

ATTACHMENT 1

ENERGY AUDIT SUBMITTAL REQUIREMENTS

OVERVIEW

The Department of Energy (DOE) is responsible for ensuring that only cost-effective weatherization measures are installed with DOE funds. Each Grantee must use energy audit tools and procedures to ensure cost effectiveness of the Weatherization Assistance Program (WAP) while treating each weatherized building as a whole system.

Energy audit requirements for the WAP are described in the regulations governing the Program (10 CFR Part 440.21). Important details for intent are included in the Preamble to the December 8, 2000, Interim Final Rule. These energy audit requirements can be grouped into three functional categories: analytic methods, field procedures, and administrative requirements.

The term “manufactured housing” is used throughout this guidance, replacing the term “mobile home”. Manufactured housing includes mobile homes and any housing built off-site that includes axles or a frame as a major design consideration for transport on public roads (e.g. light weight).

DESCRIPTION OF SUBMITTAL REQUIREMENTS

The required information that Grantees must submit for approval of an energy audit is described below:

I. Analytic Methods

- A. *Energy Estimating Methodology*: Describe the methodology used by the energy audit software to estimate annual energy use of the dwelling unit and the potential energy savings from weatherization retrofits. The description must provide sufficient detail for DOE 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, PRISM)?
 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 in the Grantee territory?

3. Are existing energy use and energy requirements of the dwelling unit determined from actual energy bills, by generally accepted engineering calculations or, optionally, 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. Does the energy audit software address domestic hot water and/or household appliance measures? If so, how is the energy estimated for these end uses?
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?

As discussed previously, Grantees requesting DOE approval to use NEAT, MHEA, MulTEA, EA-QUIP, HEAT, REM, TREAT, ECOS and eQUEST are not required to describe the energy estimating methodology.

- B. Measure Interaction:** Grantees must 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 savings-to-investment ratios (SIRs). The sample audit results must show the interacted and non-interacted energy savings and SIR for at least one architectural or mechanical measure. This will require a recommended measures list that includes at least one architectural and one mechanical measure. Provide a statement that the energy audit procedures will eliminate from consideration for installation any measure that has an interaction-adjusted SIR of less than one.

As discussed previously, Grantees requesting DOE approval to use NEAT, MHEA, MulTEA, EA-QUIP, HEAT, REM, TREAT, ECOS and eQUEST audit tools are not required to describe how the audit accounts for the interaction between measures.

- C. *Cost-effectiveness Requirements:* Grantees must 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. Include a description of how user defined measures will be allowed, including who will be allowed to develop, procedures, and Grantee monitoring of the cost effective use of user defined weatherization measures. List the costs included in the denominator of individual and overall SIR calculations, including at minimum the cost of materials, labor and on-site supervision.
 2. 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 (i.e., the air sealing measure that uses materials referenced in the Appendix A air sealing category) 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.
 3. Describe how all incidental repair costs are included in the cost of the overall package of weatherization measures and the overall SIR (See WPN 12-9, Weatherization Assistance Program Incidental Repair Measure Guidance for more details).

As discussed previously, Grantees requesting DOE approval to use NEAT, MHEA, MulTEA, EA-QUIP, HEAT, REM, ECOS and TREAT are not required to show how individual and overall SIRs are calculated. However, Grantees requesting approval of eQUEST are required to show how individual and overall SIRs are calculated because that function is not built into the standard eQUEST software. As other energy audit tools are approved, a list of audits that have reduced submittal requirements will be periodically issued by DOE.

- D. *Measures Considered:* Provide a list of the weatherization measures that the Grantee typically "enables" for the energy audit tool to evaluate. Include material and labor costs for these measures from a Subgrantee considered to be representative of statewide conditions. Provide the expected lifetime of each measure that is used in the SIR calculation.
- E. *Sample Audits:* Provide all input data, assumptions, and audit results (recommended measures) for ten sample dwelling units of each major type of structure; e.g., site built or single family, manufactured housing, small multifamily building [building with 5-25 individually heated/cooled units] and multifamily building; typical of those weatherized by the Grantee's program (contact your DOE Project Officer (PO) to discuss sample audit requirements

for all types of multifamily buildings as fewer than ten sample audits may be required). Completed field data collection forms, including any auditor notes, must be provided for the sample dwelling units, as well as printouts of the data entered into the energy audit software. The recommended measures reports from the audit tool must show the measure cost, first-year savings, SIR for each measure, as well as total job cost and overall SIR. The report must also include a line item for incidental repair costs per WPN 12-9 Incidental Repair Measures Guidance.

II Field Procedures

- A. *Audit Procedures and Field Protocols*: Describe in detail the energy audit procedures used by the Grantee. A copy of the auditor's or field operations manual, field guide, technical standards, Standard Work Specifications for Home Energy Upgrades, installation guidelines, and/or monitoring protocols may be provided to satisfy this requirement. Procedures required for each major building type served must be provided. The information provided must be sufficient to answer the following questions:
- 1 How do different audit findings affect the auditor's actions and recommendations?
 - 2 What advanced diagnostic and assessment techniques are routinely used by the auditor and/or crew?
 - 3 What client education is routinely provided by the auditor? By the installation crew?
 - 4 Are the audit and installation procedures specifically tailored for the building type being investigated in light of the varying energy audit requirements of single-family dwellings, multifamily buildings, and manufactured housing?
- B. *Weatherization Materials Installed*: Provide a statement acknowledging that only weatherization materials that meet or exceed the standards listed in Appendix A will be installed in eligible dwelling units. This statement must be provided for each major building type (e.g., single family, manufactured housing, and multifamily). Include any weatherization materials not in Appendix A that have been approved for use by the Grantee per 10 CFR 440.21(b).

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 WPN 16-7, Approved Weatherization Materials with Specifications.

Ancillary materials, incidental repair materials, as well as health and safety materials, as defined in WPN 12-9 are not “weatherization materials”, therefore are not required to be listed in Appendix A.

C. *General Heat Waste Reduction Lists*: Grantees may install general heat waste (GHW) reduction weatherization materials in eligible dwellings that DOE has determined to be generally cost effective, without the need for justification in a site-specific energy audit. GHW reduction materials are intended to be relatively low-cost items that can be quickly and easily installed. Total GHW measure costs (including labor) must not exceed \$250. These DOE-approved, presumptively cost-effective weatherization materials include:

1. Water heater 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 weatherstripping 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 are required to establish procedures to guide the installation of GHW materials and make crews aware of the circumstances that can reduce the cost-effectiveness of these measures. A recommended limit on the estimated installed costs for a GHW material may be useful as a guide to cost-effectiveness.

Grantees may request approval to use 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 will 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 but may not be within the State Plan, Annual Application submittal. Previously approved Grantee specific GHW materials must be listed in the Audit Approval request.

D. *Health and Safety*: During the audit approval process, DOE will review the health and safety plan located in the master file of a Grantee's application. The Grantee must provide a description of how the health and safety plan is implemented in the field. The Grantee may reference the appropriate section(s) of the auditor's or field operations manual, field guide, technical standards, Standard Work Specifications for Home Energy Upgrades, installation guidelines, and/or monitoring protocols to satisfy this requirement. Each major dwelling type must be addressed as applicable.

III. Administrative Requirements

- A. *Energy Audit Procedures Required for Each Building Type Served:* 10 CFR Part 440.21(f)(7) requires the Grantee to use DOE-approved energy audit procedures that are specifically tailored to each major dwelling type that represents a significant portion of the Grantee's weatherization program.

This requirement recognizes the varying energy audit requirements of different dwelling types including single-family dwellings, multifamily buildings, and manufactured housing. DOE requires energy audit procedures to be approved specifically for use on single-family dwellings and manufactured housing. For multifamily buildings, DOE defines "a significant portion of the Grantee's weatherization program" as 20 percent or more of the total units weatherized in the state each year. For Grantees that fall below the 20 percent threshold, individual buildings may be weatherized even if a Grantee chooses not to obtain a Grantee-specific approved audit for multifamily buildings. However, the audit and assessment procedures must be appropriate to the dwelling type, and each audit and all supporting documentation must be submitted to the DOE Project Officer for pre-approval. A DOE-approved audit tool for multifamily buildings must be used to calculate cost effectiveness.

For energy audit purposes, DOE considers multifamily buildings to be those containing five dwelling units or more. Several single-family energy audits can be used in buildings with one to four dwelling units as well as in small multifamily buildings with 25 dwellings or fewer per building when the dwelling units are individually heated and/or cooled. However, single family approval of a tool does *NOT* constitute approval to use this tool in small multifamily buildings. Grantees must go through the approval process demonstrating how the tool is being used and the procedures the Grantee requires Subgrantees to follow prior to using an approved single family tool for small multifamily buildings.

- B. *Re-Approval Every Five Years:* Grantees must submit their energy audit procedures to DOE for re-approval every five years. Grantees must also submit to DOE for re-approval every five years those GHW materials that are in addition to the pre-approved GHW materials listed above, if applicable.

Grantees are reminded that Subgrantees must at least annually review and as necessary the measure costs and fuel prices that the energy audit software or manual methods use to estimate cost-effectiveness. This annual 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. As part of its monitoring responsibilities, DOE may request, from a Grantee or a Subgrantee, its current measure costs and fuel prices in order to compare them to the measure costs and fuel prices in the Grantee's approved audit submittal.

- C. *Other Administrative Requirements:* If a Grantee adopts an updated version of DOE-approved single-family, multifamily, or manufactured housing energy audit software, the Grantee must submit to DOE the name and version of the updated software. DOE will 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.