner or occupant still declines a measure, not defined as a *major measure*, the **auditor must include in the client file a comprehensive justification, including background/source documents that support the decision to skip a specific measure.** All other weatherization measures must be installed. If the auditor **cannot access background/source documents that justifies the building owner/occupant's decision to decline a measure *or* the measure is defined as a "major measure,"** the situation must be fully documented in the client file and the job must be deferred due to client refusal.

*Client refusal-after a job has begun*: Due to scheduling, measures are sometimes installed with a lower priority first. If during the installation process, the client declines a higher priority measure, work must stop at the time the client declined the higher priority measure. No further installation is allowed, and the job must be inspected by a Quality Control Inspector (QCI) and closed out as a completed unit. This should be clearly explained in client file documentation.

*Inadequate training:* A lack of training for Subgrantees is not an allowable reason to skip measures. Standard procedure should be to postpone job(s) requiring priority measures that cannot be installed due to lack of trained staff until adequate training is acquired.

*A General Heat Waste (GHW) measure,* as previously approved in the Grantee's energy audit, may be skipped for any documented reason (including declined by client). GHW measures are not prioritized by the energy audit tool. The measures may be at the top of an approved Priority List, however, there is no strict prohibition from skipping an individual GHW measure.

# ATTACHMENT 9
# MAXIMUM LIFETIMES OF WEATHERIZATION MEASURES

## OVERVIEW

This attachment sets the maximum allowable measure lifetimes that can be used in all Department of Energy (DOE) approved energy audits for all Weatherization Assistance Program (WAP) Grantees. DOE will monitor to this effect.

## REVISED MEASURE LIFETIMES

The maximum allowable lifetimes for the following measures have been updated. Note that many of the updated allowable defaults apply only when specific requirements are fulfilled. Please check the relevant footnotes before updating any default measure lifetime

**Table 9.1 Revised ECM Lifetimes, years**

| Measure | Previous Default | Updated Allowable Default |
|---|---|---|
| Attic Insulation[1] | 20 | 30 |
| Wall Insulation[2] | 20 | 30 |
| Floor Insulation[3] | 20 | 30 |
| Kneewall Insulation[3] | 20 | 30 |
| Fossil Fuel Furnaces & Boilers[4] | 15 or 18 | 20 |
| Solar PV | N/A | 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-fill and batt insulation installed in fully enclosed air-tight cavities, and rigid insulation
4. Applies to standard and condensing fossil fuel fired units

Table 9.2 of this Attachment is a complete, current list of the maximum allowable measure lifetimes.

DOE will consider other changes on a case-by-case basis. A Grantee may request a longer allowable measure lifetime(s) by submitting the request, along with documentation justifying the request with independent third-party verified research, to the appropriate PO(s).

## BACKGROUND

DOE with ORNL's assistance collected and analyzed information and recommendations from Grantees that requested specific ECM lifetime changes. The Grantees provided supporting documentation from manufacturers, suppliers, and weatherization providers for DOE to determine if any of the requested ECM lifetimes could justifiably be extended. As of the release date of this WPN, DOE supports the updated lifetimes for those measures listed in Table 9.1.

The maximum allowable lifetime of any WAP measure is being limited to 30 years because the fuel cost indices which are forecasted by the Energy Information Agency do not extend beyond 30 years. Since

future fuel cost is integral to the determination of measure Savings to Investment Ratios (SIRs), measure life cannot extend beyond the forecasted period.

Several sources support increasing the lifetimes of fossil-fuel fired heating equipment as described above. However, these sources did not address electrical Heating Ventilation and Air Conditioning (HVAC) equipment such as electric furnaces, heat pumps and air conditioners. The maximum allowable lifetimes for electrically heated and cooled equipment remain the same as previously approved.

**SUMMARY OF ALLOWABLE MAXIMUM MEASURE LIFETIMES**

Table 9.2 presents the current list of the maximum allowable measure lifetimes, including the increased allowable lifetimes of the measures described above.

## Table 9.2
## Allowable Default ECM Lifetimes

| # | Measure Type | Measure Name | Life (yr.) |
|---|---|---|---|
| 1 | Building Insulation | Attic insulation: blown in and batt | 30 |
| 2 | Building Insulation | Attic insulation: all other types | 20 |
| 3 | Building Insulation | Sillbox insulation | 20 |
| 4 | Building Insulation | Foundation wall insulation | 20 |
| 5 | Building Insulation | Slab insulation | 20 |
| 6 | Building Insulation | Floor insulation: loose and batt types installed in fully enclosed air-tight cavities, and rigid insulation | 30 |
| 7 | Building Insulation | Floor insulation: all other types including loose and batt not installed in fully enclosed air-tight cavities | 20 |
| 8 | Building Insulation | Wall insulation: dense pack insulation, rigid insulation and full-cavity batt insulation in fully enclosed air-tight cavities | 30 |
| 9 | Building Insulation | Wall insulation: all other types | 20 |
| 10 | Building Insulation | Kneewall insulation: loose and batt types installed in fully enclosed air-tight cavities, and rigid insulation | 30 |
| 11 | Building Insulation | Kneewall insulation: all other types including loose and batt types not installed in fully enclosed air-tight cavities | 20 |
| 12 | Building Insulation | Duct insulation | 20 |
| 13 | Building Insulation | Manufactured home skirting | 10 |
| 14 | Building Insulation | White roof coating | 7 |
| 15 | Building Insulation | Radiant barrier | 15 |
| 16 | Ducts/Infiltration | Whole house air sealing | 10 |
| 17 | Ducts/Infiltration | Duct sealing | 10 |
| 18 | Doors and Windows | Storm window | 15 |
| 19 | Doors and Windows | Window replacement | 20 |
| 20 | Doors and Windows | Door replacement | 20 |
| 21 | Doors and Windows | Storm door | 10 |
| 22 | Doors and Windows | Window shading: awning | 10 |
| 23 | Doors and Windows | Sun screen: fabric or screen | 10 |
| 24 | Doors and Windows | Sun screen: louvered | 15 |
| 25 | Doors and Windows | Window film | 15 |
| 26 | HVAC Systems | Thermal vent damper | 10 |

| | | | |
|---|---|---|---|
| 27 | HVAC Systems | Electric vent damper | 10 |
| 28 | HVAC Systems | Intermittent Ignition Device (IID) | 10 |
| 29 | HVAC Systems | Electric vent damper and IID | 10 |
| 30 | HVAC Systems | Flame retention burner | 10 |
| 31 | HVAC Systems | Heating system tune up | 3 |
| 32 | HVAC Systems | Heating system replacement: fossil fuel fired furnaces and boilers, standard and condensing | 20 |
| 33 | HVAC Systems | Heating system replacement: all other heating systems except heat pumps | 18 |
| 34 | HVAC Systems | Smart/programmable thermostat | 15 |
| 35 | HVAC Systems | Air conditioner tune up | 3 |
| 36 | HVAC Systems | Air conditioner replacement | 15 |
| 37 | HVAC Systems | Evaporative cooler | 15 |
| 38 | HVAC Systems | Heat pump replacement | 15 |
| 39 | Baseloads | Lighting retrofit: fluorescent and compact fluorescent | (Note 5) |
| 40 | Baseloads | Lighting retrofit: LED | (Note 6) |
| 41 | Baseloads | Lighting retrofit: halogen | (Note 7) |
| 42 | Baseloads | Refrigerator replacement | 15 |
| 43 | Baseloads | Water heater tank insulation | 13 |
| 44 | Baseloads | Water heater pipe insulation | 13 |
| 45 | Baseloads | Low flow showerhead | 15 |
| 46 | Baseloads | Water heater replacement | 13 |
| 47 | Baseloads | Water heater setpoint reduction | 13 |
| 48 | Solar | Solar PV installations | 20 |

Notes:

5. 10,000 hours
6. 30,000 hours
7. 4,000 hours