



Healthy Housing Opportunities During Weatherization Work

June 2010 — February 2011

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Forward

On January 12, 2011, the Department of Energy office of Energy Efficiency and Renewable Energy (DOE/EERE) issued Weatherization Program Notice 11-6.

This guidance addressed many of the questions and concerns that grantees and subgrantees mentioned regarding health and safety repairs that are conducted during the course of a home weatherization.

The authors of this report would like to congratulate DOE/EERE for their responsiveness and careful consideration in issuing this new guidance.

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1. Executive Summary

Five Key Observations from the Report

The U.S. Department of Energy (DOE) commissioned this report to provide an overview of health and safety practices currently followed by the network of organizations that provide weatherization services for low-income families under DOE's Weatherization Assistance Program (WAP). The report's key findings and recommendations may be used to advise the WAP on ways to structure new guidance to continually improve DOE services for low-income clients by optimizing the work done to improve the health and safety of clients without exceeding permissible expenditures. The report will also help DOE inform the federal *Inter-Agency Healthy Homes Work Group* that convened in 2009 to identify ways to maximize inter-agency coordination among federal programs and funding sources, and to streamline the provision of health, safety, and housing related services nationwide.

The report illustrates how front-line weatherization service providers have developed creative and effective means of addressing many health and safety issues. Despite innovation, however, many homes they encounter in the field have structural or other challenges that prevent energy efficiency work and/or would make energy efficiency upgrades ineffective. These challenges are the starting point from which the report explores practical and viable solutions for addressing health and safety issues encountered by weatherization workers in the field.

The report is based on interviews with 44 state-level WAP administrators (grantees) and 42 local weatherization agencies that perform weatherization work (subgrantees) from all regions of the country. The National Center for Healthy Housing conducted these interviews, which resulted in the following key findings that emerged from the data:

1. The deferral rate on homes due to serious and unresolved structural repairs or health and safety issues averages 10% – 15% nationwide. However, some cities experience deferral rates exceeding 50%. The main reasons for these deferrals is that there is not enough funding to deal with significant structural issues that fall outside the funding scope of the Weatherization Assistance Program, there is difficulty accessing alternative funding, and/or the weatherization crews on the jobs lack the skills required to address the structural or health and safety problems encountered.
2. While other sources of federal funding exist for many of the health and safety repairs that DOE weatherization crews encounter, these sources are often difficult for weatherization agencies to access, are quickly depleted, and/or have different eligibility criteria.
3. DOE allows states to determine, within reason, what portion of funds they spend on health and safety measures. Grantees (state-level weatherization agencies) and subgrantees (local service providers) would like DOE to provide additional guidance regarding eligible health and safety expenses and define how WAP funds can be used to address health and safety issues and repairs.

4. As training for weatherization workers becomes more standardized, industry professionals also want to focus on better ways to share information with one another to streamline services and increase the efficiency with which they are performed.
5. DOE allows its grantees flexibility in setting funding allowances for health and safety measures. Unfortunately, no common reporting criteria occur to track health and safety performance measures, successful referrals, or the durability of weatherization repairs. DOE does not have national reporting requirements, although many states have established their own reporting criteria.

Summary of Report Recommendations

The opportunities for standardizing and funding health and safety repairs cluster into six basic strategies. Based on interview responses, this report recommends that DOE:

1. Continually enhance existing WAP guidance and resources.
2. Support and disseminate innovative strategies and best practices.
3. Help programs better use current resources to address health and safety repairs.
4. Promote improved leveraging of non-DOE funds and more effective partnering with other federal agencies to address health and safety problems.
5. Improve federal coordination to create incentives for integrating energy as well as health upgrades in low-income homes.
6. Assist grantees in identifying opportunities for collaboration to leverage non-governmental funding to supplement weatherization programs in order to correct health and safety problems.

Recommendations by relevant section of the following report:

Section 4 – Deferrals of Units: To address and reduce deferral rates:

- i. More effectively leverage alternate resources
- ii. Highlight leveraging opportunities other programs have accessed to create stable and sustainable integrated funding
- iii. Explore “carrots” that will encourage local providers to collaborate
- iv. Create additional flexible funding sources to support health, safety, and structural repairs.

Section 5 – Referrals to Other Programs and Other Funding Sources: To help state and local programs streamline their referral process and better access alternate funding sources:

- i. Highlight the range of possible leveraging opportunities by showcasing programs that have successfully worked with these funding sources to create stable and sustainable integrated funding
- ii. Promote common eligibility criteria across federal programs
- iii. Devise incentives for weatherization providers to access funding offered by federal partners
- iv. Create an “opportunity fund” for weatherization programs to correct health and safety problems
- v. Support a smaller supplemental grant fund that focuses on roof repair and replacement.

Section 6 – Guidance and Clarification on Health and Safety Measure Eligibility and Spending Limits: To help state and local weatherization programs clarify the guidance under which they operate, and thereby streamline delivery of health and safety repairs during the weatherization process:

- i. Clarify overall health and safety expenditure caps and allowable expenses
- ii. Develop and disseminate health and safety and durability performance measures
- iii. Measure weatherization generated improvements, and improvements that result from successful referrals
- iv. Improve federal coordination to create incentives for integrating energy and health upgrades in low-income homes
- v. Advocate for a broader grant program to supplement healthy homes repairs across multiple federal programs.

Section 7 – Training and Information Sharing: To help state and local weatherization programs improve training and information sharing internally and across the network:

- i. Clarify caps on health and safety expenditures and eligible expenses during training and provide updates to this information as continuing education support for workers that have already undergone training
- ii. Develop a performance measure that documents health and safety improvements and the durability of the work that is performed
- iii. Identify, profile, and disseminate information about innovative strategies that program managers are using across the country
- iv. Provide additional information in training courses about key health and safety issues
- v. Standardize training and procedures surrounding client health and education.

Section 8 – Program Metrics: To help DOE quantify the health and safety improvements that occur during weatherization, and to include this data in the overall program metrics, recommendations include:

- i. Develop performance measures to document health and safety improvements
- ii. Create a process for tracking successful referrals
- iii. Track how the health and safety improvement affects the lifespan of the weatherization improvement.

2. Introduction

The U.S. Department of Energy's (DOE) Weatherization Assistance Program (WAP) serves low-income families by making their homes more energy efficient in order to reduce energy costs. WAP operates in all 50 states, the District of Columbia, Native American tribes, and overseas U.S. territories through a network of more than 1,000 local weatherization providers. WAP first began weatherizing homes in 1976, and since 2001, has weatherized an average of 100,000 homes per year. In each home, the weatherization work reduces average annual energy bills by \$413 and reduces gas heating consumption by 32%.¹

In 2009, the American Recovery and Reinvestment Act (ARRA) allocated \$5 billion to WAP to fund weatherization work for a three-year period. Congress also increased the amount of funds permitted on weatherization per home to \$6,500—an increase of \$3,000. This funding increase allows grantees to provide deeper and more comprehensive energy efficiency measures. Under ARRA, the program weatherized nearly 325,000 homes by the end of 2010.

Since WAP's inception, DOE has required that the repair work primarily focus on a home's energy efficiency, but allows some of the budget to be used to improve a home's health and safety. Out of the entire weatherization budget for a home, crews typically spend an average of 10% of their WAP funds on health and safety improvements. They are able to repair about a third of the health and safety issues they encounter (see Appendix A).

The Report: Methodology, Limitations, and Organization

This report is a result of DOE engaging the National Center for Healthy Housing (NCHH) to review existing WAP policies, guidance, and training, and to interview a broad subset of state WAP grantees and local subgrantees from across the nation to get a strong and representative sample of the issues they encounter related to health and safety. NCHH conducted the research for this report in the summer and fall of 2010 to gauge how grantees and subgrantees interpret and incorporate existing health and safety guidance and practices in their weatherization work, and wrote the report in the winter of 2010 – 2011. A key element in the report is its evaluation of opportunities for expanding the program's ability to address health and safety issues in the low-income homes it serves. As a result, the report reflects the industry as it existed before WAP issued updated Weatherization Guidance, in its Weatherization Program Notice 11-6, on January 12, 2011.

During the interviews conducted for this report, grantees and subgrantees shared questions and confusions they had about policies and training, as well as innovations and funding opportunities that they often employ to carry out this work. In addition, the interviews provided numerous recommendations for standardizing and streamlining the focus on health and safety improvements, and clarity on how addressing certain health and safety repairs can allow weatherization work to proceed.

¹ US Department of Energy: Weatherization Assistance Program. (2008). *2008 Weatherization Assistance Program Briefing Book*. Accessed September 15, 2010 from http://www.waptac.org/data/files/website_docs/briefing_book/wap_programoverview_final.pdf

NCHH examined the plan that each state grantee submitted to receive its allocation of ARRA funding. Although each grantee is required to have a Health and Safety Plan, typically this appears in an abbreviated form in the greater State Plan document, which is open to public comment. NCHH accessed each State Plan that was available online to assess the state’s caps on health and safety expenses and any unique features of its specific Health and Safety Plans.

In addition to studying state and local program materials, NCHH contacted the 51 state-level grantees (all 50 states plus the District of Columbia), and spoke directly with 44 state weatherization managers/staff and representatives from 42 local programs. These interviews were conducted on a voluntary basis and provided an assessment of on-the-ground practices while eliciting perspectives, concerns, and suggestions about health and safety repairs in the larger context of weatherization work.

It is important to note that the local programs that NCHH evaluated were not selected randomly, and therefore may not be a statistical representation of the more than 1,000 local weatherization programs currently working in the United States and its territories. Instead, NCHH identified candidates for local interviews by asking state grantees for the names of any subgrantees who actively address health and safety problems. The resulting interviews and evaluations primarily focused on:

- Deferral rates
- Referrals and other funding sources
- Health and safety measure eligibility and allowable spending limits
- Information sharing.

The Opportunity at Hand

When weatherization crews visit a home to complete energy upgrades and repairs, they face a unique opportunity to dramatically improve the home’s safety as well as the occupants’ health. Many weatherization program managers emphasize that their clients “might not see another crew for the next 10 years,” and that for many families “we might be the first and last social service provider visiting this home.”

The number of homes that receive weatherization modifications eclipses the quantity of homes most other federal housing repair and rehabilitation programs work on each year.

Because they work with so many homes, weatherization crews are uniquely positioned to dramatically improve health and safety concerns that are present in low-income homes, but to do so, they will need:

- Additional guidance and training from DOE regarding the health and safety measures that should be improved and that DOE permits in a client’s home
- More information about leveraging non-DOE funds to address problems they encounter
- Administrative and legislative support to improve home delivery systems.

Overview of Health and Safety Policies, Plans, and Practices

States submit proposed health and safety spending limits, or “caps,” on the overall weatherization plans that they provide to DOE, which DOE project officers then approve. In these plans, the states set the amount or percentage of funds that can be spent on health and safety repairs out of a home’s entire weatherization budget. In addition, while DOE stipulates that the bulk of the money be spent on work to improve the home’s energy efficiency, it does not mandate minimum or maximum dollar amounts or

percentages that can be spent for health and safety. This allows states to customize their own policies to account for regional differences in homes or areas where homes are located.

Federal guidance is designed to be flexible. There is no set amount to be spent on any home. As a result, any limits or percentages identified in state plans set out an “average” fund that is allowed. Some homes may require no financial investment for health and safety modifications, while others may require significant investment. The states’ health and safety budgets try to anticipate what the total cost could be for the number of homes to be weatherized in a program year, and then divide that cost to create a “percentage,” or cost, for the home. Historically, the 10% figure has been used as a guide. When a state requires a percentage beyond that amount, additional documentation is required in the state plan to justify the higher level.^{2,3}

Within this framework, states have traditionally established health and safety procedures and spending limits for subgrantees in one of the following five ways:

1. Capping the total percentage of subgrantee funds that may be used for health and safety (but allowing flexibility on a per-unit basis)
2. Capping the percentage of funds that may be used for health and safety at each weatherized dwelling
3. Capping the average health and safety expenditure permitted at each dwelling (e.g., not more than an average of \$500/unit), determined as an average across the entire program
4. Capping the maximum health and safety expenditure permitted for each dwelling
5. Limiting the average health and safety expenditure (per house and across the program), as well as setting a per unit maximum dollar amount that can be spent on health and safety repairs.

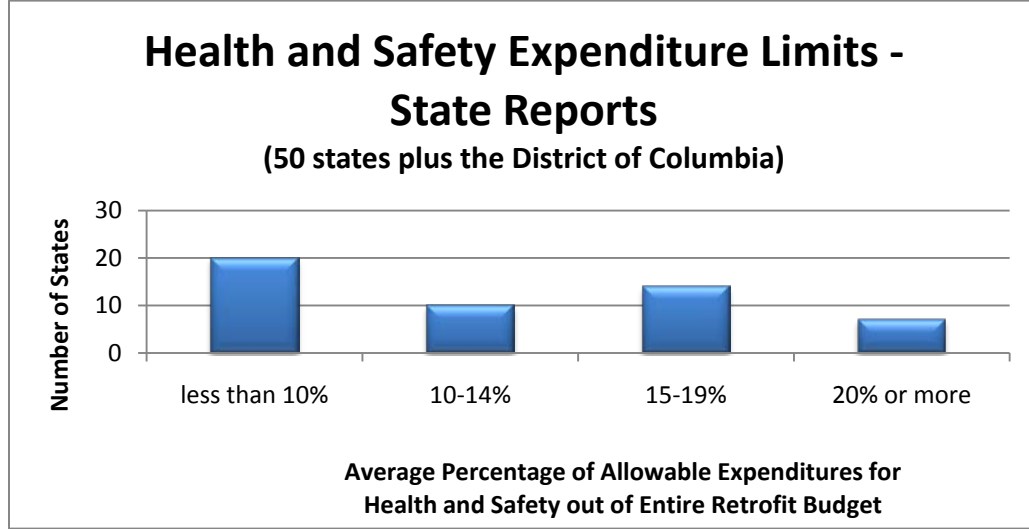
About two-thirds of the states evaluated in this report define their limits as either a percentage of program expenses or a percentage of the allowable per-unit average maximum for weatherization services. About 20% of the states reported the limit as a dollar amount. The remaining 15% of states did not specify a method of controlling expenses in the documents available.

Figure 1 summarizes states’ current established limits for health and safety expenditures out of their entire energy retrofit budget.

² WPN 10-1, p.21: “DOE encourages States to be prudent in their oversight of the percentage of funds approved for health and safety mitigation on homes weatherized by their local agencies.”

³ WPN 02-5, p.3: “States should set health and safety expenditure limits for their subgrantees. These limits are often expressed as a percentage of the average cost per dwelling unit even though health and safety costs have been removed from the average cost calculation.”

Figure 1. Health and Safety Expenditure Limits – State Reports



In state programs, allowable health and safety expenditure limits range from 3% – 30%, with a mean expenditure of 12% and a median of 10%.⁴

Ultimately, each grantee and subgrantee program manager is responsible for ensuring that health and safety expenses do not exceed their allowed budgets. Some subgrantees mentioned that they have difficulty clearly identifying which expenditures they are allowed to make under their state’s plan.

When the Recovery Act’s 2009 statutory change increased allowable weatherization budgets per dwelling to \$6,500, many states revised their health and safety budgets to commensurately match this higher spending limit. Because of this increase in health and safety funding, programs are able to undertake more robust health and safety measures.

WAP: Fine-tuning the Balance Between Energy Efficiency and Health and Safety

When a home is targeted for weatherization improvements, the first step is to audit the home to determine the most cost-effective weatherization measures it requires. When evaluating common housing stock, an auditor uses a pre-approved priority list based on acceptable site specific computerized audit standards or a computerized audit approved by DOE. During this initial audit or visit to the home, the auditor determines which health and safety measures should be prioritized and repaired in the home. For an energy efficiency/weatherization repair to be approved, an auditor must demonstrate that the energy savings-to-investment ratio (SIR) is positive. Because of this, every \$1 invested in weatherization repairs and improvements typically results in \$1.65 in energy savings.⁵ To meet this ratio, the cost of all energy-related work and incidental repairs that are

⁴ For Figure 1, NCHH converted dollars into percentages by dividing the dollar cap by \$6,500. For example, a \$500/unit health and safety expenditure cap is reported as an expenditure limit of 7%. In some cases, NCHH methodology may understate the percentage of funds allocated to health and safety when states spend less than an average of \$6,500 per dwelling on weatherization. The figures reported here reflect expenditure limits found in the 2009 editions of state plans for Recovery Act funded weatherization, plus anecdotal information gathered during interviews with state program managers.

performed must collectively equal greater than one in this ratio. However, health and safety measures do not need to meet these same SIR criteria if the grantee budgets for them separately.

⁵ US Department of Energy: Weatherization Assistance Program. (2008). *2008 Weatherization Assistance Program Briefing Book*. Accessed September 15, 2010 from http://www.waptac.org/data/files/website_docs/briefing_book/wap_programoverview_final.pdf

Case Study: The Opportunity Council

John Davies: Director of Building Performance Center, The Opportunity Council, Bellingham, Washington (25 years of experience)

Wade Gardner: Director of Weatherization and Home Repair at Opportunity Council, Bellingham, Washington

Program statistics: In 2010, 498 families served using funds from the 2009 Recovery Act, includes multifamily units, 130/year pre-ARRA. Primarily single family homes both stick built and mobile homes.

Summary

Several grantees have found ways to successfully handle health and safety repairs in weatherized homes. The Opportunity Council (a WAP subgrantee) was an early adopter of the Weatherization Plus Health concept. A decade ago, it received supplemental U.S. Housing and Urban Development (HUD) funding to promote the integration of weatherization and healthy homes.

The Opportunity Council administers a robust weatherization program designed to produce energy-efficient and healthy housing. Its *Weatherization Plus Health* program grew out of a collaborative vision among public and private sector organizations, all of which wanted to systematically improve indoor environmental conditions for households with young children suffering from asthma. *Weatherization Plus Health* builds on the strong foundation WAP provided, which protects clients' health and safety during weatherization services by following lead-safe work practices, providing mechanical ventilation when needed, addressing combustion safety, and installing smoke and carbon monoxide detectors. The *Weatherization Plus Health* program also provides families that have asthmatic children with an expanded home assessment; a healthy home educational visit with green cleaning kits, walk-off mats, and dust mite covers; and added repairs that address environmental hazards and asthma triggers (e.g., enhanced ventilation; hard-surface cleanable flooring; high efficiency particulate air (HEPA) vacuums; and other services that deal with dust, pests, environmental tobacco smoke, pet dander, chemicals, and moisture and mold).

Current WAP funding allows the program to spend up to 25% of its DOE funds for health and safety, or approximately \$1,625 per home. Davies estimates that the average investment to reduce asthma triggers costs an additional \$1,800 per home in a typical weatherization—exceeding the permissible level of health and safety expenditures that can be performed using WAP funding.

Initially, this enhanced healthy home approach was funded by a HUD Healthy Homes grant. Currently the Opportunity Council delivers the *Weatherization Plus Health* program using a variety of funding sources including WAP, Health and Human Services (HHS) Low Income Home Energy Assistance Program (LIHEAP), HUD Community Development Block Grant (CDBG), state energy and home repair funds, as well as private donations. The program relies on community support and coordinates outreach activities and referrals with the North West Clean Air Agency, Head Start, Energy Assistance, county health department, and local asthma clinics.

3. Current Health and Safety Practices

State and local program managers’ approaches to health and safety during weatherization vary greatly. Some programs view their missions as solely on reducing energy usage and undertake only those measures that are needed to avoid serious health and safety risks (e.g., carbon monoxide). At the other end of the spectrum, some programs make a concerted effort to improve both energy usage and overall health and safety conditions. These organizations emphasize the importance of treating the “whole house,” and consider health and safety a core element of their work.

Figure 2: Common Health and Safety Activities—Local Programs

Percent of Local Programs Contacted that Perform the Activities	Health/Safety Repair or Installation Performed with DOE Weatherization Funds
75% or more	Alarms (smoke and carbon monoxide) Bath and kitchen fans Combustion safety repairs/replacement Dryer vents Forced-air filter replacement Lead-safe work practices Minor electrical repairs Minor roof/gutter repairs
50% or more	Unvented space heater removal/replacement
Less than 25%	Air conditioning installation Asbestos testing/minor mitigation Dehumidifier installation Injury prevention repairs Lead paint testing Pest prevention/control Radon testing/minor mitigation

Figure 2 documents the range of activities typically categorized as health/safety repairs that are performed using DOE health and safety and/or DOE weatherization/repair funds.⁶ Many of the activities that are performed by less than 25% of local programs are those activities that were not specifically addressed in DOE guidance. This correlation suggests that without additional guidance, weatherization providers are less likely to perform the health/safety measure.

Even though most weatherization programs have widely varying approaches to the work they do, they were consistent in requesting greater flexibility in using WAP funds to treat health and safety problems

⁶ When compared to the state reports in Figure 2, we observe a larger number of activities because we used an expanded interview guide with local programs.

that may not specifically be energy-related. Some programs want to undertake repairs to address moisture problems or occupant injury prevention measures that are not directly linked to energy-saving measures.

State Plan Requirements and Recommendations

Before any state can qualify to receive weatherization funds for its residents, it must submit a state plan, which includes the grantee's health and safety plans. This plan typically includes:

- Procedures local grantees must follow (e.g., minimum requirements for performing weatherization work and retrofits)
- Allowable health and safety expenditures.

Under the Recovery Act, Congress allowed for an average per-unit weatherization expenditure of \$6,500. Within this per-unit budget, DOE encourages states to separate health and safety repair costs from the standard weatherization tasks, and monitor these budgets. In addition, states are required to address:

- Grantee health and safety
- Crew and contractor health and safety
- Client health and safety
- Potential hazard considerations
- Deferral standards.

4. Deferrals of Units

Nationally, NCHH estimates that roughly 10% – 15% of homes that are scheduled to be weatherized are deferred or referred to another program due to pre-existing health, safety, and structural problems. This falls in line with the results of the American Housing Survey (AHS), which state that 11% of housing units occupied by households under the poverty line have “moderate to severe” structural problems.⁷

For this report, a “deferral” is a home that has such severe health, safety, or structural issues that a weatherization program cannot immediately provide weatherization services. To better understand weatherization deferrals, it is useful to understand a typical weatherization intake process. Local weatherization programs follow different procedures to assess whether a home is eligible to receive weatherization services. The intake process always entails confirming that the occupants meet the income eligibility requirement of having yearly household earnings that total no more than 200 percent of the federal poverty level. In addition, the local program must determine that the home does not have health, safety, or structural problems that would keep weatherization work from proceeding (e.g., structural damage that would result in air leakage, thereby preventing proper sealing, or roof leaks that would expose insulation to moisture that would make it less effective).

Figure 3: Process to Identify and Address Homes with Health and Safety Problems

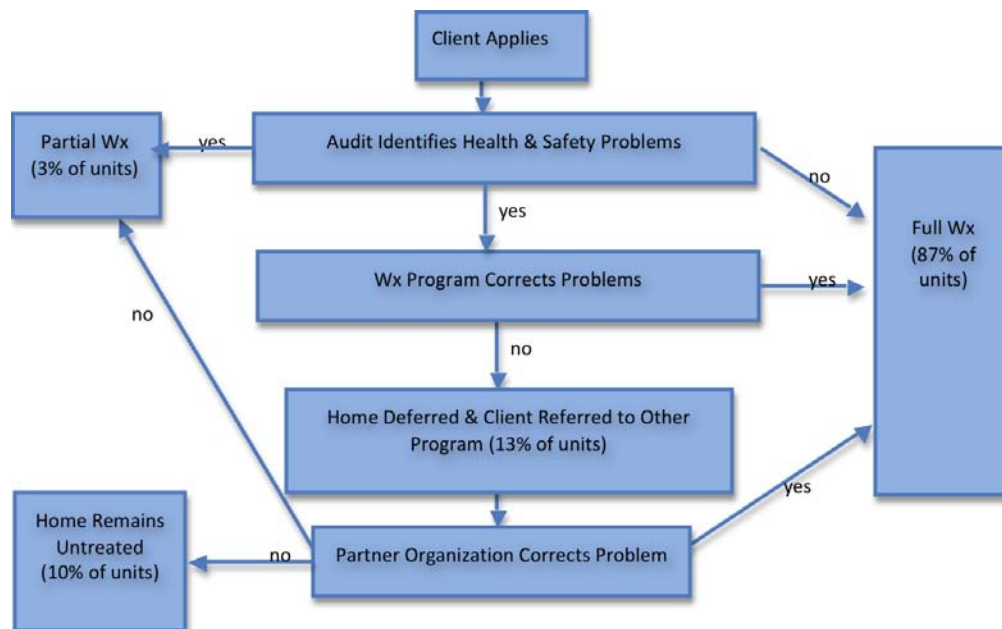


Figure 3 offers a graphical representation of the general approach local weatherization (Wx) programs take to identify and attempt to correct significant health, safety, and structural problems.⁸ Ideally, deferred units should return to the weatherization program once these problems are resolved, but it is estimated that at least 24% of the deferred homes remain

⁷ HUD, American Housing Survey dataset 2007

⁸ In some cases, local programs proceed directly to perform partial weatherization due to the unlikelihood that the referral process will result in correction of the problem.

untreated (this equals 10% of the total number of homes that that are initially scheduled for weatherization).

Results

Not all state and local weatherization programs track data about deferred homes. With this understanding, NCHH asked the grantees and the local programs in the interview to estimate the deferral rates in their service areas. The deferral process is quite complex and the terms “deferral” and “units remaining untreated” are neither explicitly defined nor consistently used amongst the network of grantees, subgrantees, and other third parties. When a home is deferred, the weatherization program informs the owner of the problems and refers the home to other programs that may be able to offer assistance. If the problems in a deferred home are corrected, the home is then eligible for weatherization services.

Deferral rates vary greatly from state to state and from program to program. Although the majority of programs report deferral rates below 10%, a small number of programs report deferral rates of between 25% – 50%, and occasionally even higher. Most programs, even those with relatively low deferral rates, were interested in additional resources to address those units they must turn away.

Although homes may be deferred at almost any stage of the weatherization process, many state and local programs have come up with a variety of processes to identify homes that may be deferred before weatherization begins so that few, if any, resources are expended. In this way, they refer the home to other agencies that may be able to provide the funding and work needed to fix the home for it to be eligible for weatherization.

Identifying deferrals during telephone screening

In a subset of communities where client homes are frequently in substandard condition, some local programs use telephone screening to assess whether a home is likely to meet the weatherization eligibility criteria. This helps the agencies avoid spending resources on a site visit to a home that is clearly not a candidate for weatherization.

Some programs determine initial eligibility solely through these sorts of screening calls, while others follow up with an abbreviated site visit to verify the information that came out of the screening call to fully determine eligibility before they conduct a full energy audit or site visit. Homes that are found to be ineligible are deferred from WAP and are then typically referred to another entity specializing in housing rehabilitation or environmental remediation, if this sort of entity exists in the area.

Identifying deferrals during the energy audit/site visit

For the majority of programs, an energy audit provides the first assessment of a home’s eligibility based on its physical condition. After the energy auditor comprehensively assesses the home’s energy needs and reviews any health and safety hazards, the program determines whether the home needs weatherization services.

If the home is eligible but has health and safety hazards that the weatherization program cannot address with its own funds or those leveraged from other sources, the program refers the home to the appropriate entity for possible assistance. When the weatherization program can leverage funds from other sources to correct the home’s problems itself, no referral is necessary.

Identifying deferrals when working on site

Usually health, safety, and structural concerns are identified during pre-screening or the audit, but in a limited number of cases, weatherization crews come across a new or previously undiscovered hazard that disrupts weatherization work after it has begun.

In some cases, a local program may partially weatherize a home that has health, safety, or structural problems in only a portion of the home, such as replacing an inefficient furnace with a more efficient model in a home with a leaking roof that prevents a crew from insulating the attic. Please see “Partial weatherization” below for more details about this subject.

If resources (owner or other resources) cannot be identified to treat the underlying conditions that triggered the deferral, the unit may remain untreated. A “unit remaining untreated” is a home that does not receive weatherization services because of unresolved health, safety, or structural problems. In addition, if a client becomes uncooperative, or if there is illegal or dangerous activity at a home, it may be deferred.

It is possible for an untreated, or deferred, home to receive other assistance, months and even years after the condition was first identified, and eventually become eligible for weatherization services. However, local programs report that homes with hazards that are not corrected shortly after deferral rarely return to the program. Therefore, programs can estimate that out of every 100 homes that are targeted for weatherization, 13 are deferred – three of these deferred homes will later receive weatherization service, while 10 will never undergo weatherization. Still, it is important to state that estimating deferral rates is an imprecise process at best, and that in addition to the complexities of the nomenclature, neither grantees nor subgrantees track/report deferred unit counts or the number of homes that ultimately go untreated.

Figure 4: Percentage of Dwellings Deferred

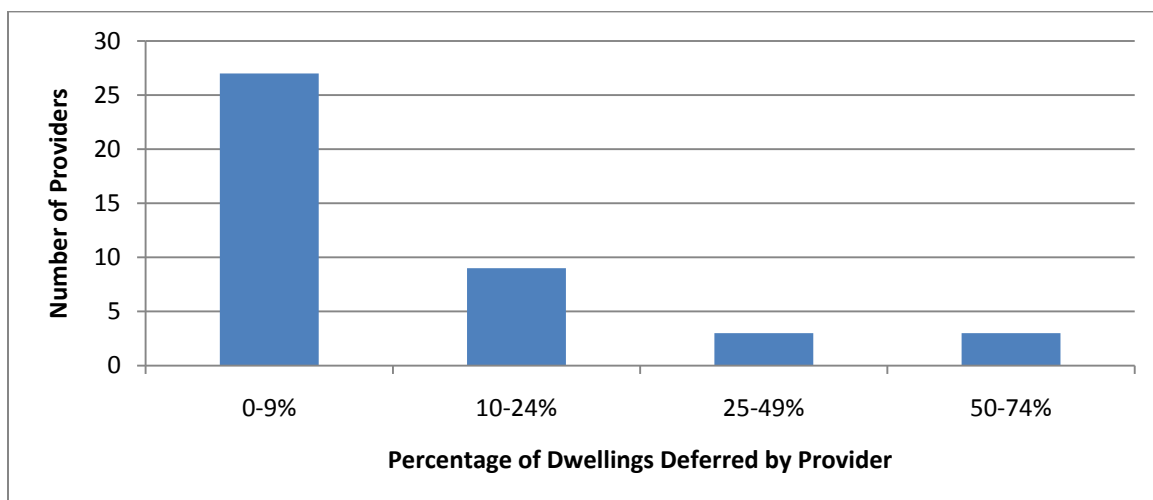


Figure 4: This table reflects the responses of 42 local providers regarding the percentage of units they defer. In this study, more than 60% of local programs (27 respondents) reported overall deferral rates of fewer than 10% of applicants. The remaining 40% of local programs (15 respondents) reported deferral rates of 10% or

more. NOTE: The local programs contacted about this topic are not a nationally representative sample, and these results are not intended to represent a scientifically valid estimate of deferral rates.

Primary causes of deferrals

During the interviews, grantees and subgrantees reported that structural, roofing, and mold/moisture problems are responsible for the majority of their deferrals. Electrical, sewage, and pest problems account for most other deferred units.

Based on input from state and local programs, NCHH estimates that for a deferred unit, the average costs to repair problems—including those mentioned above—to be \$6,000. This cost reflects what is needed to bring the unit up to a standard necessary for weatherization to continue.

“I estimate roof replacement costs at \$5,000–\$6,000 per unit. My vote is yes, I’m sure we could do 1,000 roofs per year. I’ll take anything. It’s a huge need. It’s awful. Houses with bad roof leaks melt before your eyes. Structurally they deteriorate as well. You get sagging roofs, bending walls.”

John Hamilton – CEDA (Community and Economic Development Association) Chicago, Illinois

Although repairs such as fixing/replacing roofs and gutters allow programs to then make cost-effective energy upgrades, these sorts of health and safety or structural repairs typically exceed allowable weatherization spending limits and lead to deferrals. If the issues are more localized, such as electrical problems or asbestos on or in building components, the unit may not need to be deferred and partial weatherization can occur.

Partial weatherizations

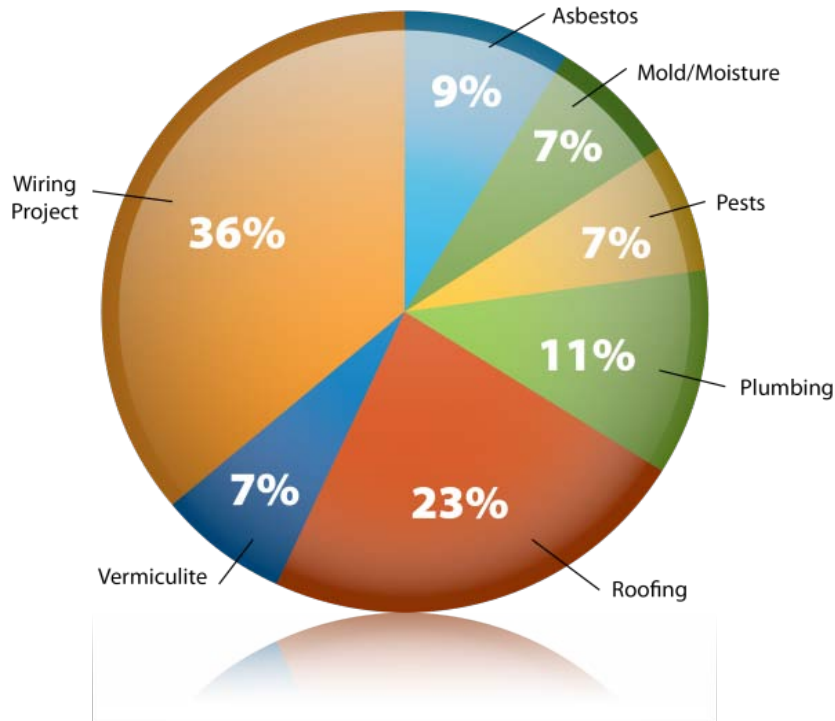
Programs report that partial weatherization work, in which some but not all energy conservation measures are implemented due to underlying health and safety conditions, occurs in an estimated 3% of treated units. However, in a few programs, this amount was estimated to be as high as 10%.

Programs in areas with a large stock of substandard homes, in both urban and rural areas, often confront this challenge. Because some service providers feel strongly that “some weatherization is better than none,” they have established protocols to allow weatherization work to be completed in areas of the home that are free of hazards.

Providing energy efficiency measures in only part of the home limits the potential energy savings. This limitation is amplified when energy work cannot be done in portions of the home where the most significant energy saving opportunities lie. Typically, crews cannot return to a home once it has been designated a “weatherized unit.”

Partial weatherization often fails to pursue the most cost-effective retrofits (e.g., estimated energy savings over the lifetime of the measure compared to the cost of implementing the measure). The most common reason for partial work cited was moisture in attics—often caused by leaky roofs and broken gutters—which precludes attic insulation and air sealing. When working in a home, grantees and subgrantees often come across health and safety repairs they would like to be able to make in a home, but cannot because of a lack of funding, or because of policy restrictions.

Figure 5: Health and Safety Repairs that Grantees and Subgrantees Wish They Could Make but Do Not Due to Policy or a Lack of Funding



Both grantees and local program managers reported that there is typically a wide percentage—from 1% to 10%—of units that receive a less than complete and comprehensive weatherization because housing conditions prevent work in some areas of the home.

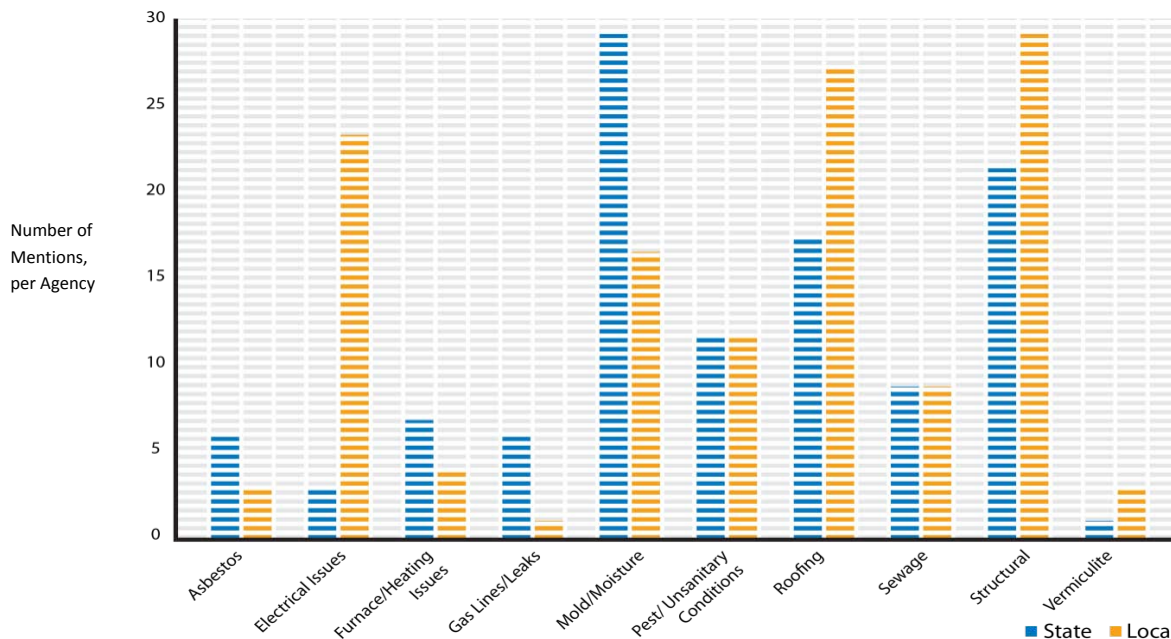
Wet attics often cause providers to only do a partial weatherization, particularly when resources are insufficient to make roof repairs that will allow for attic air sealing and insulation. In such a case, the weatherization crew might replace a heating system and insulate non-attic areas. Similarly, significant knob and tube wiring issues often prevent air sealing or insulation in portions of an attic or the entire attic because of concerns that heat may build up in any thermal insulation that has been placed over knob and tube wiring.⁹ In both cases, these sorts of issues keep programs from completing what is often one of the most cost-effective weatherization measures.

Homes that remain untreated

Based on interviews with local program staff, NCHH estimates that 75% of deferred homes never return to the program for weatherization services due to unresolved health, safety, and structural problems.

⁹ There is a provision in the National Electrical Code (NEC) as amended in 1987 that prohibits the installation of insulation over knob-and-tube wiring. DOE initially prohibited the use of insulation on knob-and-tube wiring, but later amended its policy in 1988 to allow state discretion to insulate over knob and tube in jurisdictions where this provision of the NEC (or a similar provision) was not adopted.

Figure 6. Reasons for Deferrals



The percentages of units remaining untreated appeared highest in urban areas experiencing declining infrastructure and neighborhood divestment, as well as in rural communities experiencing disinvestment and limited social service networks—resulting in limited referral partners and associated financial resources. Additionally, these communities often have code inspection departments that are overwhelmed with substandard dwellings or that have substandard codes or code enforcement. Some program managers noted that areas prone to flooding and moisture problems increase deferral rates.

The poor condition of the low-income housing stock in the service delivery area seems to be the dominant factor that causes most deferrals. More specifically, grantees and subgrantees identified the following health and safety hazards as those that most commonly pose obstacles to weatherization:

- Extensive moisture or mold issues
- Serious roof disrepair
- Sewage issues
- Electrical problems
- Unsanitary conditions
- Structural problems.

In addition to these obstacles, local policies and codes related to certain hazards (e.g., vermiculite insulation, electrical issues such as knob-and-tube wiring, etc.) can pose legal obstacles to weatherization.

Recommendations for Reducing Deferral Rates

Weatherization crews are well positioned to oversee or conduct additional, sometimes critical repairs to the homes in which they work. They can often make these repairs with minimal transaction costs.

Weatherization providers' ability to creatively and effectively use currently available funds demonstrates their dedication to serving weatherization clients. To help the providers reduce the percentage of homes they need to defer, NCHH would like to offer the following recommendations:

i. Effectively leverage alternate resources.

Many local weatherization programs successfully leverage both governmental and non-governmental resources to offer robust weatherization services that meet many of their client's energy related health needs. Sometimes this leveraging can be challenging, particularly for new programs working to build capacity and systems. To maximize leveraging, DOE could:

- Improve federal coordination of programs addressing energy and health upgrades in low-income homes
- Continue to support weatherization program efforts to leverage non-governmental resources.

ii. Highlight leveraging opportunities other programs have accessed to create stable and sustainable integrated funding.

In a previously funded case study, DOE reports how three local providers successfully leveraged resources to better provide energy retrofit services to their clients, by:¹⁰

- Administering both weatherization and housing/community development funds
- Earning a "CHDO" (Community Housing Development Organization as required for U.S. HUD programs) designation for their service area
- Having local providers report to a state weatherization agency, which could be housed in the State Energy Office (typically located in the state housing and community development department).

iii. Explore "carrots" that will encourage local providers to collaborate.

For example, HUD could provide extra points in its Notice of Funding Availability for the HUD Lead Hazard Control grant program, if an applicant documents a partnership with WAP. Similarly, HUD could incentivize its Home Investments Partnership (HOME) program grantees to leverage WAP and the U.S. Department of Agriculture (USDA) could incentivize applicants under its 504 Loan Program.

"It would be helpful to have funding for mold mitigation, LBP (lead-based paint), and asbestos. Three areas where we do the minimum, but if it is much greater of a problem, then the agency must find another resource, which is extremely limiting, or we walk away. Sometimes we help the family find another location, but that's not always possible. Sometimes the homeowner doesn't want to leave."

Steve Payne, Washington

¹⁰ Economic Opportunities Studies, Inc., *The Community Weatherization Study: How Three Weatherization Agencies Implemented Programs Now Dubbed "Weatherization-Plus"* October 12, 2010 from <http://www.opportunitystudies.org/repository/File/weatherization/three-case-studies.pdf>

iv. Create additional flexible funding sources to support health, safety, and structural repairs.

Currently, health and safety improvements are constrained by the health and safety limits that each state establishes in its health and safety plan. This limit is often a percentage of the \$6,500 average unit spending limit. These limits often constrain WAP's ability to fully conduct key health improvement measures in eligible homes. Some organizations¹¹ have been able to leverage as much as \$20,000 for a home, but this is the exception. Even with priority treatment for WAP applicants, the existing limited resources are insufficient to fully address housing related health threats in weatherizing tens of thousands of homes each year. To fully address eligible homes, providers require more funding and more flexibility in using it. To be most effective, these funds should be:

- Easily accessible, and involving minimum amount of additional paperwork
- Adequate for addressing the most common needs of deferred units (e.g., roof repair, electrical repair, moisture/structural problems)
- Available to meet funding demands throughout the year and with a quick turnaround
- Stable and predictable
- Based on small grants, not loans, because households that are eligible for these services have neither the inclination nor ability to acquire and carry additional debt.

¹¹ There are programs in Massachusetts that have combined funding streams, which allow them to bring around \$20,000 worth of resources to homes with significant health and safety problems. This is the highest level of funding that we heard weatherization agencies leverage.

Case Study: Baltimore Housing and Community Development

Ken Strong: Assistant Commissioner for Green, Health and Sustainable Homes, Baltimore Housing and Community Development

Program Statistics: 833 families served in 2010 with ARRA funds, 167/year pre-ARRA. Primarily single family homes.

Summary

Baltimore is a city that faces its share of challenges, yet its citizens retain a great spirit of hope. It is this hope for a better future that Ken Strong brings to his job every day as director of the city's weatherization program. Years of disinvestment have left many homes in the target areas of the city with conditions that force energy auditors to defer these units from weatherization services. When Ken joined the program in 2009, more than 50% of the applicants had to be turned away until their homes' structural problems could be addressed. The program, with the support of many other dedicated people in the city, is making progress in reducing the number of units the city defers, while at the same time funding more health and safety repairs. Ken notes, "Our opportunity to intervene is limited. If we don't look at the housing comprehensively, we are frittering away our resources."

The city has developed a Whole House Assessment Triage (WHAT) team to coordinate rehabilitation related services with various sources of funding to provide more low-income homeowners with weatherization services. Any program that can fix a home becomes a potential weatherization partner. The city has tapped:

- A city bond fund to repair roofs
- A senior home independence program to fix roofs and plumbing in the homes of older clients
- HUD Recovery Act funds, partnered with Rebuilding Together, to fix steps, railings, and grab bars
- State energy administration funds for furnace repair.

The city is an early member of the Green and Healthy Homes Initiative, which is demonstrating how a comprehensive process that combines weatherization and healthy homes can create safer and more stable homes. The city continues to look for opportunities every day, such as a new collaboration with the local utility, to drive down their deferral rates.

NOTE: DOE has awarded grant funding to the Green and Healthy Homes Initiative (GHHI) through its Weatherization Innovation Program.

5. Referrals to Other Programs and Funding Sources

If a local weatherization program is unable to correct a home’s significant health, safety, and structural hazards itself, DOE policy requires the program to defer the property. The program is required to document the reasons for the deferral and the property owners are referred to other programs. DOE does not require grantees to report information on the number of referrals and many grantees do not require subgrantees to do so either.

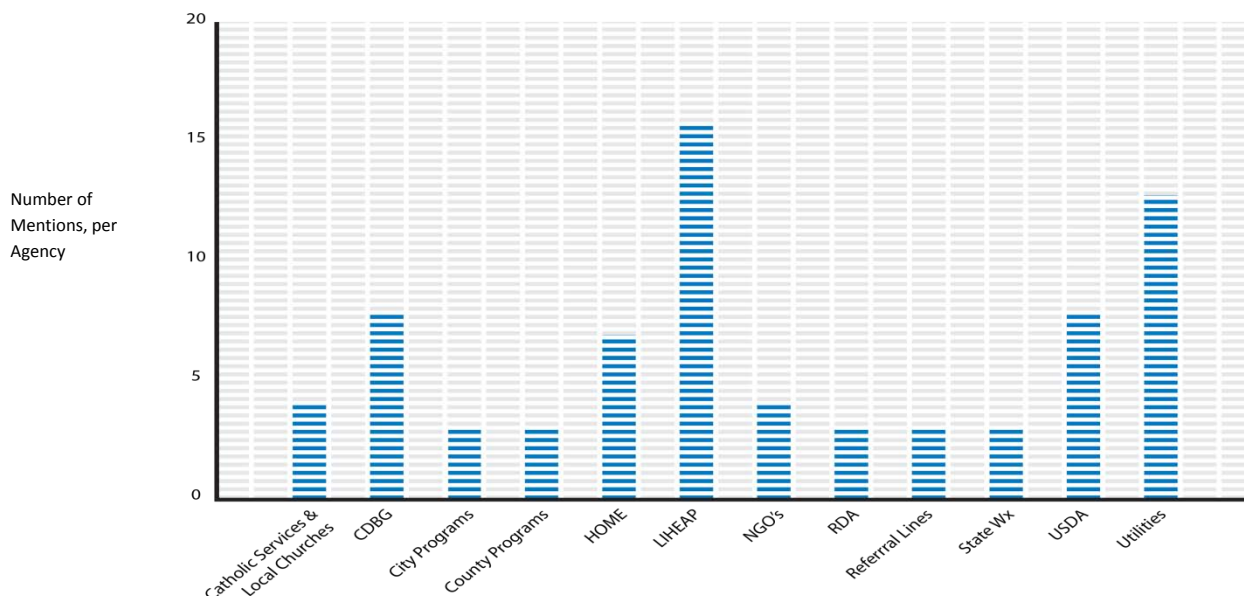
Because expenditures charged to the health and safety budget are often supplemented by other funds, they may not always represent the full set of repairs and other activities a program undertakes to improve a home’s health or structural conditions. State grantees inform their subgrantees of the percentage they can spend out of the health and safety budget, and then the local programs use a mixture of health and safety funds and incidental repair funds that are often part of a home weatherization budget, and refer the home to non-DOE programs such as Low Income Home Energy Assistance Program (LIHEAP) to address their clients’ health and safety needs.

Results

On average, state and local programs across the nation would need an average of between \$1,500 and \$2,900 per home to fully address the health and safety issues that they come across when weatherizing eligible homes (Appendix A), and in homes with extreme health, safety, and structural issues, as much as \$6,000 per home. This number is more than three times the \$480 – \$740 per home limit that the programs are typically authorized to spend out of their overall WAP funding.

Although many programs report successfully leveraging non-WAP funds (e.g., funding from other federal, state, and local government programs, charities and non-profits, foundations, etc.) to undertake more robust energy and health upgrades, local programs also expressed frustration in leveraging federal funds due to varied income eligibility issues, or depleted resources.

Figure 7. Supplemental Agencies That Pay for Health and Safety Improvements



During the NCHH interviews, grantees and subgrantees were asked what other sources of funding they turn to in order to complement the DOE funding they use to pay for weatherization work to a unit. The above graph shows the top 12 agencies that interviewees mentioned.

Supplemental health and safety funding

Staff in many programs expressed a desire to more effectively address occupant health and safety needs, either through referral to an appropriate program or through access to additional resources to enable weatherization crews already on site to streamline their ability to address needed housing or health repairs in a home.

For example, some grantees and local programs reported spending energy retrofit funds on incidental repairs, which could include health and safety repairs, as long as the combined cost of the repairs and the energy retrofits undertaken, compared to the expected energy savings satisfied the savings-to-investment (SIR) ratio greater than or equal to one. Although this practice doesn't fully align with DOE recommendations, the programs would do things such as include the cost of minor roof or gutter repairs in a weatherization budget, as long as the total expense of all of the work conducted during the weatherization ended up being less than the future energy savings from the insulation.

This is why many programs prefer to use their limited health and safety funds for activities that do not meet the SIR ratio and therefore can only be covered by incidental repair funds. Repairs most commonly falling into this category are:

- Combustion appliance repairs
- Dryer venting
- Bath fans
- Carbon monoxide alarms.

Referrals to other programs

Most weatherization program referrals are made to local housing rehabilitation programs, which manage a variety of federal, state, and local funds depending on the state and locality. Based on the hazards identified, local programs also refer homes to organizations such as lead hazard control programs, community action agencies, or nonprofit volunteer-based organizations such as Habitat for Humanity or Rebuilding Together.

The success rate of referrals varies widely. In communities where weatherization and housing rehabilitation programs are co-located in the same agency, the referral process often runs smoothly. In other communities, the local weatherization program has an excellent working relationship with referral agencies that collaborate to shepherd the home through the repair process to make it eligible for full weatherization. A few fully integrated programs also have strong connections with health programs that support housing-based health issues (e.g., environmentally triggered asthma, lead poisoning, occupant injury prevention, etc.).

It is important to note that when a weatherization provider is housed in an organization with goals that extend beyond energy savings and that are connected to a broader community mission (e.g., Community Action Agencies), that provider often has access to other sources of funding. This results in the provider being better equipped to address health and safety issues than providers that are more tightly focused on weatherization and are likely limited to WAP funds.

Challenges in the referral process

In many cases, if there are strong links between weatherization providers and referral agencies, they are based on personal relationships and initiative, rather than formal program commitments and are at risk when staffing changes. In other communities, a lack of referral agencies (or their lack of interest in collaborating with the weatherization programs) means that referrals rarely result in corrective action that can make a home eligible for weatherization.

In addition, when local weatherization programs try to refer units to other programs, they encounter hurdles in the form of inconsistent:

- Income eligibility requirements
- Geographic restrictions
- Programmatic priorities
- Unit selection processes.

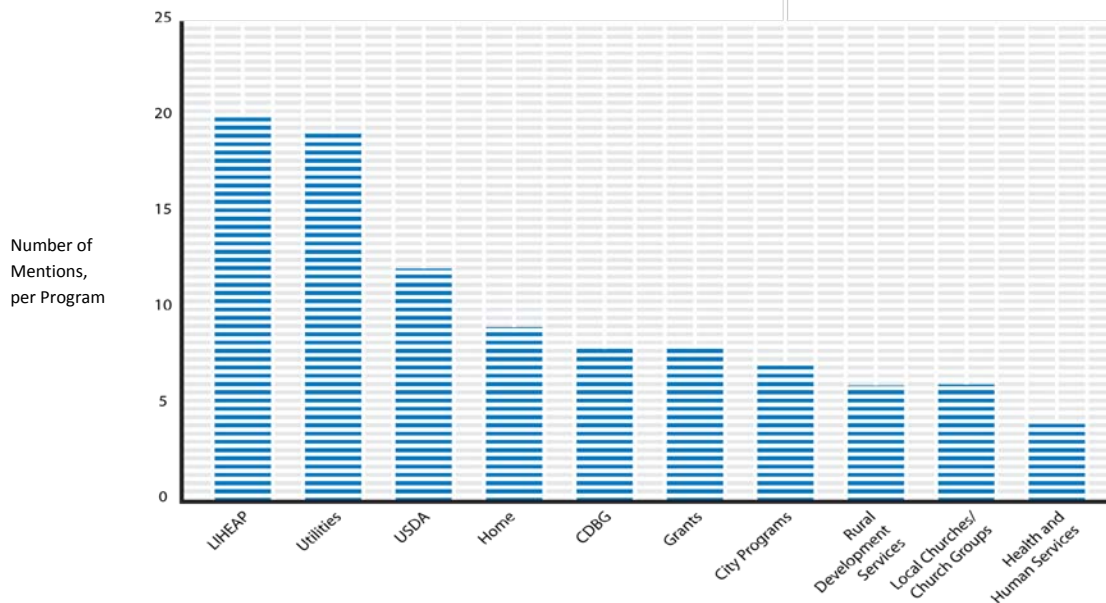
These differences can lead to client confusion and fatigue in applying for multiple programs.

Leveraging other funding sources for repairs

One way to address the issue of referrals that may go untreated is for local programs to leverage additional funds themselves. This allows weatherization programs to complete needed health, safety, and structural repairs in a timely and efficient way, using their own crews or specialty contractors. Although the dwelling is considered ineligible for weatherization services until the problems are corrected, some programs continue to maintain the property as an active file while the referral agency is making repairs. Once the hazards have been corrected, the home is then weatherized.

Using non-WAP resources to resolve health and safety problems depends on the local program's ability to access other funding sources. Some local programs have direct access to multiple sources of non-DOE funds, creating robust local networks that give them flexibility to correct health and safety hazards while making energy improvements. These repairs, which include improvements such as a furnace replacement, may exceed WAP budgets or unit caps. In many cases, this sort of successful leveraging is the result of years of coalition building, a highly entrepreneurial staff, and/or the weatherization program administering or having access to other programs that have separate funding sources, such as housing rehab. More than 90% of the local programs NCHH interviewed leverage funds other than WAP.

Figure 8. Top Ten Programs for Home Referrals, Following WAP Deferral



NOTE: The programs mentioned in Figure 8 are direct responses to an open-ended interview question, and categories may overlap.

The most common sources of supplemental funds used to bolster WAP funding include: LIHEAP funds, utility funds, U.S. Department of Agriculture (USDA) rehab loans, HUD HOME and CDBG housing rehab resources, and state or local housing rehab funds (both government and non-governmental). A few communities have been able to leverage private foundation resources to further supplement WAP budgets.

While many state and local programs have been able to ingeniously and tenaciously track down referral and funding options to take care of issues in homes scheduled for weatherization, there are some challenges in this arena as well. Several program managers report that as WAP funding has increased under the Recovery Act, funding for local, state, and other federal programs has not kept pace, and in many cases has been reduced. Despite substantial local efforts to successfully refer homes that require repair to programs or resources that can help low-income families, some homes still go untreated, which means that the client’s weatherization and health and safety needs remain unmet.

Recommendations for Streamlining Referrals and Leveraging Other Funding Sources

Many of the programs interviewed noted that they have successfully leveraged utility funds, state or local housing rehabilitation funds, and foundation and other non-governmental resources for work on homes whose families are income eligible for weatherization but that have too many inherent problems to fully weatherize.

Program staff indicate that they often work for many years to cultivate the partnerships needed to effectively draw upon supplemental resources to support robust healthy homes actions in energy upgrade work.

To assist programs, particularly new programs, DOE could work to:

- i. **Highlight the range of possible leveraging opportunities by showcasing programs that have successfully worked with these funding sources to create stable and sustainable integrated funding.**

DOE could publish case studies of successful partnerships between WAP providers and other funders to offer integrated energy and healthy homes treatments. Case studies focusing on a few programs that have built referral networks could provide excellent information for determining the efficiency of differing coordination models. These case studies could be used to inform other weatherization programs of the best ways to build referral networks and could also be the basis for a grant-based technical assistance program to assist programs in building capacity through referral networks.

- ii. **Promote common eligibility criteria across federal programs.**

DOE could work with its federal partners to try to establish consistent income eligibility criteria among programs that provide funding for housing and health repairs in low-income homes (e.g., HUD HOME Rehab; HUD CDBG; HUD Lead Hazard Control and Healthy Homes Production Grants; USDA Rural Development 504 Loans/Grants; DOE WAP; and LIHEAP funds).

- iii. **Devise incentives for weatherization providers to access funding offered by federal partners.**

For example, DOE could work with its federal partners to create incentives such as:

- a. HUD providing extra points in its Notice of Funding Availability for the HUD Lead Hazard Control grant program if an applicant documents a partnership with WAP
 - b. HUD encouraging its HOME grantees to leverage WAP and USDA could encourage applicants under its 504 Loan Program
 - c. Technical assistance being offered to WAP programs to help support their efforts to develop robust referral networks and supplemental funding
 - d. Instead of suggesting that homeowners seek out rehabilitation loans of up to \$20,000, having weatherization providers coordinate with HUD and public health organizations to organize small grants to cover essential health and safety repairs.
- iv. **Create an “opportunity fund” for weatherization programs to correct health and safety problems.**

DOE could work with the federal government to create a specific funding source that state or local weatherization agencies could access to address health, safety, and structural problems in homes being weatherized. Application and reporting requirements should be kept to a minimum to make this funding easily accessible and straightforward, with reliance on self-certification of compliance.

- v. **Support a smaller supplemental grant fund that focuses on roof repairs and replacement.**

DOE could work with the federal government to create a specific funding source that state or local weatherization agencies could access to address roofing specific problems. While this would not address all health and safety concerns, it would target one of the leading causes for deferral. This fund could be absorbed into the opportunity fund mentioned above, work independently, or be pursued if development of the opportunity fund is not successful.

Case Study: Weatherization & Home Rehab

Ryan Clouthier: Weatherization and Home Rehab Director, Southern New Hampshire Services (SNHS), Manchester, New Hampshire

Program Statistics: 600-750 families served annually with ARRA funds, 300/year pre-ARRA. Primarily single family homes.

Southern New Hampshire Services provides weatherization assistance to families in urban and rural settings. The program provides comprehensive energy upgrade services by successfully leveraging funds from utilities, LIHEAP, HUD HOME Rehabilitation, HUD Lead Hazard Control Grant Program, and community housing repair funds. Utilities commit the largest source of leveraged funds, contributing approximately 40% of the average \$6,500 spent on each home.

“Without utility money, the number of jobs we could complete would be cut in half and we would generate more deferrals,” Clouthier says. “Utility money helps fund repairs, many of which are health and safety related but exceed our health and safety funding caps, so that we can avoid deferring clients.” The N.H. WAP has a \$500 average and \$650 cap for health and safety expenses. Because the majority of health and safety needs can be addressed with an average expenditure of \$1,000 per Home, Clouthier notes that the program uses a combination of WAP and utility dollars to make up any shortfalls. The program then leverages LIHEAP funds to complete heating system repairs and replacement. SNHS is also connected to another three programs, which provide added funding sources:

- HUD HOME Rehab program, which provides \$30,000 – \$40,000 per home to about 12 homes per year
- Portion of a statewide Lead Hazard Control Grant program, which provides up to \$13,500 per home to address lead hazards
- HUD-supported One Touch Health and Energy Efficiency Program, which coordinates delivery and referral of health, housing, and energy upgrade services, which generate new partnerships with asthma, lead, health visitors, and city housing rehab programs.

WAP leverages these funds to address significant repair or lead needs. About 50% of the HOME Rehab projects coordinate with weatherization projects, so that both pots of money are used to fix the problems in homes with more significant repair needs. There are some challenges when coordinating the varying program requirements, however. For example, in the case of varying income qualifications, Clouthier says, “We’ve had families that qualify for lead work and HOME Rehab but were not able to obtain WAP assistance because they did not meet our more stringent income eligibility requirements.”

6. Guidance and Clarification on Health and Safety Measure Eligibility and Spending Limits

State and local weatherization programs currently follow both federal enabling legislation and DOE regulations and guidance when weatherizing eligible homes. According to federal regulation 10 CFR 440, WAP should:

“. . . increase the energy efficiency of dwellings owned or occupied by low-income persons; reduce their total residential energy expenditures; and improve their health and safety, especially low-income persons who are particularly vulnerable such as the elderly, the handicapped, and children.”¹²

The overarching goal of this regulation is to help weatherization programs “achieve a balance of a healthful dwelling environment and maximum practicable energy conservation.”¹³

DOE regulations provide even more detail about the goal of balancing health and safety with improving a home’s energy efficiency:

“Subgrantees limit expenditure of funds under this part for installation of materials (other than weatherization materials) to abate energy related health and safety hazards, to a list of types of such hazards, permissible abatement materials and their costs which is submitted, and updated as necessary at the same time as an annual application under Sec. 440.12 of this part and which DOE shall approve if:

- (1) Elimination of such hazards are necessary before, or as a result of, installation of weatherization materials; and
- (2) The grantee sets forth a limitation on the percent of average dwelling unit costs which may be used to abate such hazards which is reasonable in light of the primary energy conservation purpose of this part.”¹⁴

DOE’s guidance allows for states to define their own limits for health and safety expenditures due to extensive variations in geography, climate, housing stock, and need. In addition, DOE allows health and safety repairs to be exempt from meeting a savings-to-investment ratio (SIR), which is required for energy efficiency measures. Instead, per DOE guidance, the energy auditor who evaluates a home is responsible for identifying health and safety hazards, relying on DOE Weatherization Program Notices for the latest information and guidelines.

These program notices provide protocols for local programs should they encounter health and safety problems in a home.¹⁵ For example, these notices often recommend that programs refer certain issues

¹² 42 USCS 6861 (b), Accessed September 15, 2010 from http://www.law.cornell.edu/uscode/42/usc_sec_42_00006861----000-.html

¹³ 42 USCS 6863 (b)2A. Accessed September 15, 2010 from http://www.law.cornell.edu/uscode/42/usc_sec_42_00006863----000-.html

¹⁴ 10 CFR 440.16(h) Accessed September 15, 2010 from <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=b513be5a3e4f684c620657d714cb375e&rgn=div8&view=text&node=10:3.0.1.4.22.0.85.10&idno=10>

to other, better suited programs rather than have weatherization crews address the issue. The notices also identify eligible and ineligible health and safety repairs that crews can correct using WAP funding. The Program Notices often allow states wide discretion in what measures their crews can undertake, as long as health and safety spending caps are not exceeded.

Results

DOE gives states the ability to identify and submit limits on health and safety repairs as part of their State Plan, as long as a set percentage of the funds remains targeted to energy efficiency modifications. This ability is designed to encourage and enable regional flexibility and customization—unfortunately, it can also result in confusion about how best to apply the funds, and even about what repairs may be undertaken.

DOE's FY10 Program Year grant guidance

According to DOE's FY10 Program Year grant guidance, "DOE encourages states to be prudent in their oversight of the percentage of funds approved for health and safety mitigation on homes weatherized by their local agencies."¹⁶ DOE also states that,

"States should set health and safety expenditure limits for their subgrantees. These limits are often expressed as a percentage of the average cost per dwelling unit even though health and safety costs have been removed from the average cost calculation."¹⁷

States have discretion to negotiate a health and safety budget with DOE at the time of grant award. During the NCHH interviews, multiple grantees reported that they had heard either directly or indirectly from DOE staff or contractors that

- The budget should not exceed 10% of their per unit costs
- Grantees would be required to provide additional justification to exceed the 10% threshold; they would have a hard time getting approval from DOE for more than 10%.

States are able to request however much they choose and many have received approval for health and safety budgets of up to 20% of their average per-unit costs.

In addition, when states give their local programs discretion in how much health and safety dollars may be spent per unit, some of the subgrantees enjoy the flexibility while others find it confusing/frustrating.

2009 Recovery Act

The 2009 Recovery Act dramatically increased the scheduled pace of weatherizing homes. This also increased the allowable weatherization budget per dwelling to \$6,500. This increase in health and safety funding has enabled programs to undertake more robust health and safety repairs, such as:

- Improving ventilation to increase the exchange of fresh air in the home and reduce the levels of contaminants such as formaldehyde and volatile organic chemicals

¹⁵ The 15 areas can be found listed with eligible and ineligible expenses in Appendix B and are: 1) asbestos, 2) biological contaminants, 3) building structure, 4) client education, 5) combustion safety, 6) electrical issues, 7) fire hazards, 8) formaldehyde and volatile organic compounds, 9) lead paint, 10) occupant health assessment, 11) radon, 12) refrigerant issues, 13) smoke and carbon monoxide (CO) alarms, 14) space heaters, and 15) wood stoves.

¹⁶ WPN 10-1, p.21

¹⁷ WPN 02-5, p.3.

- Adding bathroom or kitchen ventilation fans to remove moisture from the home and hinder mold growth or condensation that can attract pests.

The increased weatherization budgets have allowed crews to undertake more expansive health, safety, and structural repairs than they could previously. While states still average health and safety budgets of 10 – 15% of their total weatherization funds, the available funds have increased to around \$480 – \$740 per unit. This amount allows weatherization to continue in more than 85% of eligible homes, but equals less than 1/3 of the cost to fully repair all health and safety issues, which would average about \$1,560 – \$2,900 per unit (Appendix A)¹⁸.

State guidance on allowable and unallowable health and safety activities

In general, states have used the information in the WAP 2002 Health and Safety Weatherization Program Notice 02-5 as the basis for their health and safety plans. For some of the health and safety issues highlighted in the program notice, such as combustion safety and mold policies, DOE requests that states provide more detailed information about how they plan to implement these procedures. DOE has recently created a revised version of its health and safety guidance; however, while it was designed to provide clarity to grantees in many areas that are discussed within this section of the report, this guidance was not complete when conducting interviews with state and local programs and at the time of this report, had not yet been implemented in the field. The state plans provide local programs with further clarification about allowable activities and expenses. Because DOE must approve each state plan, these procedures reflect federal health and safety policies.

During the NCHH interviews, some grantees noted that DOE staff sometimes applies inconsistent direction across different regions. For example, one grantee who expressed frustration that DOE does not allow its funds to be used to install air conditioning when the current units are inoperable (even though lack of proper air conditioning is a serious health hazard in his state) was surprised to learn that another state had a narrowly constructed program that allows for air conditioner installation using WAP funds. Similarly, a few northeastern states expressed concern about having to defer homes with vermiculite, yet two other states have protocols for testing vermiculite and managing the risk of asbestos exposure from this insulation.

While in many cases, it may be the state's responsibility to develop and provide direction to subgrantees within their state plans, there is a general lack of consistency in how DOE guidance is applied from state to state. When no written DOE guidance is available, states talk to other states and construct plans that are similar to other existing plans. As an example, the 10% spending limit for health and safety expenses may have grown out of this sort of information sharing.

The 2002 health and safety guidance also offers general advice about where weatherization programs can turn for help when they confront certain health hazards. The guidance recommends contacting a local environmental program for radon issues, the U.S. Environmental Protection Agency (EPA) for asbestos, and HUD for building structure problems. However, many local programs lack specific information about the names of offices within agencies, specific program information, and fact sheets, which could be utilized to better serve their clients in making referrals.

¹⁸ The data reported in Appendix A reflects the expenditure limits found in the 2009 State Plans for Recovery Act-funded weatherization plus any supplemental information acquired during discussions with state program managers. When the two sources were not in agreement, NCHH relied on the verbal report under the assumption that the plan had been updated.

Inconsistent application of health and safety repair criteria

DOE requires state grantees to stipulate the percentage of funds they can use for health and safety. However, DOE does not provide a priority list of health and safety repairs for weatherization crews, which has caused a wide variation in health and safety activities and spending across the country.

Most program managers identified at least one issue where additional technical guidance and recommended practices would enable expanded use of WAP funds to address the health needs of occupants in homes the program treats. Figure 9 categorizes health and safety issues commonly seen while weatherizing homes, and whether it was viewed as sufficient or where states will benefit from guidance being expanded or developed.

Figure 9. Opportunities to Enhance Program Guidance

Guidance Sufficient	Expand or Clarify Guidance	Develop New Guidance
<ul style="list-style-type: none"> • Building Structure • Combustion Appliances • Fire Hazards • Refrigerant Issues • Space Heaters • Wood Stoves 	<ul style="list-style-type: none"> • Asbestos • Biological Contaminants • Client Education • Electrical – Knob & Tube • Formaldehyde/Volatile Organic Compounds (VOCs) • Lead Paint • Occupant Health • Radon • Smoke & CO Alarms • Spray Foam Insulation 	<ul style="list-style-type: none"> • Injury Prevention • Moisture • Pest Exclusion • Air conditioning • Mold

During the interviews, state and local providers also voiced frustration about some of the following fundamental constraints when working with other federal, state, and local programs:

- **Eligibility:** DOE and HHS base income eligibility on 150% or 200% of the poverty level; HUD and USDA base income eligibility on 50% or 60% of area median income. In some areas, eligibility limits are similar, but each application requires additional information.
- **Loans:** WAP is a grant program, while HUD and USDA often offer loans. Low-income families may not always have the proper credit to apply for loans. If they do have access to a line of credit, they may not be interested in placing a lien on their property or assuming this sort of debt.
- **Service area coverage:** WAP works in all communities in this country, but many of the other programs are targeted to specific areas of high need. As a result, funding streams rarely overlap in the communities WAP serves.
- **Project scope:** In some cases, WAP needs less than \$5,000 to address a specific structural hazard. Some of the home repair loan funds prefer not to finance projects of this low dollar amount because of local administrative overhead costs or program priorities.

- **Timing and availability of other federal funds:** WAP tends to allocate funds to enroll clients over the course of a program year. Other loan funds allocate their dollars early in the fiscal year, which can result in the application process being closed for as much as half the year. Some weatherization agencies are reluctant to work with loan funds that are not always available to support their work.
- **Time-consuming administrative processes:** Each local provider must ultimately be accountable to its federal funder. Each loan or grant a weatherization agency pursues typically has its own application process and reporting requirements. This paperwork diverts WAP personnel from the mission of providing energy upgrades to their clients.

Some of these barriers may be the result of fundamental differences in mission and may be difficult to change. Barriers such as eligibility requirements for federal programs, however, may be something that could be changed with the proper amount of political will, although they might still require involved processes to change policies, statutes, and/or regulations.

Recommendations for Improving Guidance on Health and Safety Measure Eligibility and Spending Limits

When determining *which* health and safety measures should be pursued during a weatherization, it would be very helpful to provide state and local programs with more explicit guidance on eligible expenses, recommended actions, and key resources. It would be better to achieve a balance in the work specifications – maximizing cost-effective energy savings to reduce the financial burden of energy costs to clients, while also addressing critical health and safety needs. This is especially important when the health and safety issues preclude full or any weatherization work from occurring.

Grantees and subgrantees would also benefit from changes in guidance, as well as from better—and more manageable—tracking of the positive outcomes that result from health and safety repairs or referrals.

Based on the interviews with state and local program managers, NCHH has developed the following list of recommendations for DOE to clarify guidance on health and safety repairs:

- i. **Clarify health and safety expenditure caps and allowable expenses.**
DOE has not previously provided written guidance on the overall percentage of funds that can be used for health and safety. The challenge is to provide needed clarification without taking away flexibility. Specifically, DOE can:
 - Provide a consistent core of health and safety treatment, with a minimum set of health and safety measures, and a related minimum percentage of funds allocated for health and safety repairs, unless programs can document that other funds are committed to completing these health and safety measures
 - Encourage states to specify funding caps based on average per unit costs
 - Make explicit whether certain energy-related health and safety activities are allowable WAP expenses (e.g., pest control to ensure integrity of weatherization measures, purchasing X-ray fluorescence [XRF] equipment for lead paint testing, repairs to address moisture and mold, small repairs to knob-and-tube wiring, and testing vermiculite for asbestos)

- Cite specific resources for technical documentation alongside general guidance.

ii. Develop and disseminate health and safety and durability performance measures.

DOE could explore developing performance measures to document health and safety improvements, such as units with installed CO or smoke detectors/alarms, carbon monoxide reduction measures, and lead-safe practices that prevent lead hazards. In addition to counting how many of these sorts of improvements are made, DOE could help grantees and subgrantees establish measures to indicate the short- and long-term impact of these improvements.

“It would be great if DOE would allow testing of some things (it can be expensive to test for asbestos, radon). The fact that we can’t pay for testing puts us in a position where we take precautions, and those precautions happen on every job – there is an incremental cost we’re showing. It would help us fine-tune and help us do a good job on houses that we need to be careful on.”

Martha Benewicz, Wisconsin

iii. Measure weatherization-generated improvements, and improvements that result from successful referrals.

Weatherization programs provide a unique opportunity to assess the health and well-being of not only a home but also its occupants, and can be instrumental in providing help and resources for the occupants. For example, a weatherization program could report outcomes when it refers a client to:

- A program that funds lead hazard control work to comprehensively address lead hazards
- A local asthma home-visiting program that visits an asthmatic child
- A housing rehab program that would address injury risks to elderly residents.

iv. Improve federal coordination to create incentives for integrating energy and health upgrades in low-income homes.

Weatherization programs suggest that the federal government could strategically coordinate related federal programs to enhance and streamline the process of making health and safety upgrades during weatherization. Programs currently leverage funds from:

- HHS (LIHEAP energy retrofit funds)
- HUD (HOME and CDBG Repair Loans and Lead Hazard Control grants)
- USDA (504 Home Repair Loan/Grants).

DOE should work within the current interagency task force on healthy homes to explore barriers that prevent the various agencies from coordinating efforts and funds and identify methods to reduce and possibly remove these.

v. Advocate for a broader grant program to supplement healthy homes repairs across multiple federal programs.

This program could be designed to overcome barriers WAP currently faces when attempting to leverage federal funds. For example, if a family qualifies for WAP, it would automatically qualify for the new funds. The structure for this sort of DOE-administered flexible grant program has already been developed in federal legislation introduced by Representative Brady and Senator Reed: Section 204 of S. 3654 and HR 3891 (111th Congress).

7. Training and Information Sharing

DOE is tightly focused on the issues of training and information sharing within its WAP network – a focus that is more critical than ever, as the industry expands to meet the ambitious weatherization goals set in the 2009 Recovery Act. As it develops its *Workforce Guidelines for Home Energy Upgrades*, DOE has emphasized setting standard work specifications for weatherization procedures, and on systemizing certain health and safety procedures in conjunction with the weatherization work.

Results

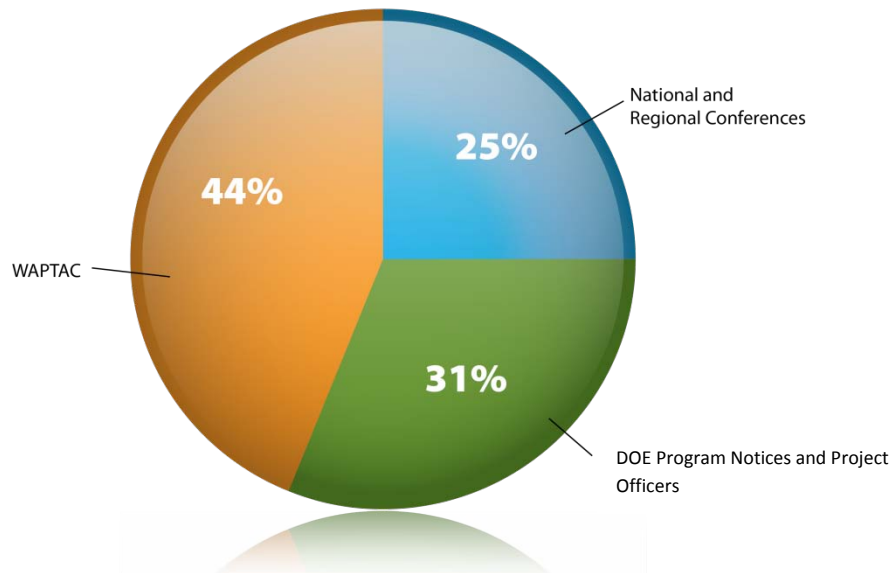
After reviewing the available state Health and Safety Plans, NCHH determined that because federal guidance does not dictate exactly which health and safety measures are allowed during a weatherization, many state plans have sought to clarify these—as a result, this clarification is inconsistent from state to state, and even from region to region or county to county, depending on how these allowances are interpreted. While it is important for this flexibility to remain, there is a great benefit to encouraging states to share solutions and policies, even when individual state practices are not formally recognized by DOE.

For each hazard DOE identifies in Weatherization Program Notice 02-5, at least one grantee provides some form of expanded guidance. With an improved focus on information sharing, it is possible that guidance developed for one state plan could help inform policy in other states that currently lack this sort of information.

Information sources

When NCHH interviewed state and local programs, the program managers listed many sources of information, including a weekly program devoted to the weatherization industry, Wx TV (<http://www.weatherization.org/wxtv/>). However, across the board, there were three main sources of information that almost every respondent mentioned: the DOE-supported Weatherization Assistance Program Technical Assistance Center (WAPTAC), DOE program notices and project officers, and conferences (see Figure 10).

Figure 10. The Top Three Sources of Weatherization Information for State Programs



WAPTAC.org serves as a common first-stop, accessible resource that connects weatherization staff and programs to:

- DOE-funded and recognized WAPTAC training centers
- Many private or nonprofit training and technical assistance providers and resources around the country
- The new, national WAPTAC model curriculum.

Peer solutions

A remarkable level of innovation exists among state and local weatherization programs as they integrate health and safety repairs while improving a home's energy efficiency. Program managers are interested in learning about their peers' strategies to meet clients' health and safety needs. During the NCHH interviews, program managers described how they had adapted their standard scope of work to include procedures such as:

- Testing lead paint to determine if lead-safe work practices are required
- Responding to moisture and mold problems
- Enhancing ventilation to meet ASHRAE 62.2 standards (2010)
- Implementing pest exclusion strategies
- Improving successful referrals to other programs and leveraging funds
- Providing low-cost, high-impact occupant injury prevention strategies
- Leveraging other funding sources to allow more comprehensive treatments
- Radon testing and mitigation
- Removing/replacing asbestos siding for insulation work
- Testing vermiculite for asbestos
- Conducting occupant health assessments and education.

Program innovations include more than just health and safety procedures. For example, some weatherization providers are constantly seeking and discovering new ways of leveraging federal, state, and nonprofit resources to cover essential health and safety repairs. With a more formalized system of

information-sharing, this success could be replicated nationwide through parallel collaborations and partnerships.

Training resources

The most common training sources cited by states and local programs include DOE- and state-funded training centers, as well as private and nonprofit training providers.

While these training resources are abundant, there is currently no single training course that comprehensively addresses the full range of health and safety issues related to energy-efficient retrofits or WAP-permitted expenditures. Instead, health and safety issues are woven into various state-employed curricula, some of which are developed by DOE and some by other private sources. Some of the courses that address health and safety issues in energy upgrade work include:

- The Weatherization Assistance Program Standardized Curricula
- DOE Weatherization Installer/Technician (set of three courses)
- DOE Energy Auditor Training (Single Family)
- DOE Crew Chief Training
- DOE Mold Training
- DOE Lead Safe Weatherization Training (developed by Montana State University)
- Building Performance Institute (BPI) Building Analyst Test & Related Training
- NCHH Healthy Opportunities in Energy Audits and Upgrades.

These training programs are part of the standardized curricula used at DOE training centers and in other state-sanctioned training providers.

All of the previously listed trainings are designed for delivery in a classroom setting with hands-on modules. For some courses, such as the BPI training, an online version is available for the classroom component. The course length ranges from one day for the Lead Safe Weatherization and Healthy Opportunities courses to six days for the DOE Energy Auditor course. The other courses are generally three days; the BPI Building Analyst curriculum also includes a written and field exam component.

In general, when there is training on health and safety issues, the most commonly cited issues are combustion safety, fire hazards, mold and moisture, lead, and ventilation. Other health and safety risks, such as pests, radon, garage contaminants, and occupant injury prevention, are built into training less commonly, if at all. Current trainings typically do not include training to help grantees and weatherization workers easily identify likely referral pathways or other funding sources that can address health and safety problems. Nor do most trainings include information about occupant education or health and safety issues.

Appendix D provides additional information about training and includes a more detailed assessment of health and safety training issues, based on feedback from state and local program managers and analysis of various training course curricula.

Current and future training opportunities

While current weatherization training provides workers with a solid grounding in weatherization procedures, there are targeted opportunities for enhancing health and safety training in areas such as ventilation, pest control, radon, client education, and referral opportunities.

One of the keys to making this training initiative as successful as possible is to ensure that workers are only trained on those measures they are allowed to implement, and that pertain to the homes they will encounter in their daily work. For this reason, it will be necessary for the broad weatherization/health and safety curriculum to allow for a certain level of customization, so it is maximally efficient in terms of expense and time commitment.

There is also a mostly untapped opportunity to provide continuing education to weatherization workers in the form of more formalized updates when new procedures or policies are introduced. During the interviews, many program managers stated that even though guidance updates are usually posted on WAPTAC.org, they typically do not check the site unless they are prompted to do so or go there to search for specific information.

Recommendations to Improve Training and Information Sharing

DOE's well-established WAP network of more than 1,000 state and local providers presents a well-established infrastructure for cost-effectively enhancing health and safety improvements while weatherizing eligible homes.

Although many programs robustly and efficiently address health and safety issues in the homes they treat, with an increased focus on standardized training and information sharing, DOE can raise the overall level of health and safety work across the country. In order to do this, NCHH recommends that DOE:

- i. Clarify caps on health and safety expenditures and eligible expenses during training and provide updates to this information as continuing educational support for workers that have already undergone training.**
DOE could build information about budgeting for and leveraging health and safety repairs into its recommended curricula to help weatherization managers and workers navigate this often confusing landscape. In addition, when it issues new health and safety guidance, DOE could issue web alerts, webinars, or other forms of outreach to help crews be aware of and understand the new policies.
- ii. Develop a performance measure that documents health and safety improvements, as well as the durability of the work that is performed.**
DOE could create a parameter for what is meaningful to measure and why, as well as a reporting tool that helps grantees and subgrantees count and quantify the health and safety repairs they are making.
- iii. Identify, profile, and disseminate information about innovative strategies that program managers are using across the country.**
DOE should continue to develop case studies of innovative practices and disseminate these through networks such as WAPTAC.org, conferences, training programs, and webinars.
- iv. Provide additional information in training courses about key health and safety issues.**
Training could include information on:
 - Pest control, radon and soil gases, asbestos, ventilation, and garage contaminants
 - The special health and safety challenges posed by multi-family buildings
 - Referral networks
 - Updates in policies, procedures, and best practices.

v. Standardize training and procedures surrounding client health and education.

Local programs would like more information on actions workers should take if the home's occupant has health issues, and how to avoid exacerbating health issues during the course of the weatherization. Specifically, program managers would like additional training in using health survey results to modify the scope of work and inform any precautionary measures that they need to take. In addition to training weatherization workers and managers about ways to educate clients about health and safety measures in their homes, DOE could create standardized materials so that homeowners across the nation benefit from consistent guidance.

"I would suggest or request that DOE provide money first and guidance second. We're in a position on the ground already to innovate. Let the states go out and do what they can to address ventilation, have a trial period, and then take the best practices from the 50 states."

Michael Furze, New Mexico

"The state has developed a client education curriculum. It is an allowable expense. The DOE is more interested in funding materials, but client assistance allows for labor too. There is an established curriculum. You must hit specific points if you do it, but you are not mandated to provide a program. It is driven by funding. Marking funds for education would be very helpful. There is a lot of value in doing it, but specific funds would be helpful."

Steve Payne, Washington

Case Study: Mid-Ohio Region Planning Commission (MORPC)

Tom Andrews: Energy Efficiency Program Manager, Mid-Ohio Region Planning Commission (MORPC)

Program Statistics: 540 families served in 2010 with ARRA funds, 200 a year before ARRA. Additional homes supported with utility funds. Mainly single family homes, with 5% manufactured homes.

Most local weatherization providers in Ohio share a core belief that they offer more than just an energy program. Ohio weatherization clients often live in housing that has a host of deficiencies that go well beyond the basic problems found in a standard home that is less than energy efficient. For WAP programs across the county, this story sounds all too familiar, but in Ohio, weatherization providers rarely walk away from homes. Tom Andrews worked for the state weatherization program for almost 15 years before returning to help run a local weatherization program in 2009. “When I was at the state level, it was about energy, but after returning to the street level, this is about bringing as many resources to a home as possible. The state did not intentionally instill this full-service mindset, but when the state convened annual technical conferences, the program always included time for sessions about supporting local weatherization programs with partnerships.”

The annual statewide conferences are both a time to disseminate technical information, such as the latest in zone testing, and a time for providers to share information amongst themselves about leveraging non-WAP resources to provide the range of services most clients need. The providers bring a grassroots commitment to fully serve the clients’ needs. Andrews believes the conferences are a great opportunity to discuss strategies on how to build partnerships with other local agencies and utilities in order to leverage funds. By sharing information about how to leverage these resources effectively, Ohio delivers energy efficient and healthy housing to almost all of the clients who seek WAP assistance.

8. Program Metrics

DOE tracks health and safety expenditures, but lacks performance metrics to track the benefits of health and safety improvements. While the National Evaluation (funded through the 2009 Recovery Act) provides an opportunity for developing these sorts of metrics, DOE does not currently require state or local weatherization programs to keep track of their program metrics to measure performance, document health and safety improvements, and gauge the durability of the work that has been performed.

The most frequently cited weatherization program statistic focuses on the number of units that have been weatherized.

Recommendations to Implement and Use Weatherization Program Metrics

As the nation's focus on weatherization expands, in part due to the influx of funding from the 2009 Recovery Act, it becomes ever more important to measure and quantify the impact these changes are having on the U.S. housing stock. At a local level, programs could use this increased focus on weatherization to implement similar means of counting local health and safety actions or estimating health and safety precautions that are occurring across the country.

Some weatherization programs are already working toward this sort of health and safety documentation, but DOE has not yet adopted a system of metrics that track the full extent of the health and safety improvements that occur during the weatherization work happening across the country. To fully gauge the impact of health and safety repairs during the weatherization process, NCHH recommends that DOE:

- i. **Develop performance measures to document health and safety improvements.**
DOE could record the health and safety improvements that programs are making in homes (e.g., the number of units in which CO or smoke alarms/detectors have been installed, carbon monoxide reduction measures that have occurred, times when lead-safe practices have been employed to prevent lead hazards, etc.). These measures could be generated by counting local actions and/or by estimating from a top-down approach the estimated health and safety precautions that are occurring during weatherizations across the country. It will be essential to find a balance that allows programs to document the health and safety measures they are performing without overburdening them with too much additional record-keeping.
- ii. **Create a process for tracking successful referrals.**
DOE could measure indirect improvements that result from successful referrals to other programs. For example, a weatherization program could report outcomes when it refers a family to:
 - A program that funds lead hazard control work to comprehensively address lead hazards
 - A local asthma home visiting program, which visits the asthmatic child
 - A housing rehab program that would address injury risks to elderly residents.

iii. Track the durability of energy as well as health and safety upgrades to better reflect the long-term benefits of weatherization.

If DOE develops these sorts of tracking metrics, they could measure the long-term challenges of improving energy efficiency in the U.S. housing stock, and recognize the enduring value of improvements such as roof or other structural repairs, many of which have collateral health and safety benefits.

Case Study: Home Energy Plus Programs

Tony Link: Manager, Home Energy Plus Programs, Wisconsin Division of Energy Services

Program Statistics: Following the inception of ARRA funding, from July 2009 through October 2010, Wisconsin has weatherized 17,683 dwelling units, compared to the 8,521 units it weatherized the previous year. The housing stock is primarily one- to four-unit buildings, with 20% – 25% multifamily and 5% mobile homes.

Summary

A decade ago, to ensure its customers were receiving the best-possible services, Wisconsin began evaluating its programs' weatherization improvements, installation protocols, and reporting systems. The Measure Review Initiative documented that non-financial benefits such as comfort and health are important outcomes of weatherization and valued by customers. As a result, Wisconsin now requires local providers to report specific measures and costs in the state's web-based reporting system, including health and safety measures. This enables the program to track the incidence rate and report the average costs of each health and safety measure. To address any challenges this level of reporting may pose to field personnel, the state holds regular trainings/webinars and supports a help desk to answer questions. With this information, the state can track the demand for health and safety repairs, associated costs, and measure the effectiveness of these repairs, particularly when new measures (e.g., enhanced ventilation) are implemented.

"Through a whole-house approach, Wisconsin targets energy conservation measures that address the building shell, HVAC, and baseload needs of our customers. In addition, health and safety issues are identified at the time of the energy audit, and addressed when the cost of effectiveness of the overall job substantiates the investment," says Tony Link. "Access to high-quality and timely data is essential to make these decisions."

When potential health and safety measures exceed \$1,000 per home or repair costs exceed \$500 per home, the state requires the local provider to model the proposed measure package, including the health and safety or repair costs. If the cumulative energy savings-to-investment ratio is greater than one, the provider can justify the investment in the health and safety or repair upgrades. This approach allows the potential for more health and safety issues to be addressed in homes where the energy savings are the greatest. Health and safety funding comes from a mixture of WAP funds and other available resources such as LIHEAP.

9. Conclusion

This report provides a snapshot of weatherization program activities related to health and safety during the summer and fall of 2010. The picture is hopeful, as interviews with 44 state weatherization programs and 42 local weatherization providers demonstrate that weatherization programs across the country tenaciously strive to provide their clients with energy upgrades while also addressing health and safety issues related to the energy efficiency work. Viewed nationally, programs effectively incorporate health and safety repairs into their work specifications and allocate an average 12% (or about \$780) of the \$6500 per unit allocated for weatherization work to complete this sort of health and safety work.

Across the country, there are innovative programs that have found ways to leverage added resources to significantly increase the scope of the health and housing upgrades they can deliver. Innovators have also tackled challenging technical and implementation issues which, in some cases, have streamlined program activities while also creating healthier housing (e.g., testing paint for lead content to determine if lead-safe work practices are required; an action that results in reduced regulatory compliance costs for lead-safe work practices since only a minority of homes tend to test positive for lead).

The interviews with these grantees and subgrantees also revealed challenges. Not all programs have access to or aggressively pursue non-WAP funds to complete needed health and safety repairs while making essential energy upgrades. Even in cases where additional funds may be available, program managers may experience frustration when trying to combine programs and resources that have distinct funding requirements. Some programs described challenges that prevented or limited work in units with specific health and safety issues, while other programs created procedures to successfully address similar issues. Still, the overall picture remains hopeful because opportunities abound for DOE to assist programs in leveraging, innovating, and collaborating.

In general, weatherization programs encounter five core challenges when addressing health and safety issues as they work to create healthier living environments:

1. Increasing the number of homes that they successfully refer to other programs/resources to address health and safety issues which can prevent initial weatherization work, with the goal of reducing deferrals.
2. Finding more effective ways to leverage non-WAP funding to support housing upgrades, in order to more fully address health and housing deficiencies in the homes undergoing weatherization.
3. Improving access to DOE health and safety policies that clearly describe eligible expenses, priority actions for the range of issues confronted in the field, and recommended health and safety allocations that allow local discretion in meeting average—not rigid—per-unit caps.
4. Improving access to training and best practices to address challenging health and safety issues, which will encourage programs to share information in order to benefit from program innovators.
5. Effectively communicating the benefits of the health and safety upgrades for client health as well as the measuring, tracking, and reporting the durability of the weatherization measure.

NCHH makes the following recommendations for DOE, in order to address the challenges described in this report. These include:

1. **Continually enhancing existing WAP guidance and resources.** This will address concerns related to eligible expenses, health and safety priorities, and funding limits. It may also result in fewer deferrals as programs are better able to address conditions that previously resulted in a deferral.
2. **Supporting and disseminating innovative strategies and best practices.** This will address programs' desire for enhanced training and learning about best practices in order to address challenging and emerging health issues. It will also increase the number of homes successfully referred to other programs/resources, resulting in fewer deferrals.
3. **Promoting improved leveraging of non-DOE funds, as well as more effective partnering with other federal agencies to address health and safety problems.** This will help to increase successful referrals and thereby reduce deferrals, while leveraging non-WAP funds. Strategies noted in the report include: providing incentives for weatherization providers to access other federal housing/health renovation funding, creating an "opportunity fund" weatherization providers can access for health and safety repairs, and supporting a supplemental roof repair program to ensure the durability and reach of weatherization work.
4. **Improving federal coordination to create incentives for integrating energy as well as health upgrades in low-income homes.** This will help increase successful referrals for homes needing additional housing and health repairs because programs will be able to offer integrated services. It will also increase non-WAP funding in homes serviced by weatherization. The report recommends that DOE and other federal, state, and local agencies collaborate to provide incentive points in federal housing programs for grantees that leverage weatherization funds, and support consistent income eligibility criteria among energy and housing rehab programs.
5. **Assisting weatherization grantees so they can identify opportunities for collaboration to leverage non-governmental funding to supplement WAP and address health and safety issues.** This will help increase the number of successful referrals while reducing deferrals. It will also increase non-WAP funding in homes serviced by weatherization and provide programs with access to innovative collaborative approaches and best practices.
6. **Developing and supporting program metrics to track successful referrals, health and safety benefits, and enhanced durability of weatherization measures that result from health and safety improvements.** This will help address programs' desire to more effectively communicate the health and energy benefits of health and safety actions. These sorts of metrics could also document changes in effective leveraging of non-WAP funds as well as the number of successful referrals to non-WAP programs which reduce program deferrals.

DOE has demonstrated strong leadership in balancing health and safety with its energy efficiency mandate. A great opportunity exists to provide the WAP guidance, tools, and best practices to enhance grantee and subgrantee capacity to make homes healthier during energy retrofits. DOE is also well positioned as a member of the federal *Inter-Agency Healthy Homes Work Group* to further the strategies identified in this report, which will help to increase programs' access to added resources. Through these collaborative effects, the weatherization network can successfully offer its clients homes that are as comfortable and healthy as they are energy efficient.

Glossary

Audit: An assessment of a building to identify needed energy upgrades and health and safety issues.

Defer: Action to deem a unit ineligible—even temporarily—for weatherization work due to pre-existing housing condition or housing-based health condition. Deferred units are often referred to a different resource for housing rehabilitation and/or information is provided to the property owner about the repairs needed before the unit would be eligible for weatherization services.

Health and safety improvements: Actions/repairs/improvements to improve health and/or address safety issues for occupants in homes.

Partial weatherization: Weatherization services done to provide energy upgrades in a portion of a building/home. For example, if attics are wet, weatherization crews avoid air sealing and insulating attics and instead undertake heating system repairs and other work not affecting the attic. If portions of an attic have knob-and-tube wiring, crews avoid insulation work in these areas.

Referral: Actions taken to provide a property owner with information about another program that may be able to address housing or occupant health needs. Possible housing referrals may be to USDA Rural Development grants/loans; HUD CDBG or HOME Rehab funds; state or local rehab funds; lead poisoning prevention or lead hazard control grant programs; utility funded energy programs. Referrals may be limited to providing information to an owner or occupant or more directly assisting the owner's access to these sorts of available services.

Units remaining untreated: Units that are deferred for needed work and in which the work does not occur, resulting in the home not receiving weatherization services.

WAP: Weatherization Assistance Program

Appendix A: Cost Estimates for Hazards that Weatherization Programs May Encounter (Assumes 100,000 Units Weatherized Annually)

Hazard Action	Common Treatments	Prevalence	Unit Cost	Sources' Prevalence /Cost	Total Cost (\$ millions)
Alarm systems missing/inoperable	CO Detector installation Smoke alarm installation	77.3% 11.4%	\$85 \$27.50	1/b 1/b	\$6.8
Carbon monoxide hazards	Tune appliances	22%	\$300-400	6/d	\$6.6
Electric circuits upgrades	Replace circuit box	8.6%	\$1,300-3,000	1/f	\$11-26
HVAC Filters requiring replacement	Replace filters – high efficiency	56%	\$25	1/d, g	\$1.4
Lead hazard prevention (LSW)	Follow DOE/EPA lead-safe work practice (LSW) rules	10%	\$60	7/b	\$0.6
Moisture problems	Minor roof and gutter fixes	5%	\$650	1/b	\$3.3
Space heaters – unvented	Replace – primary	3.5%	\$900-2,400	1/d	\$3.2-8.4
Ventilation needed	Bath exhaust fans, dryer vents to exterior	16.6% 33%	\$225-425 \$350	3/b,h	\$15-18.5
SUBTOTAL					\$48-74 Million Or \$480-740/unit
Air conditioner (missing or inoperable in warm climate)	Install room air conditioner	5-20%	\$220	8/d	\$0.4-1.8
Asbestos	Vermiculite testing	32%	\$300	5/i	\$9.6
Client education	<i>Formal client education</i>	100%	\$50	9 /l	\$5.0
Electrical	<i>Repair knob-and-tube wiring</i>	5% ¹⁹	\$700-2,500	9/k	\$3.5-12.5
Injury prevention	<i>Repair stair, replace handrail, install grab bar, replace missing bulbs, Set water temp <120°</i>	20%	\$75-150	9/d	\$2.2-3.7
		20%	\$15	9/d,g	
		80%	\$5	1/b	
Lead	Lead paint testing	41.6%	\$200	1/l	\$11.1-15.7
	Repair deteriorated	3.7%	\$750-2,000	1,7/c,j	

¹⁹ Knob-and-tube wiring is most commonly found in pre-1930 homes (EPA/WAPTAC); with the assumption that 10% of pre-1930 homes are below poverty (based on American Housing Survey data), it is possible to infer that 50% of these homes have knob-and-tube wiring.

Hazard Action	Common Treatments	Prevalence	Unit Cost	Sources' Prevalence /Cost	Total Cost (\$ millions)
	interior paint				
Moisture problems	Fix plumbing/replace toilet;	10%	\$350	1/d	\$28.2-40.6
	Replace roof	6.2%	\$4,000-6,000	1/d	
	Replace gutters* (in excess of basic repair)	4.9%	\$750	1/d	
Mold	Moderate mold control	38%	\$500-2,000	2/c	\$19-76
Pest control	<i>Pest control</i>	5%	\$150	9/l	\$1.4-2
	<i>Rodent exclusion</i>	8.3%	\$75-150	1/l	
Radon	Testing	100%	\$15	5/e	\$6.8-18.2
	Mitigation	6.7%	\$800-2,500	5/e	
Sewerage breakdown	Sewer line repair	2.0%	\$4,000-8,000	1/c	\$8-16
Ventilation	Kitchen exhaust fans;	10%	\$1,000	4/a	\$13-16
	Dehumidifier	15%	\$200-400	4/e	
Other	Refrigerant disposal, wood stove replacement				No estimate
SUBTOTAL					\$108-216 Million Or \$1,080-2,160/unit
TOTAL					\$156-290 Million Or \$1,560-2,900/unit

All prevalence and cost estimates were derived from documented sources except where *italicized*. *Italicized* data are estimates based on professional expertise. Appendix E provides a detailed explanation of the cost estimates and provides specified data sources for each.

Information Sources

Prevalence

1. American Housing Survey (2007) – Data for Households Below Poverty Living in 1-4 Unit Buildings
2. American Society of Home Inspectors (2010)
3. Asthma Regional Council, *New England Healthy Homes (NEHH) Project Final Report (2006)*
4. Baltimore Weatherization Program (2010)
5. EPA – Asbestos, Radon Websites (2010)
6. Environmental Health, *Report on CO and Appliances (2008)*
7. National Survey of Lead and Allergens (1995)
8. Residential Energy Consumption Survey (2005)
9. Professional Expert Opinion

Cost

- a. Asthma Regional Council, *New England Healthy Homes (NEHH) Project Final Report (2006)*
- b. Baltimore Weatherization Program (2010)
- c. Costhelper.com (2010)
- d. Craftsman 2010 National Renovation Insurance Repair Estimator
- e. EPA Energy Star, Radon Website (2010)
- f. Fixr.com (2010)
- g. Home Depot (2010)
- h. Housing Developer Pro, Community Development Software LLC (2010)
- i. Seattle Weatherization Program (2010)
- j. The National Center for Healthy Housing, *National Evaluation of HUD Funded Lead Hazard Control Grantees (2003)*
- k. WAPTAC (Knob-and-tube repair report) (2010)

APPENDIX B: Current WAP Policy Notices that Address Health and Safety

WPN 02-5 – Health and Safety Guidance

Effective July 12, 2002; provides information about the types of hazards, abatement materials, and costs that should be considered when developing health and safety procedures. Includes unit deferral criteria.

WPN 02-6 – Weatherization Activities and Federal Lead-Based Paint Regulations

Effective July 12, 2002; provides updated guidance to Regional Offices and States relative to Weatherization health and safety matters associated with lead-based paint in homes.

WPN 05-1 – Energy Related Mold and Moisture (excerpt)

Effective November 12, 2004; provides guidance to the DOE policy on mold and provides resources to assist educating the weatherization network and clients about mold.

WPN 06-4 – Mold Awareness Training CD

Effective May 18, 2006; provides Mold Awareness Training CD to all grantees with copies for their local agencies for use in the Weatherization Assistance Program.

WPN 08-4 – Space Heater Policy

Effective March 3, 2008; provides an update to the policy relating to space heaters for the Weatherization Assistance Program. This policy supersedes the previous space heater policy issued by memoranda on March 18, 1992.

WPN 08-6 – Interim Lead-Safe Weatherization (LSW) Guidance

Effective September 22, 2008; provides additional guidance for an LSW component of a Health and Safety Plan. This guidance builds on the foundation provided in Weatherization Program Notice (WPN) 02-6, Weatherization Activities and Federal Lead Based Paint Regulations.

WPN 09-6 – Lead Safe Weatherization (LSW) Additional Materials and Information

Effective January 7, 2009; provides clarification and additional information to grantees as they implement WPN 08-6, Interim Lead-Safe Weatherization (LSW) Guidance. This guidance augments, but does not replace, WPN 08-6 and builds on the foundation provided in

Weatherization Program Notice (WPN) 02-6, Weatherization Activities and Federal Lead Based Paint Regulations.

APPENDIX C: Summary and Suggested Enhancements to Improve DOE Health and Safety Guidance

The activities currently required by DOE health and safety program notices as well as eligible and ineligible expenses are presented below for each issue. Suggested modifications to the existing state and local program guidance are summarized.

Asbestos: Required Actions: Major asbestos problems should be referred to the appropriate state agency and/or the Environmental Protection Agency (EPA).

- *Eligible:* Encapsulation, removal, and replacement of asbestos siding, and removal to the extent that energy savings resulting from the measure will provide a cost-effective savings-to-investment ratio.
- *Ineligible:* General asbestos removal.

Suggested modification: *Clarify eligibility of vermiculite testing expenses. Provide innovative approaches for vermiculite testing (e.g., Oregon, Washington State) and removal/replacement of asbestos siding.*

Some local programs are deferring, or anticipate deferring, up to 50% of units because they do not believe testing is an eligible expense and are not prepared to work in attics with potential vermiculite unless it is documented to be asbestos free. Other local programs report confusion about the eligibility of removal and replacement of potential asbestos siding that has resulted in partial weatherization efforts. Current guidance is clear that this is eligible.

Biological contaminants, including mold: Take caution when selecting air tightness limits for dwellings with these problems. Consider establishing procedures that allow local agencies to assess moisture. States are required to have a description of a training plan on awareness of moisture and mold hazards, and client notification procedures for its local agencies. DOE has developed a recommended mold awareness curriculum to enable Weatherization workers to assess moisture and mold conditions and take precautions during Weatherization work so as not to exacerbate moisture problems.

- *Eligible:* Actions to address conditions that would prevent effective weatherization work to proceed or affect the health of workers or clients.
- *Ineligible:* General removal of mold, odors, viruses, bacteria, unsanitary (including raw sewage) conditions, and rotting wood. DOE funds should not be used to test, abate, remediate, purchase insurance, or alleviate existing mold conditions.

Suggested modification: *Provide innovative approaches (e.g., moisture/mold response protocols; notification/disclaimer forms; moisture assessment).* Grantees are clear that DOE funds cannot be used for general removal of mold, but how to implement this is unclear.

Building structure: Major structural problems should be referred to the appropriate state agency and/or HUD. Chimneys should be checked to ensure they are in good condition and that no obvious building code violations are evident. Masonry chimneys used by vented space heaters should be inspected to ensure that they are properly lined in compliance with building codes.

- *Eligible:* Incidental repairs necessary for the effective performance or preservation of weatherization materials are allowed. Examples of these limited repairs include sealing minor roof leaks to preserve new attic insulation and repairing water-damaged flooring as part of replacing a water heater.
- *Ineligible:* Significant building rehabilitation.

Suggested modification: None

Client education: Client education, including information on the proper operation of the heating equipment and installed smoke or carbon monoxide alarms should be provided. Client education is required when wood stoves are provided. All local agencies should include some form of notification or disclaimer to the client upon the discovery of a mold condition and what specifically was done to the home that is expected to alleviate the condition and/or that the work performed should not promote new mold growth.

- *Eligible:* Provision of client education regarding the dangers of carbon monoxide and excessive moisture levels, particularly if any unvented space heaters are left in the dwelling as a secondary heat source, or emergency back-up.

Suggested modification: *Provide innovative approaches.* The focus and intensity of the current education varies greatly. Almost half of the programs contacted said that their auditors informally provide clients information about maintenance of energy activities (e.g., use of thermostats, filter replacement) and the required health and safety materials (lead pamphlet, mold observations). A similar percentage of programs require the auditor to dedicate time to meet with the client to review energy and health and safety items. Approximately 10% of the programs contacted offered a more intensive program with client educators providing a standard package of information about how to maintain a safe, healthy and energy efficient home.

Combustion safety: Develop and implement a policy for testing combustion appliances (particularly before and after air tightening) and addressing problems identified.

- *Eligible:* Purchase of testing equipment, treatment to address problems found. The cost to purchase the testing device and mechanical tools necessary to check for indoor air quality and to train personnel to do the testing are allowable expenses. These charges may be made to the program operations cost category.

Suggested modifications: None

Electrical issues: Ensure that thermal insulation around knob-and-tube wiring conforms with applicable codes in jurisdictions where the work is being performed. Identify and notify the owner of gross electrical overloads. Consider repairing conditions if they prevent effective installation of Weatherization measures (e.g., installation of air conditioners, heat pumps, or electric water heaters).

- *Eligible:* Repair measures for overloaded circuits necessary to allow weatherization measures (e.g., installation of air conditioners, heat pumps, or electric water heaters).

Suggested modification: *Promote current guidance.* Some programs continue to believe that DOE discourages thermal insulation around knob and tube wiring and either walk-away from these situations

or provide partial weatherization services even though existing guidance provides this flexibility if it is consistent with current building code.

Fire hazards: Develop procedures to identify hazards, treat hazards and identify resources to address hazards that cannot be remediated with DOE WAP funds. Safety inspection related to a space heater should include, but not be limited to, a check for adequate floor protection and code-compliant clearances to walls and other combustible materials.

- *Eligible:* Treatment of fire hazards.

Suggested modification: None

Formaldehyde/volatile organic compounds (VOCs): Take caution when selecting air tightness limits in dwellings with VOC problems. No specific guidance is provided in DOE program notices about eligible or ineligible expenses.

Suggested modification: *Provide innovative approaches to assess and respond to VOCs.* Grantees rarely raised formaldehyde or VOCs as an issue. A possible interpretation of this silence is that the policy is clear and programs are addressing these hazards by improving ventilation with bath and kitchen fans. However, an equally likely interpretation is that the current guidance is brief and offers no specific actions or references to best practices that programs should follow.

Injury prevention: No current guidance.

Suggested modification: *Develop guidance on injury prevention citing minor repairs as eligible expenses and identify innovative approaches.* Programs expressed both confusion and frustration about their ability to address low cost injury prevention actions such as installing banisters and repairing stairs. The majority of state programs do not treat this as an eligible health and safety expense, yet a significant number of local programs indicated that they felt this was a low cost (generally less than \$50) expense that provides significant health benefits for the target population of elderly and disabled individuals, and families with small children. For the few grantees that will approve the repair of a railing or step as a health and safety item, they justify it as a necessary practice to allow workers to safely conduct their work.

Lead paint: Undertake lead safe work practices consistent with DOE Lead Safe Weatherization (LSW) training curriculum, EPA regulation and HUD guidance.

- *Eligible:* Testing lead based paint associated with weatherization activity. Lead safe Weatherization (LSW) practices. Although DOE does not require grantees to charge LSW costs to health and safety, it strongly encourages grantees to do so.
- *Ineligible:* Lead abatement, routine lead paint testing, and dust clearance testing.

Suggested modification: *Consolidate lead guidance into one document, allow lead paint testing as an eligible expense, and provide innovative practices for paint testing or lead safe work practices.* Some programs complained that the multiple notices result in confusion about the current DOE policy position (e.g., follow EPA regulations, Lead Safe Weatherization, or both). A few states also believe that if routine lead paint testing was an eligible expense, many programs would find many homes could be exempt

from lead renovation rules. Two states (Indiana, Utah) currently undertake routine lead testing and have found it productive in reducing the number of units requiring lead safe work practices.

Moisture assessment and responses: No guidance beyond that provided under Biological Contaminants, see above.

Suggested modification: *Provide new guidance on moisture assessment needs, eligibility of moisture repairs, and innovative approaches.* There is confusion in the field about eligibility of moisture repairs. For example, some programs consistently repair or install bath fans to exhaust humidity and moisture while other programs consider this an ineligible expense. Similarly, minor repairs to gutters/downspout and minor roof repairs are treated inconsistently among states. While existing guidance does address mold, it does not more broadly deal with moisture.

Occupant health: Establish procedures to identify preexisting conditions (e.g., allergies) and steps to ensure that weatherization work will not worsen these problems. DOE Program Notices provide no specific guidance about the eligibility of expenses.

Suggested modification: *Provide innovative approaches to assess occupant health during energy audits and client education.* Current guidance calls for energy auditors to include a question about the health of the occupant as part of the energy audit. Outreach to states and local programs suggests that many programs do not routinely ask such a question and when it is asked, programs are unable to state how the information changes the weatherization scope of work.

Pests: No current guidance.

Suggested modification: *Provide new guidance on pest exclusion and identify innovative practices.* There is no mention of pest control activities in current guidance. Most states do not consider pest control an energy-related activity and thus consider it ineligible. However opportunities exist to incorporate pest exclusion with air sealing strategies, particularly to exclude rodents. Failure to pest proof air sealing can make a home susceptible to pests chewing through foam or caulk used during a job. Opportunities also exist to provide guidance on addressing pest issues in attics and other spaces that might impede effective weatherization work.

Radon: Establish sound radon-related policies. Refer to appropriate local environmental organization or agency for mitigation or abatement.

- *Eligible:* Take precautions in a dwelling with a known radon problem. Include Weatherization techniques that have been shown to help in radon remediation.
- *Ineligible:* Radon abatement.

Suggested modification: *Identify innovative practices and clarify radon testing is an eligible expense. Revise guidance pending results of upcoming pilot projects and evaluation work (e.g., DOE national evaluation to test radon pre and post weatherization work).* Current guidance calls for grantees to establish sound radon-related policies, but most programs are at a loss for what this means. There is no written policy on testing and grantees report that some DOE project officers discourage testing because

DOE funds cannot be used to correct any hazards identified. DOE guidance encourages referrals to EPA, but EPA grants to localities to address radon are extremely limited. DOE guidance does allow grantees to implement weatherization activities (e.g., plastic ground cover in basements/crawlspace) that could have an ancillary benefit of mitigating radon. Most grantees do not address radon. A few are pursuing pilot projects to better understand the radon problem and possible solutions.

Referral opportunities to health, housing and environmental programs: Guidance integrated with issues.

Suggested modification: *Expand existing guidance to provide more specific information on how to access federal, state and local programs/funds. Identify innovative approaches.* The 2002 Policy Notice on Health and Safety offers some guidance to grantees about where they can go for additional information and support for certain health and safety hazards. For example, programs are to refer to the EPA or a local environmental agency when confronted with asbestos or radon and are to refer to HUD when addressing structural deficiencies or lead paint. Unfortunately, this guidance is fairly limited and lacks details about the specific grant programs that are available and how a WAP grantee might coordinate with them. Some Federal programs such as the USDA rural housing rehab program are not listed in any of the DOE policy notices.

Refrigerant issues: States should have protocols in place to comply with EPA standards relating to the maintenance, service, repair, and disposal of appliances containing refrigerants. Reclaim refrigerant in compliance with Clean Air Act requirements. DOE program notices do not address the eligibility of refrigerant-related expenses.

Suggested modification: None

Smoke and carbon monoxide alarms: No required actions.

- *Eligible:* Installation of smoke and CO alarms. (Language could be interpreted to suggest eligibility applies only to homes with space heaters.) These expenses may be charged to health and safety or program operations.

Suggested modification: *Create distinct guidance for smoke and CO alarms clarifying eligibility of the expense.* A significant number of programs consider installation of smoke alarms and carbon monoxide detectors an eligible expense and a common health and safety measure. However, the only written guidance regarding the eligibility of such devices is found in the policy notice on space heaters, and this policy is vague whether installation of alarms is an eligible expense in homes without space heaters. Some programs confessed confusion about why a smoke alarm is energy-related.

Space heaters: Prohibits DOE-funded Weatherization work where the unit is heated with an unvented gas- and/or liquid-fueled space heater as the primary heat source. Allows unvented gas- or liquid-fueled space heaters to remain as secondary heat sources in single-family houses provided compliance with building codes, but encourages removal/replacement.

- *Eligible:* Replacement of unvented gas- or liquid fueled space heaters with vented heaters when the space heater is a primary heat source. Removal of unvented gas- or

liquid fueled space heaters that serve as secondary heat sources. Costs over the savings to investment ratio may be paid for with health and safety funds.

- *Ineligible:* Any work other than incidental repairs to electric space heaters. Replacement of unvented gas- or liquid fueled space heaters that serve as secondary heat sources and remain in the dwelling after weatherization.

Suggested modifications: None.

Spray foam: Follow applicable EPA and OSHA requirements and guidance.

Suggested modification: *Provide guidance on safe work practices to address occupant health.* The current guidance refers programs to EPA and OSHA but does not provide specific suggestions. This is an emerging issue where guidance will likely need to be updated over the coming years.

Ventilation: No current guidance.

Suggested modification: *Clarify eligibility of ventilation improvement expenses (e.g. bath fan, dryer venting, kitchen fans) all of which are commonly pursued. Provide Innovative Approaches related to testing fan flows and compliance with ASHRAE 62.2 (2010).* Several state and local programs indicated that they were pursuing more aggressive ventilation responses to enable them to confidently tighten homes. Several are exploring meeting the ASHRAE 62.2 standard for existing buildings and/or testing bath fan flows and repairing and replacing as needed.

Wood stoves: Meet local codes and EPA emission standards when replacing stoves. DOE Program Notices do not address the eligibility of wood stoves.

Suggested modification: *Clarify allowable expenses.*

APPENDIX D: Assessment of DOE Training and Other Courses

This appendix summarizes our assessment of DOE and other training, addresses health and safety issues in weatherization based on feedback from state and local program staff interviewed and our cursory examination of the seven training course curricula.

Training resources

The WAPTAC website serves as a common first-stop, easily used umbrella resource that can connect staff and programs to: 1) DOE funded and recognized WAPTAC training centers, 2) many of the private or nonprofit training and technical assistance providers and resources around the country, and 3) the new, national WAPTAC model curriculum. The most common sources of training cited by states and local programs include DOE and State funded training centers and private and nonprofit training providers.

Health and safety training providers

DOE & state funded training centers

The WAPTAC website currently provides referrals to 15 different DOE-supported weatherization training centers, which meet the needs of various climate zones throughout the country:

<http://www.waptac.org/Training-Resources/WAP-Training-Centers.aspx>. These centers offer in-class and hands-on training either onsite at the Centers or by bringing trainings to other areas. Regional, climate-specific field guides are also available.

In June 2010, DOE announced that they are funding 26 additional training centers to serve the growing needs of the weatherization industry. The funding will also support the expansion of 8 existing training centers, thereby more than tripling current capacity. The training centers will offer training through a combination of classroom, online, and hands-on learning tools.

Private and nonprofit training resources/providers

The WAPTAC website also provides referrals to 14 private and nonprofit weatherization consultants and resource centers and useful guides for identifying and developing residential energy training programs. The private and nonprofit weatherization consultants include BPI Training Affiliates, Affordable Comfort, Inc, Saturn Resource Management, Conservation Services group and several other nationally leading providers (<http://www.waptac.org/Training-Resources/Training-Opportunities.aspx>). Useful technical training tools and training guidance is available on the additional resources page, <http://www.waptac.org/Training-Tools/Additional-Resources.aspx>.

Assessment of training courses' treatment of health and safety issues

No one separate training course addresses the range of health and safety issues related to weatherization. Health and safety issues are woven into various curricula to a varying extent among

different weatherization training courses. To understand the extent of this variation and current health and safety priorities in the field, we reviewed a number of common training courses to assess the extent to which they address some common healthy home issues associated with potential hazard situations and indoor air quality problems. We reviewed the following training course curricula:

- WAPTAC Standardized Curricula
 - o DOE Weatherization Installer/Technician (set of 3 courses)
 - o DOE Energy Auditor (Single Family)
 - o DOE Crew Chief
 - o DOE Mold Training
- Lead Safe Weatherization Training
- Montana Weatherization Training
- BPI Building Analyst Test & Related Training (used by many states)
- NCHH Healthy Opportunities in Energy Audits and Upgrades (newly developed)

Table 1 summarizes the extent to which these training courses address health and safety issues in four broad categories:

- “Awareness Only” provides general information about various health and safety risks.
- “Assessment Strategies” prepares trainees to identify and assess specific risks in the field.
- “Repair” prepares trainees to either correct a problem observed or to take preventative measures.
- “Referral Guidance” helps trainees identify potential referral resources for additional assistance in dealing with specific risks.

Observations

A few hazards are consistently addressed at the Assessment and Repair levels by all training programs: Combustion Appliances and Combustion Gases, Fire Hazards, Mold and Moisture, Lead, and Ventilation. Combustion Appliances and Combustion Gases appear to be addressed in the most depth, with clear guidance on how to remediate problems as well as prevent others from developing. The Montana Weatherization training covered Assessment and Repair most consistently.

Fire hazards also received strong attention for both Assessment and Repair, however not all programs offered clear guidance on how to maximize energy benefits from attic insulation when knob and tube wiring was in place. The guidance was clear that putting insulation over knob and tube wiring created a hazard, but it was less clear how to address the problem should it arise (other than doing a partial job or going around the wiring).

All of the training courses addressed Ventilation at the level of Assessment and Repair, but there is variation about the types of ventilation addressed. Training programs reviewed blower door tests and other diagnostic tests and most addressed the importance of dryer vents and some other spot

ventilation. We did not specifically note whether there was guidance on how to provide enough mechanical ventilation to meet ASHRAE 62.2 or how to find funds for such ventilation.

Guidance on Lead was also fairly consistently delivered in terms of Assessment and Repair, usually stipulated by federal regulations for lead safe work practices. Guidelines on lead testing were less frequent than recommendations to look for peeling paint. Similarly, guidance on Mold and Moisture focused on basic visual assessment and preventative moisture control measures, rather than mold testing and remediation. The DOE Mold course offered the most extensive moisture and mold training and discussed health impacts, assessment and actions to prevent moisture problems during weatherization work.

There was a significant mix in the extent to which the other issues were covered by the different training programs, which was reflected by the uncertainty that many state and local program staff expressed in interviews. For example, the training classes did not consistently address Radon and Asbestos at the Assistance and Repair levels, and many local programs reported confusion or different strategies for these issues. The DOE Installer/Technician program addressed both of these issues at the Repair level on a limited basis (with an emphasis on using a well-sealed vapor retarder in crawl spaces to seal that air off from the home in the case of radon, and doing sidewall insulation from the inside in the case of asbestos shingles).

There was also significant variation in coverage for Garage Contaminants, Refrigerant issues, and Home Safety. In addition, there was very little attention paid to control measures for Pests, other than making sure that exterior vents have a flap to keep pests from crawling indoors, as mentioned in the DOE Installer/Technician Program. No Assessment or Repair actions were included for sewage or biological contaminants or for Non-Radon Below Ground Gases.

WAPTAC standardized courses do not include information about making referrals to other programs. The NCHH's HOEAU program provides referral opportunities, except for asbestos. The BPI training courses offer information about referrals in most cases.

In summary, current training is much more extensive for combustion safety, fire hazards, mold and moisture, lead, and ventilation. Current training courses give relatively little emphasis to client education, establishing referral networks, pests, radon, garage contaminants, and injury prevention.

Table D-1. Summary Health and Safety Issues Covered by Weatherization Training

	No coverage	Awareness Only	Assessment Strategies (e.g., testing, assess visually)	Repair Specifications	Referral Guidance (suggestions of local programs, identification exercise...)
Combustion Risks (Appliances and Gases)		NCHH HOEAU	DOE Installer/Tech DOE Energy Auditor DOE Crew Chief Montana Training BPI Training BPI Test	DOE Installer/Tech DOE Energy Auditor Montana Training BPI Training BPI Test	BPI Training BPI Test NHCHH HOEAU
Fire Hazards, (e.g., venting hazards, creosote, electrical)		NCHH HOEAU	DOE Installer/Tech DOE Energy Auditor DOE Crew Chief Montana Training BPI Training BPI Test	DOE Installer/Tech DOE Energy Auditor DOE Crew Chief BPI Training BPI Test	BPI Training BPI Test
Mold and moisture		DOE Crew Chief	DOE Installer/Tech DOE Energy Auditor DOE Mold BPI Training BPI Test Montana* NCHH HOEAU	DOE Installer/Tech DOE Energy Auditor DOE Mold BPI Training BPI Test Montana* NCHH HOEAU	BPI Training NCHH HOEAU DOE Mold
Sewage or other biological contaminant	DOE Installer/Tech DOE Crew Chief BPI Training BPI Test	DOE Energy Auditor NCHH HOEAU			NCHH HOEAU
Pests	DOE Crew Chief	DOE Energy Auditor Montana* BPI Training	BPI Test NCHH HOEAU	DOE Installer/Tech NCHH HOEAU	NCHH HOEAU
Home Safety (e.g., trips /falls; alarms)	DOE Installer/Tech	DOE Energy Auditor DOE Crew Chief	Montana Training BPI Test NCHH HOEAU	Montana Training BPI Training BPI Test NCHH HOEAU	BPI Training BPI Test NCHH HOEAU

	No coverage	Awareness Only	Assessment Strategies (e.g., testing, assess visually)	Repair Specifications	Referral Guidance (suggestions of local programs, identification exercise...)
Lead	DOE Energy Auditor		DOE Installer/Tech DOE Crew Chief BPI Training BPI Test NCHH HOEAU	DOE Installer/Tech BPI Training BPI Test NCHH HOEAU	BPI Training NCHH HOEAU Montana* ²⁰
Radon	DOE Crew Chief	BPI Training BPI Test NCHH HOEAU	DOE Energy Auditor Montana Training NCHH HOEAU	DOE Installer/Tech DOE Energy Auditor Montana Training	NCHH HOEAU
Non Radon Below Ground Gases (e.g., sewer gas)	DOE Installer/Tech DOE Energy Auditor DOE Crew Chief Montana Training BPI Training BPI Test	NCHH HOEAU			NCHH HOEAU
Asbestos (e.g., vermiculite, pipe insulation, siding)	DOE Energy Auditor DOE Crew Chief		BPI Training BPI Test NCHH HOEAU Montana*	DOE Installer/Tech BPI Training BPI Test Montana*	BPI Test Montana*
Ventilation (ASHRAE 62.2)			DOE Installer/Tech DOE Energy Auditor DOE Crew Chief Montana Training BPI Training BPI Test NCHH HOEAU	DOE Installer/Tech DOE Energy Auditor DOE Crew Chief Montana Training BPI Training BPI Test NCHH HOEAU	NCHH HOEAU
Garage Contaminant	DOE Installer/Tech DOE Crew Chief	DOE Energy Auditor Montana Training	BPI Training BPI Test NCHH HOEAU	DOE Energy Auditor BPI Training BPI Test NCHH HOEAU	NCHH HOEAU
Refrigerant issues	DOE Installer/Tech		DOE Energy Auditor BPI Training	DOE Energy Auditor	MT Wxn Training Center offers EPA level

²⁰ In cells where there is an * following Montana, there was a general comment offered for the issue by the reviewer. These notes included: the MT WTC developed the DOE mold training curriculum; the MT WTC offers potential responsible party and lead safe work practices training to address lead; and offers OSHA initial 24-hour certification.

	No coverage	Awareness Only	Assessment Strategies (e.g., testing, assess visually)	Repair Specifications	Referral Guidance (suggestions of local programs, identification exercise...)
	DOE Crew Chief NCHH HOEAU		BPI Test		1-3 certification

REPORT DOCUMENTATION PAGE

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13. SUPPLEMENTARY NOTES NREL Technical Monitor: Christina Larney					
14. ABSTRACT (Maximum 200 Words) In the summer and early fall of 2010, the National Center for Healthy Housing interviewed people from a selection of state and local agencies that perform weatherizations on low-income housing in order to gauge their approach to improving the health and safety of the homes. The interviews provided a strong cross section of what work agencies can do, and how they go about funding this work when funds from the Weatherization Assistance Program (WAP) do not cover the full extent of the repairs. The report also makes recommendations for WAP in how to assist agencies to streamline and maximize the health and safety repairs they are able to make in the course of a standard weatherization.					
15. SUBJECT TERMS Health; safety; repairs; funding; agency; Weatherization Assistance Program; WAP; Department of Energy; DOE; Office of Energy Efficiency and Renewable Energy; EERE; weatherization; upgrade; energy efficiency; grant; deferral; referral; metrics					
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