

Rapid Health Impact Assessment: Weatherization Plus Health in Connecticut

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Building Relationships to End Poverty

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Executive Summary

The state of Connecticut has an ambitious energy efficiency goal, to weatherize 80% of its housing stock by 2030. Decisions around how best to invest federal, state, and utility ratepayer resources to reach this goal have implications for the health of Connecticut residents and especially for low-income households, where housing has a considerable impact on health and the life chances of children. Over the past six months, multiple state agencies have been considering policy and funding decisions about whether, and to what extent, health and safety measures will be included as part of residential energy efficiency upgrades. How can Connecticut achieve its energy goal, while maximizing positive health outcomes and reducing potentially negative impacts on health?

To advise state decision makers, the state's weatherization and healthy homes stakeholders, led by the Connecticut Association for Community Action (CAFCA), conducted a rapid health impact assessment to help inform two key policy decisions:

- What health and safety measures should be included in state administered Department of Energy funded Weatherization work?
- What health and safety measures should be included in state and utility funded weatherization work?

The stakeholders included the Energy Efficiency Board, United Illuminating, Connecticut Light and Power, local Weatherization provider New Opportunities, Inc., the LAMPP project at the CT Children's Medical Center, and the state Departments of Public Health, Social Services, and Energy and Environmental Protection. A health impact assessment (HIA) is a flexible, data-driven tool that brings health and safety information to the table for decisions made outside of the health arena.¹ HIAs produce information for action around a specific policy or program decision, involving participation by the full range of stakeholders, a systematic and impartial review of the evidence, and dissemination of findings. The rapid HIA was conducted over a three month period using existing data to estimate the likely health impacts of specific health and safety measures, as well as that of weatherization itself, and the estimated cost: benefit ratios for such measures. These analyses inform a priority list of health and safety measures that could be conducted by the energy workforce and achieve significant health benefits with positive cost: benefit ratios.

The HIA looks at the evidence for 16 health and safety measures conducted as part of energy upgrades, as well as outcomes associated with providing energy assistance funds, conducting weatherization/home energy upgrades, and with heating system repair or replacements alone. The HIA finds that the following list of health and safety repairs will produce substantial health benefits and can be integrated

¹ The National Research Council defines HIA as "a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population. HIA provides recommendations on monitoring and managing those effects." Page 4, in *Improving Health in the United States: The Role of Health Impact Assessment* (2011).

with energy upgrades using the existing workforce or through coordinated referrals to appropriate professionals. Repairs noted with an + will help reduce health inequities linked to asthma and respiratory disease, lead poisoning, pest infestations, fire and carbon monoxide risks, and trips and falls resulting in injuries and hospitalizations. Documentation of assessment criteria, methods, and data sources are included in the full report.

Measures (+ Addresses Health Disparity)	Reduce Deferrals	Enhance Energy Saving	Significant Health Benefit	Health Benefit: Cost
Repairs Reduce Deferrals, Save Energy, & Improve Health				
Minor Moisture Repairs (needed for energy work) +	✓	✓	✓	X \$1.14/1
Asbestos Abatement (non-intact & needed for energy work)	✓		✓	Data not available
Gas Leak Detection & Repair	✓			X likely >\$1/1
Knob & Tube Wiring Repair (needed for energy work)	✓			Data not available
Air Sealing with Pest Exclusion +		✓	✓	X likely >\$1/1
Window Replacement of Leaded Single Pane +		✓	✓	X likely \$1.79/1 (includes energy benefits)
Repairs Create Significant Health Savings				
Injury Prevention/Minor Home Repairs +			✓	Data not available
Radon Testing +			✓	X \$51/1
Radon Mitigation (if work increases radon>EPA threshold) +			✓	X \$47/1
Remove Unvented Gas Appliances			✓	X likely >\$1/1
Smoke Alarms +			✓	X \$33/1
Smoking Cessation Client Education & Referral +			✓	X likely >\$1/1
Repairs Recommended by EPA Protocols				
Carbon Monoxide Detectors +				X \$1.25/1
Ventilation Upgrades				Data not available

Recommendations

1. Ensure that the Connecticut Weatherization plan submitted to DOE in 2013 provides the flexibility to undertake priority health and safety repairs allowed by DOE. Include asbestos encapsulation by qualified professionals, repair/replacement of red-tagged heating systems, minor electrical repairs

to knob and tube wiring, smoke alarms, carbon monoxide alarms, minor moisture repairs, integrated pest management, radon testing, removal of unvented combustion space heaters, referrals for smoking cessation and smoke free housing, and ventilation improvements.

2. **Fund energy efficiency programs fully to achieve both energy and health and safety benefits.**
3. **Refer Connecticut residents who receive Department of Social Services benefits to energy efficiency programs, leveraging existing state investments in population health.**
4. **Provide funding and financing to resolve the health and safety issues that would otherwise cause eligible households to be deferred from weatherization.** These include gas leaks, asbestos and vermiculite insulation, knob and tube wiring, significant lead hazards from severely deteriorated paint in pre-1978 homes, and significant moisture/mold repairs. Addressing these root causes of deferrals enables the state to administer utility ratepayer and US Department of Energy (DOE) Weatherization Assistance Programs more cost-effectively and moves Connecticut closer to its goal of weatherizing 80% of homes by 2030.
5. **Incorporate priority health and safety repairs into energy efficiency programs using a combination of energy efficiency funds, financing, and/or other resources. Give priority to repairs that produce a net positive health and energy benefit, enhance energy savings, and reduce health inequities related to housing, including**
 - Air sealing including pest exclusion
 - Minor moisture repairs needed for energy work to proceed
 - Window replacement of single pane windows (pre-1950) likely with lead paint
 - Air sealing with pest exclusion.
6. **Identify sustainable funding sources to address additional health and safety repairs, which can be undertaken by the energy efficiency workforce and related professions. State health, environment, social service and housing agencies, utilities, and non-governmental organizations should collaborate to secure the necessary resources.** Assuming 43,000 homes are treated annually, support will be needed to provide the following: smoke alarms and carbon monoxide detectors (if owners cannot provide), radon testing, radon mitigation for income eligible families, removal of unvented appliances, referrals for smoking cessation and smoke free housing, injury prevention repairs, integrated pest management, and ventilation upgrades.
7. **Conduct evaluations to track the health benefits of added health and safety repairs during energy work.** Identify those measures that are most effective in reducing health inequities among Connecticut residents.

Introduction and Background

The state of Connecticut has established an ambitious energy efficiency goal, to weatherize 80% of its housing stock by 2030. The state intends to use funds generated by utility ratepayers, the US Department of Energy Weatherization funds, and private investments to achieve its goal. Decision-making around the investment of public and utility ratepayer resources for energy efficiency upgrades to achieve this goal has implications for population health and safety in Connecticut, given the many ways in which housing and indoor air quality affects health, especially for low-income households. Yet there is no state policy to guide the health aspects of both funding decisions and the scope of weatherization activities. How can Connecticut achieve its energy goal and create positive health outcomes, while reducing potentially negative impacts on health?

Health and safety is an important part of the multiple weatherization programs in Connecticut. The CT Department of Energy and Environmental Protection (DEEP) administers low-income weatherization programs using funds from the U.S. Department of Energy (DOE WAP) and from funding acquired through ratepayer programs. The CT DEEP's Public Utility Regulatory Authority (PURA) oversees weatherization programs supported by ratepayers at two electric utilities (CT Light and Power, United Illuminating) and three gas utilities (Yankee Gas, CT Natural Gas, Southern CT Gas). The weatherization programs supported by ratepayers include the Home Energy Solutions Income Eligible (HES-IE) Program (for low-income households) and the Home Energy Solutions (HES) program for remaining households.

Two policy opportunities exist to specify health and safety measures during energy upgrades.

- DOE's Weatherization Program has established rules regarding allowable health and safety measures, as well as the total cost permissible for health and safety. States submit plans to define how they will implement health and safety practices within the constructs of the DOE requirements.
- Utilities may develop their own policies regarding required and allowable health and safety repairs.

An innovative pilot, the CT Efficient & Healthy Homes Initiative CTEHHI, managed by United Illuminating in collaboration with The Connecticut Light and Power Company (CL&P), as well as nonprofit, municipal, and healthcare partners, provides energy efficiency and healthy homes upgrades to low-income residents with a goal of reducing energy use, improving client health, and reducing the number of low income families turned away for such services due to housing conditions that necessitate a deferral of work. The pilot is made possible by the Connecticut Energy Efficiency Fund, an Energize CT partner, and by a Weatherization Innovation Pilot Program grant from the United States Department of Energy. The initiative has spurred interest across the state in linking weatherization with healthy homes interventions. In addition, an active healthy homes partnership across the state has identified housing-based health threats that are not being adequately addressed by the weatherization programs; two of the six core goals for the state's Healthy Homes Initiative are to promote the adoption of integrated

healthy homes programs across the state (the subject of this HIA) and to support impact assessment (this project) (CT DPH, CT Healthy Homes Data Book, 2012).

Developments in Connecticut draw on national efforts to support the integration and coordination of weatherization and healthy homes interventions, in particular through the DOE's Weatherization Plus Health initiative being implemented by the National Association for State Community Services Programs (NASCSPP). Weatherization Plus Health offers training and technical assistance to facilitate new and stronger strategic partnerships between weatherization and healthy homes programs, to enhance the services offered to clients, improve the health conditions for those receiving energy upgrades, and streamline the delivery of energy upgrade programs. Connecticut's weatherization providers, led by the Connecticut Association for Community Action (CAFCA), community action agency and local Weatherization provider New Opportunities, Inc., and the state DOE WAP Program Manager at the Department of Energy and Environmental Protection (DEEP), have been involved in Weatherization Plus Health-supported pilot activities. This health impact assessment is one part of Weatherization Plus Health in Connecticut.

Stakeholders

A number of organizations are actively participating in this health impact assessment. They include:

- Department of Public Health (DPH) –Francesca Provenzano (coordinator of the statewide Healthy Homes Initiative)
- Department of Energy and Environmental Protection (DEEP) –Mike Coyle (DOE WAP Program Manager)
- Department of Social Services (DSS) –Sylvia Gafford (state WAP administrator prior to Oct 2012)
- CT Energy Efficiency Board (EEB), advisor to the CT Public Utilities Regulatory Authority (PURA) -- Glenn Reed (Energy Futures Group, EEB Consultant), Jamie Howland (Environment Northeast, EEB Consultant)
- CT Association for Community Action (CAFCA) –Edith Karsky (Executive Director), Kelley Jacobson, Rhonda Evans
- New Opportunities, Inc. (NOI) –Joanne Balaschak, Mike Gurecka, Jeff Rouleau (WAP sub-grantee)
- CT Children's Lead Action for Medicaid Primary Prevention (LAMPP) –Chris Corcoran
- United Illuminating/CT Efficient & Healthy Homes Initiative (UI) --Chris Ehlert and Pat McDonnell
- Connecticut Light and Power (CL&P) –Lomont White.

In addition to these formal, active stakeholders, the CT Academy of Engineering and Science is an observer of this HIA. The Academy has been commissioned by the state General Assembly to conduct a study of HIAs and their prospective use to promote informed decision-making within the state.

NASCSP supported consultants Ellen Tohn, Tohn Environmental Strategies and Amy McLean Salls and Jonathan Wilson of The National Center for Healthy Housing (NCHH) to provide training and technical assistance on this HIA. Dr. Lynne Snyder at NASCSP served as project manager and analyst. In-kind technical assistance on HIA was provided by Dr. Megan Sandel at the National Center for Medical Legal

Partnerships (NCMLP). The team also received added technical assistance from NCHH as part of a grant from NCHH to NOI, supported by the American Public Health Association and The Centers for Disease Control.

About Health Impact Assessment

A health impact assessment (HIA) is a flexible, data-driven tool that brings health and safety aspects of policy and programmatic considerations to the table for decisions that typically are made outside of the health arena yet are expected to influence inequities in health and life chances for a large group of people. State health departments are using HIAs more and more to integrate health-related concerns across the range of public policy decisions (Pew Charitable Trusts, 2012). HIAs share a common methodological approach focused on producing actionable information relevant to a specific policy or program decision, involving participation by a full range of stakeholders, a commitment to systematic and impartial review of relevant data, and broad dissemination of findings and recommendations. An HIA may take place over the course of a day, months, or years. HIAs are typically conducted over a period of 4 months (rapid) to 18 months (full).

The six steps in an HIA include the following (Human Impact Partners, n.d.):

1. Screening –determine whether HIA is a useful and feasible approach
2. Scoping –develop a theory and a related set of research questions about how the decision affects health and a work plan to test this theory
3. Assessment –create a profile of population health conditions and document or predict how health would be changed by the decision being examined
4. Recommendations –generate a set of policy-relevant recommendations based on findings from the assessment
5. Reporting –develop and present HIA results to decision makers
6. Monitoring –track the influence of the HIA on decision-making and on stakeholders

Given the timing of key policy decisions, this is a rapid HIA. The evidence and recommendations from the HIA are anticipated to influence decision making about weatherization in the state related to the inclusion of specific health and safety measures in the DOE funded WAP and utility rate payer-funded programs, as well as funding sources. The HIA process in Connecticut will serve as a best practice, to be replicated in other jurisdictions engaged in advocacy to inform state utility regulators and legislatures making decisions about healthy homes funding as part of energy efficiency programs.

Screening & Scoping

The first two of an HIA's six steps involve establishing parameters for the study: what decision will be addressed, and how. The HIA stakeholders completed both screening and scoping at their November 7th meeting.²

Screening: Relevant Policy Decisions

The HIA is intended to provide information that will be considered by decision-makers in multiple policy contexts.

1. The Department of Energy and Environmental Protection (DEEP), for its submission to the DOE Weatherization Assistance Program of an annual state plan, including a detailed health and safety plan, scheduled for April 1, 2013.
2. DEEP's Energy Efficiency Board, an advisory body, and Public Utilities Regulatory Authority, as both continue in early 2013 to develop the elements of a 3 year plan for utility ratepayer-funded energy efficiency programs (Home Energy Solutions, Home Energy Solutions-Income Eligible).

To inform these decisions, this rapid HIA examines 16 health and safety measures, as well as weatherization itself, heating system repair and replacement, financial energy assistance, and thermal comfort as a program objective, to derive a list of priority measures expected to have the most significant health benefits, with attention to those that deliver both health and energy benefits. The HIA also offers guidance about the process for implementing health and safety measures, and for tapping resources outside of WAP, HES, and HES-IE.

This set of decisions has the potential to affect health through likely impacts on housing quality and affordability, effects of reduced demand for home energy on power plant utilization, and the local and state economy. These outcomes have implications for health inequities among Connecticut that are rooted in socioeconomic and housing-related factors. They will be felt most immediately by households that are income-eligible for weatherization (earning no more than 200 percent of federal poverty) and energy assistance (earning no more than 150 percent of federal poverty, or 200 percent for a household that includes an elder or someone living with a disabling condition). During 2011, about 170,000 households received energy assistance out of an estimated 363,170 eligible households, or about 27 percent of Connecticut's approximately 1,359,218 households (USDHHS, 2011). Impacts are also likely to be felt by all households that as ratepayers pay a surcharge that supports the state energy efficiency fund and all state residents whose homes are potentially eligible for either DOE WAP or the HES programs.

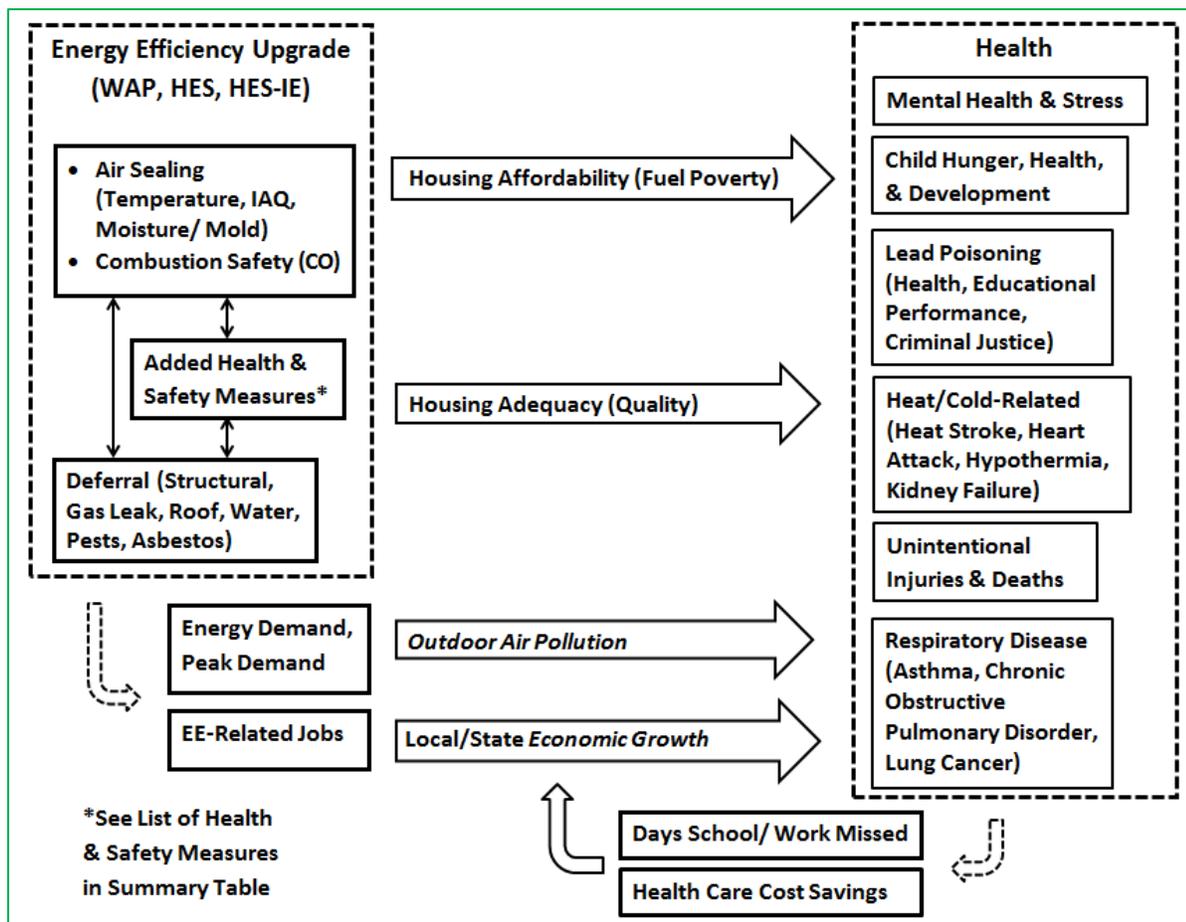
The relatively short time for conducting the HIA and limited resources available dictated the decision to develop a rapid HIA, using existing data sources. Connecticut stakeholders are well situated for involvement in an HIA, with a number of ongoing projects that link weatherization and healthy homes

² Copies of the resulting screening worksheet and initial scoping pathways diagram are available on request.

and an active state Healthy Homes Task Force. Beyond the immediate decision points that the HIA will address in the next 3 to 4 months, the HIA will offer input to future state legislative proposals regarding funding for energy efficiency that includes healthy homes.

Scoping Pathways

The team and stakeholders generated scoping pathways diagrams to depict the scope of weatherization’s influence on health through a series of pathways from intervention to health outcome. A revised version of the scoping pathway is depicted in Figure 1, illustrating a shared set of pathways for weatherization and for weatherization plus health. The four means by which energy efficiency upgrades



(depicted on the left hand side of the figure) influence health are depicted as arrows and include housing affordability, housing adequacy or quality, outdoor air pollution, and the local or state economy. Health outcomes are listed in the boxes on the right hand side of the figure.

Figure 1. Scoping Pathway for Residential Energy Efficiency Upgrades for DOE Weatherization Assistance Program (WAP), utility funded upgrades for both Income-Eligible (HES-IE) and Market Rate (HES), and including expanded health and safety measures under Weatherization Plus Health (WPH).

Assessment Plan

Four research focus areas were identified:

- Which health and safety measures are likely to produce significant benefits? Which of these have added value for low income households? Which ones are relatively low cost to implement, considering the frequency of intervention?
- How will a decision to fund Weatherization Plus Health affect the capacity to deliver weatherization services without additional funding for health and safety repairs?
- If the policy goal is to reduce deferral rates, which health and safety interventions should be added to weatherization? What are the health and safety benefits of adding these measures?
- If an expanded set of health and safety measures (Weatherization Plus Health) is not funded under PURA direction, are there other funds available to address these needs?

The workplan for the HIA involved three stakeholder meetings (the first for screening and scoping, the second for review of findings, and the third for review of draft recommendations and communications plan); all three meetings built and enhanced our stakeholder engagement. The core HIA team (Tohn, Wilson, Snyder, and Salls) conducted the analytic work, monitored DEEP, EEB, PURA deliberations, and prepared the report and outreach materials as a set of deliverables under the NASCAP Weatherization Plus Health Initiative. Specific tasks conducted as part of the assessment included literature reviews, a health profile of Connecticut's population, and modeling of the likely health and safety outcomes based on evidence from health and safety measures conducted in Connecticut and elsewhere.

Assessment: Profile of Existing Conditions

A health impact assessment considers the range and likelihood of outcomes of a specific intervention for a specific population. This HIA looks at outcomes related to residential energy efficiency upgrades or weatherization, around the selection of health and safety measures to be funded or realized through partnerships with healthy homes providers. The HIA also explores the implications of these programmatic and funding decisions related to weatherization on the health of Connecticut residents, especially those who live in low-income households eligible for DOE WAP or weatherization funded by utility ratepayers (HES-IE, HES).

To answer the research questions noted above, the HIA consists of multiple parts - (1) a profile of existing conditions, including community health and health disparities associated with housing and a tabulation of current health and safety measures performed as part of energy efficiency upgrades, and (2) an analysis of the likely health benefits and cost: benefit ratios associated with health and safety interventions, based on a literature review, for the categories of health conditions identified in the scoping pathway. A set of key findings is listed, from both the profile and the analyses, and comprises the basis for the HIA's recommendations.

Community Health Profile and Health Inequities Related to Housing

A profile of this population from the perspective of demographic and socioeconomic characteristics, residential energy access and use, housing and housing-related health conditions, helps us understand the significance of what we know about weatherization and enhanced health and safety interventions for Connecticut; CT's Healthy Homes Data Book (2012) provided much of the information presented below.

Demographic, Socioeconomic, & Geographic Profile

Connecticut is an urban state (88% of its population) of approximately 3.6 million residents in 1.4 million households (U.S. Census, 2012). About 5.5% of its residents are young children (5 and younger), 22.4% are children 18 years and younger, and 14.4% are elders at least 65 years of age. About 11.1% of residents identify themselves as Black and 13.8% as Hispanic. Median income for Connecticut households is \$69,243, while 10.1% of all residents, and 12.8% of children, live in households earning less than federal poverty (U.S. Census, 2012).

Residential Energy Access & Use

Like other states in the Northeast and upper Midwest, Connecticut relies on costly fuel oil to meet heating needs; nearly half (48.2%) of households use fuel oil or kerosene as their primary fuel. Over one-quarter (28.5%) of CT households are income-eligible for LIHEAP, or about 387,027 households (USDHHS, 2011). Many of these households include someone more vulnerable to adverse health outcomes: 42.1% of CT LIHEAP eligible households include an elder 60 years or older, 16.6% include a child under 6 years of age, and 10.5% include a member living with a disability (USDHHS, 2011). Even

with the receipt of energy assistance, housing affordability remains a problem, with implications for safety and health.

A survey of Connecticut households receiving an energy assistance grant (the federal Low-Income Home Energy Assistance Program) identifies influences or determinants of health,

- Housing Affordability: 77% of LIHEAP households reduce spending on household basics, 38% report missing full rent/mortgage payments, and 5% report being evicted;
- Hunger and Nutritional Status: While 13.8% of CT population is food insecure, including 18.8% of CT children (Map the Meal Gap, 2012), 25% of LIHEAP households report going without food for 1 day due to high energy bills;
- Access to Care: While 9% of CT adults report going without health care in the past 12 months due to cost (County Health Rankings, 2012), 29% of LIHEAP households report going without medical or dental care due to high energy bills and 31% did not purchase a medically necessary prescription;
- Social Capital: 19% of CT residents report social isolation, which presents a risk to health, especially during a power outage or hot weather (County Health Rankings, 2012)
- Temperature-Sensitive Conditions: 27% of LIHEAP households in CT report being unable to use heat due to shutoff for nonpayment or broken equipment, and 18% unable to use a/c due to shutoff for nonpayment or broken equipment (NEADA, 2011).

Housing

Housing adequacy or quality as well as affordability influences the health of Connecticut residents. This is especially true for the 5.5% of households nationally that report severe or moderate physical problems (AHS, 2011) and the 40% of CT households that report housing costs greater than 30% of income (County Health Rankings, 2012). National-level indicators of risky exposures highlight where a Weatherization Plus Health approach can make a difference:

- Respiratory Disease: 24.2% of households report rats, mice, other rodents, or roaches, 19.3% of households report moisture from a leak, and 3.5% report mold; 11.9% of households nationally include smokers (AHS, 2011). In Connecticut, approximately 20% of residents live in homes in high radon exposure areas (CT DPH, CT Healthy Homes Data Book, 2012).³
- Temperature-Sensitive Conditions: 1.1% of households report being too cold in winter due to high energy bills (AHS, 2011).
- Unintentional injuries and deaths: 4.5% of households nationally report using unsafe means to heat; in Connecticut, 26% of LIHEAP recipient households report using a stove or oven for heat

³ Across Connecticut's 8 counties, average indoor radon exposures vary from 2.4 picoCuries/Liter (Middlesex) to 4.3 picoCuries/Liter (Windham). The percentage of households tested with indoor radon exposures higher than the EPA threshold for mitigation (4 picoCuries/Liter air) are as follows: Fairfield (29% of households), Hartford (18% of households), Litchfield (28% of households), Middlesex (16% of households), New Haven (28% of households), New London (28% of households), Tolland (23% of households), and Windham (30% of households). Data from Air Chek, 2012.

(NEADA, 2011). 5.3% of households nationally report no working smoke detector (AHS, 2011), and 21.1% of households nationally report no working CO detector (AHS, 2011).

Housing-Related Health Conditions

The HIA scoping pathways point to a range of health outcomes, some caused by substandard housing and others, including heart and respiratory disease, made worse by poor indoor air quality or other hazardous conditions. Connecticut-specific data are available for indicators of health status that can be addressed by a Weatherization Plus Health Approach, illustrating the burden of housing-related conditions:

- Lead Poisoning: About 6.5% of children tested in the state, or 4,984 children, have elevated blood lead levels of 5 micrograms/deciliter blood or higher and 0.8% of children tested statewide, or 619 children, have elevated blood lead levels of 10 micrograms/deciliter blood or higher (Hung, 2012).
- Temperature-sensitive conditions: 29.8% CT residents report having high blood pressure, with residents who identify themselves as Black much more likely to report high blood pressure (38.8%); and 7.3% of CT adults report a diabetes diagnosis.
- Unintentional injuries and deaths: There have been 52 deaths from CO poisoning between 2000 and 2007 (CT DPH, Healthy Homes Data Book, 2012).
- Respiratory disease: 11.9% of children and 9.4% of adults have asthma, and 6.1% of adults live with chronic obstructive pulmonary disorder (COPD) (2009) (CT DPH, CT Healthy Homes Data Book, 2012). There are approximately 4,700 smoking-related deaths annually (CT DPH, 2013).

Health Inequities

The CT Healthy Homes Data Book (2012) describes Connecticut as a state where wealth and poverty divide the population into two groups that have very different life experiences, where

“striking disparities exist across town lines, among racial and ethnic groups, and between urban and rural populations. The overall health of Connecticut’s people varies dramatically between its wealthiest and poorest communities.”

Poverty magnifies the impact on health and safety of housing-related influences or determinants of health. These determinants contribute to health disparities, or inequities in health and life chances for residents who live in low-income households, compared with all Connecticut residents. Households of color, for example, are disproportionately more likely to be low-income, putting their members at greater than average risk of exposure to housing conditions that broaden health inequities:

- Lead Poisoning: In Connecticut, children of color (Black or Hispanic) are about twice as likely to have an elevated blood lead level (at least 10 micrograms per deciliter blood) compared with white children (1.2%, versus 0.7% for white and 0.6% for non-Hispanic children) (CT DPH, CT Healthy Homes Data Book, 2012).

- **Temperature-sensitive Conditions:** Households living in poverty and those identifying themselves as Black are almost twice as likely to report being too cold in winter due to inadequate insulation, compared with all households (1.9% versus 1.1%) (AHS, 2011). Among CT households receiving LIHEAP, 15% of LIHEAP households report a member visiting a physician or hospital due to illness related to cold home, and 4% due to illness related to a hot home (NEADA, 2011). African American and Hispanic adults are much more likely to have heart disease or diabetes, two conditions that are made worse by exposure to the cold.
- **Unintentional Injuries and Deaths:** Households living in poverty and those identifying themselves as Hispanic are about twice as likely to report no working smoke detector, and Black and Hispanic households about three times as likely to report no working carbon monoxide detector (58.3% and 67.2%, respectively, compared with 21.1% for all households), as do 64.2% of households living in poverty (AHS, 2011). A convenience survey of Connecticut emergency room patients finds that urban respondents who rented their homes, those in poor or near-poor households, and households identified as Hispanic or Black were less likely to have a carbon monoxide detector (57.8% of white respondents, compared with 24.7% of Hispanic and 42.0% of African American respondents (Johnson-Arbor et al., 2012). Hispanic and Black households are much more likely to report using unsafe means to heat (12.3% for Hispanic, 19.2% for Black), compared with all households (4.5%), compared with 15.7% of households in poverty (AHS, 2011).
- **Respiratory Disease:** Children of color are much more likely to be exposed to asthma triggers at home and to have asthma. Nationally, households that identify themselves as Black and those living in poverty are almost twice as likely to report pests, compared with all households (39.1% and 33.9%, respectively), more likely to report indoor moisture or mold, and more likely to include someone who smokes (16.9% of Black households and 20.0% of households living in poverty, compared with 11.9% of all households nationally) (AHS, 2011). In Connecticut, 16.7% of adults report smoking, a percentage that rises to 25.7% for Hispanic adults (BRFSS, 2011). Black children are more than twice as likely to have an asthma diagnosis, and children in homes below poverty are one-third more likely to have asthma (AHS, 2011).

Weatherization Health and Safety Measures: DOE and HES

The scope of health and safety measures integrated into weatherization in CT, and available funding, varies by program. This HIA considers two weatherization programs in the state:

- the U.S. Department of Energy’s low-income Weatherization Assistance Program (DOE WAP), which includes the Weatherization Innovation Program competitive award to United Illuminating (for its CT Efficient and Healthy Homes Initiative)
- residential energy efficiency upgrades funded by utility ratepayer funds, administered through the state’s HES and HES-IE (income-eligible) programs.

Table A identifies the health and safety measures currently allowed under each program.

Table A. Measures Currently Performed During Energy Upgrades in Connecticut

Health & Safety Category	DOE-WAP	Utility Funded, Income-Eligible (CTEHHI, HES-IE)	Utility Funded, Market Rate*	Notes
Asbestos Remediation	X		X	Removal of siding only
Carbon Monoxide Detectors	X	X	X	Only some programs include
Dehumidifier		X		Justified as both energy and health
Electrical Repairs & Upgrades (Knob & Tube)	X	X	X	If needed to perform energy efficiency upgrade
Gas Leak Detection & Repair		X	X	
Heating Systems Tuneups, Repair, & Replacements	X	X	X	
Hot Water Heaters	X	X		
Mechanical Venting	X			
Minor Moisture Repairs, including Vapor Barrier	X	X	X	
Minor Repairs to Building Structure, Roof; Drainage	X	X	X	If needed to perform energy efficiency upgrade
Remove Unvented Gas Appliance	X			
Smoke Detectors	X			
Window Replacement for Older Single Pane (likely leaded)			X	

Sources: DEEP state plan for WAP (2012); unpublished data from United Illuminating (handout from Jan 3, 2013 stakeholders meeting).

* Many of these measures are funded by the property owner.

Assessment: Health Impacts of Weatherization Plus Health

To analyze the likely impacts of weatherization on health outcomes, and create a ranking of the health and safety measures, a literature review was conducted that focused on typical components of a Weatherization Plus Health approach, as well as residential energy efficiency upgrade work itself.⁴ While the scoping pathway identifies four determinants or influences on health –housing affordability, housing quality, outdoor air pollution (as a result of changes in energy production), and the local and regional economy (as a result of energy efficiency as well as health and safety interventions), the available evidence on both air pollution and economic impacts is very limited and the rapid HIA timeframe and resources precluded conducting original research or modeling; findings related to outdoor air pollution and economic impacts are cited where existing studies have been identified.

For each health and safety measure, the HIA team:

- Estimated the likely impact (evaluating the magnitude, significance for health, and distribution among groups within the state population);
- Provided a quantitative estimate of the likely health benefit (e.g., number of reduced deaths, injuries, hospitalizations) and related costs, where data were available;
- Identified if the repairs would help reduce deferrals (housing conditions that must be addressed before energy work can proceed);
- Indicated if the repairs would provide benefits to at risk populations; and
- Judged the quality of the evidence.

Summary Table of Findings

Table B presents the results of the literature review. It is organized by category of health determinant and outcomes identified in the HIA scoping pathways. It includes an assessment of

- the extent of impact,
- the estimated number of homes that would be treated (based on the approximately 43,000 Connecticut homes weatherized in 2012 through WAP, HES, and HES-IE),
- a notation if failure to include a measure would be likely to result in deferral of a home from weatherization,
- the distribution of a measure’s likely impacts within the Connecticut population (for example, almost all measures disproportionately benefit low-income households, compared with their benefit to the general population)
- ranking of the quality of evidence (method given in the table legend that follows)

⁴ See Appendix A for a description of the literature review methodology and a summary of citations, by category of health determinant and outcomes.

To assess the quality of evidence, the HIA team looked at the strength of the literature and whether the health and safety measure was included as a minimum health protection in U.S. Environmental Protection Agency’s Healthy Indoor Environment Protocols for Home Energy Upgrades –Minimum Health Protections (2012). According to EPA, the protocols “provide practical guidance on improving or maintaining indoor air quality and indoor environments during home energy upgrades, retrofits or remodeling”.

Health Determinant & Outcomes	Intervention	Extent of Impact (Magnitude & Severity)	Impact (assuming 43,000 weatherized homes)	Likely Deferral	Distribution	Quality of Evidence & EPA Minimum Action* (◆ EPA, ◇ not in EPA)
Pathway = Housing Adequacy or Quality						
Heat- & cold-related ailments & premature deaths	Air Sealing, Insulation, Heating System Repair/ Replacement	◆◆◆	Likely		Low-income	◆◆◆
Residential fire & smoke-related injuries & premature deaths	Smoke Alarm	◆◆◆	Prevents 3 deaths Prevents injuries		Low-income; African American elders	◆◆◆
	Electrical Repairs (Knob & Tube)**	◆◆	Removal from attic allows insulation installation per NEC code	yes	Low-income and older housing	◆
	Electrical Repairs (Faulty Circuits)**	◇◇	Required for work to proceed/prevents fires	yes	Low-income;	◇◇
	Heating System Repair/ Replacement	◆◆◆	Prevents 3 deaths		Low-income;	◆
Carbon Monoxide Poisonings & Premature Deaths	CO Detector	◆◆	Prevent 17 CO poisonings		Low-income;	◆
	Gas Leak Repair**	◇◇◇	2,500 homes receive repairs Reduced risk of explosions	yes	Low-income;	◇
	Remove Unvented Gas Appliances	◆◆	860 unvented heaters removed		Low-income	◆◆
Respiratory Disease,	Air Sealing with Pest Exclusion	◆◆ IPM ◆ Pest Exclusion	2,150 homes with mice (5% - AHS)		Low-income	◆◆ IPM ◆ Pest Exclusion

Health Determinant & Outcomes	Intervention	Extent of Impact (Magnitude & Severity)	Impact (assuming 43,000 weatherized homes)	Likely Deferral	Distribution	Quality of Evidence & EPA Minimum Action* (◆ EPA, ◇ not in EPA)
Disability, & Premature Death (asthma, COPD, heart disease/stroke)	Ventilation (ASRAHE 62.2)	◆◆			Low-income	◆
	Thermal Comfort	◇◇	Reduction of COPD symptoms; reduction of child respiratory symptoms		Elder households; households with children	◇◇
	Moisture Repairs	◆◆	1,419 asthmatics reduced symptoms	yes (mold)	Low-income; households with children;	◆◆◆
Lung Cancer & premature deaths	Env Tobacco Smoking Client Ed & Referral	◇◇	Simple referral program; impact depends on local cessation partner		Low-income; Households that include a smoker	◇◇◇
	Radon Testing & Client Education	◆/◆◆			Households in high-radon areas; low SES (income, education)	◆◆
	Radon Mitigation**	◆◆	4,300 homes with reduced lung cancer risks		Households in high-radon areas; low SES (income, education)	◆◆◆
	Asbestos Abatement (if friable and prevents energy efficiency work, ie pipe)	◆◆	10% of pipes insulated with asbestos (NB: > 50% of homes over 50 years old have some asbestos.)	yes	Low-income; older housing stock	◆◆
	Asbestos Abatement (vermiculite attic insulation)**	◆	4,3000 homes (10%)	yes	Low-income; homes built between 1920 and 1990	◆◆

Health Determinant & Outcomes	Intervention	Extent of Impact (Magnitude & Severity)	Impact (assuming 43,000 weatherized homes)	Likely Deferral	Distribution	Quality of Evidence & EPA Minimum Action* (♦ EPA, ◇ not in EPA)
Lead poisoning, with cognitive & behavioral problems for children, heart & kidney disease for adults	Single Pane Window Replacement (Lead Remediation)	♦♦	1,650 pre-1978 homes get at least one window replaced per year yielding \$900,000 in lifetime productivity benefits to society		Older housing stock	♦♦
Unintentional Injuries/falls	Minor home repairs (grab bars, railings, trip hazards)	◇◇	Likely		Low-income; Seniors	◇◇
Pathway = Housing Affordability						
Reduced Hunger	Energy assistance	◇◇◇	Possible		Low-income; Elder households; Households with children	◇◇
Access to Medical, Dental, & Prescription Medicines	Energy assistance	◇◇◇	Likely		Low-income; households with children	◇◇
Health & Development for Young Children	Energy assistance	◇◇◇	Likely		Low-income; Households with young children	◇◇
Adult Mental Health	Energy assistance & Wx	◇	Possible		Low-income	◇◇
Reduced heat deaths from social isolation	Thermal confort/access to cooling	◇◇◇	Likely		Low-income; Elder households	◇◇

Health Determinant & Outcomes	Intervention	Extent of Impact (Magnitude & Severity)	Impact (assuming 43,000 weatherized homes)	Likely Deferral	Distribution	Quality of Evidence & EPA Minimum Action* (◆ EPA, ◇ not in EPA)
Pathway = Ambient Air Pollution & Greenhouse Gases						
Respiratory Disease, including lung cancer, & premature death	Weatherization	◆◆	Possible		Low-income households; Elder households; households including children	◇
Pathway = Local/State Economy						
Jobs Created	WAP/WPH	◆◆	Likely		Low-income households	◇
Days of School & Work Missed	Heating system repair/replacement, Wx	◆◆	Likely		Low-income; households with children; households with working-age adults	◆◆
Reduced Medicaid Costs	WAP	◇	Possible		Low-income; households with children	◇
	WPH	◆◆	Possible		Low-income; households with children	◇

Table B. Summary of Findings, Health Impacts of Weatherization Plus Health

Legend for Table B:

* EPA Healthy Indoor Environment Protocols for Home Energy Upgrades – Minimum Health Protections

** Intervention may require that contractor be licensed or credentialed by the state of Connecticut, requiring additional training and certification beyond that required of WAP crew members [HIA team to confirm]

Direction & Extent of Impact (includes magnitude, severity)

- ◆◆◆◆ Significant improvement for many (either number or proportion of at-risk population)
- ◆◆◆ Significant improvement for few or small impact on many
- ◆◆ Moderate improvement for medium number
- ◆ Small improvement for few
- ? Uncertain
- No effect or “none”

Likelihood of Impact: Either specific estimated impact or ranking

Likely = it is likely that impacts will occur as a result of the proposal

Possible = it is possible that impacts will occur as a result of the proposal

Unlikely = it is unlikely that impacts will occur as a result of the proposal

Uncertain = it is unclear if impacts will occur as a result of the proposal

Quality of Evidence

- ◆◆◆ Excellent (2+ peer reviewed studies or meta-analysis; at least 3 strong studies)
- ◆◆ Good (1 peer-reviewed study or several reports which may not have control groups)
- ◆ Fair (no clear studies but generally consistent with principles of public health or expert opinion)
- Inconclusive (studies indicate both positive and negative outcomes)

Priority Health and Safety Measures

The 12 health and safety repairs listed below were judged to produce significant health benefits because the measure:

- received at least two ♦♦ for “Extent of Impact” and “Quality of Evidence” and were included in EPA’s Healthy Indoor Environment Protocols for Home Energy Upgrades (HIE) Minimum Health Protections (EPA, 2011).
- Received at least ♦♦ for “Extent of Impact” and “Quality of Evidence” by the HIA, although not included in the EPA protocols -- replacement of older single pane windows with lead paint.
- Was included in the EPA Protocols (noted in *italics* below) but did not score at least two ♦♦ for extent of impact and quality of evidence: carbon monoxide detectors, ventilation improvements, and knob and tube wiring repairs.

Health and Safety Repairs With Significant Health Benefits *
1. Asbestos Abatement (non intact and needed for energy work)
2. Air Sealing with Pest Exclusion +
3. Injury Prevention, Minor Home Repairs +
4. Minor Moisture Repairs (needed for energy work) +
5. Radon Testing and Mitigation (if work increases levels above EPA threshold) +
6. Remove Unvented Gas Appliances
7. Smoke Alarms +
8. Smoking Education and Referral +
9. Window Replacement of Single Pane +
10. <i>Carbon Monoxide Detectors</i> +
11. <i>Ventilation Upgrades</i>
12. <i>Knob and Tube Wiring Repair (needed for energy work)</i>

Summary Table, Costs and Benefits

The stakeholders expressed a strong interest in the costs of the various health and safety repairs, to inform decision making about priorities for funding and inclusion of specific measures. This information is presented in Table C below, which provides an average cost for each repair, total programmatic costs assuming 43,000 homes receive energy upgrades each year, and the net benefits (health and energy benefits compared to the costs) to identify those repairs that yield net positive benefits. Appendix B provides documentation on data sources and methods used to derive these estimates.

Costs and Net Benefits of Potential Weatherization Plus Health Interventions

Health Determinants & Outcomes	Health and Safety Activity	Est. Housing Units Needing Action per 43,000 ⁵ Units	Cost/Housing Unit	Program Costs	Health and Energy Benefits/Cost
Residential fire & smoke-related injuries & premature deaths	Smoke Alarm	18,100	\$50 (\$25/alarm)	\$908,000	\$33/1
	Electrical Repairs (Knob & Tube)	2,200	\$3,000	\$6,600,000	-
	Electrical Repairs – faulty circuits	3,700	\$2,150	\$7,955,000	-
	Heating System Replacement, Repair, and Tuning	11,200 3,900 6,000	\$2000 replace, \$500 repair, \$150 clean/tune	\$25,250,000	\$0.55/1 ⁶
CO poisonings & premature deaths	CO Detector	22,800	\$64 (\$42.50/detector w/1.5 detectors per unit)	\$1,459,000	\$1.25/1
	Gas Leak Detection & Repair	2,500	\$350	\$875,000	Likely >\$1/1
	Remove Unvented Gas Appliances	860	\$10 - disposal	<\$10,000 ⁷	Likely >\$1/1
Unintentional injuries/falls	Minor home repairs (grab bars, railings, trip hazards)	6,800	\$125	\$1,075,000	-
Heat- & cold-related ailments & premature deaths	Air sealing, insulation, heating repair/replacement (ALREADY ACCOUNTED FOR IN ENERGY BUDGETS)	43,000	\$3,000	\$129,000,000	Energy/Other: \$2.51/1 (DOE)
Respiratory disease,	Moisture Repairs	6,500	\$350	\$2,275,000 ⁸	\$1.14/1

⁵ Source: DEEP – estimates of annual state/utility-funded energy-retrofit work

⁶ Includes energy benefits; assumes all home have smoke alarms

⁷ If action requires heating system installation, cost included in heating system line item

⁸ Includes some activities covered to meet ventilation standards (i.e., bath exhaust fan)

Costs and Net Benefits of Potential Weatherization Plus Health Interventions					
Health Determinants & Outcomes	Health and Safety Activity	Est. Housing Units Needing Action per 43,000 ⁵ Units	Cost/Housing Unit	Program Costs	Health and Energy Benefits/Cost
disability, & premature death (asthma, COPD, heart disease/stroke)	Air Sealing with Pest Exclusion	3,400	\$150	\$510,000	likely >\$1/1
	Ventilation (ASRAHE 62.2) Kitchen and bath exhaust systems	25,800	\$1,080	\$27,864,000	-
	Thermal Comfort (See Air Sealing)	See Above			
Lung Cancer	Radon Testing & Client Education	43,000	\$50	\$2,150,000	>\$51/1
	Radon Mitigation	4,300	\$1,500 + Testing	\$8,600,000	>\$47/1
	Asbestos Removal from Pipes	4,300	\$500 \$40-60 per linear foot of pipe insulation – limited scope e.g. 10 ft)	\$2,150,000	-
	Vermiculite Insulation Removal	4,300	\$7,000 (\$5-8/square foot; 1,000 ft ²)	\$30,100,000	-
	Env Tobacco Smoking Client Ed & Referral	10,800	Minimal (pamphlet distribution)	<\$10,000	Likely >\$1/1
Lead poisoning, with cognitive & behavioral problems for children	Window Replacement for Single Pane (Likely Leaded)	6,800	\$438 (\$350 per window *1.25 windows per unit)	\$2,978,000	\$1.79/1 ⁹

Table C. Costs and Benefits of Weatherization Plus Health Measures.

⁹ Includes added energy benefits

Findings

The HIA team and HIA stakeholders reviewed the assessment results presented above, and on the basis of these results present the following key findings.

- 1. Energy upgrades produce health benefits for occupants and society at large, particularly for low-income families who suffer disproportionately from housing based health hazards (e.g., fire hazards, asthma, lead poisoning).**
 - For the 28.5% of CT households that are income-eligible for LIHEAP, lower fuel bills translate into more affordable housing, which reduces hunger, improves access to health and dental care and prescription medicines, improves the health and development of young children and the mental health status of adults, and lessens social isolation. Low income young children receiving fuel assistance makes them 20% less likely to be underweight and 30% less likely to require hospital admission.
 - Reduced energy decrease levels of ambient air pollution, decreasing respiratory disease. In 2011, Connecticut residential energy efficiency programs (HES, HES-IE) reduced carbon dioxide emissions by 146,788 tons (CT Energy Efficiency Fund, 2012).
 - Energy efficiency programs support the state’s economy, create jobs, reduce the number of school and work days missed due to housing-related ailments and are likely to provide savings to the state Medicaid program. Macroeconomic modeling of electricity, natural gas, and unregulated fuel energy efficiency programs in Connecticut over a period of 20 to 40 years estimates a \$41 billion contribution to gross state product, \$28 billion in real household income, and 287,537 job years, or number of full-time jobs for a one-year period, all in 2008 dollars (ENE, 2009)
- 2. Health and safety repairs produce significant occupant health benefits and could be integrated with energy upgrades using the existing workforce or through coordinated referrals to appropriate professionals.** Repairs noted (+) will help reduce health inequities linked to asthma and respiratory disease, lead poisoning, pest infestations, fire and carbon monoxide risks, and trips and falls resulting in injuries and hospitalizations.

Measures (+ Addresses Health Disparity)	Reduce Deferrals	Enhance Energy Saving	Significant Health Benefit	Health Benefit: Cost
Repairs Reduce Deferrals, Save Energy, & Improve Health				
Minor Moisture Repairs (needed for energy work) +	✓	✓	✓	X \$1.14/1
Asbestos Abatement (non-intact & needed for energy work)	✓		✓	Data not available
Gas Leak Detection & Repair	✓			X likely >\$1/1
Knob & Tube Wiring Repair	✓			Data not available

(needed for energy work)			
Air Sealing with Pest Exclusion +	✓	✓	X likely >\$1/1
Window Replacement of Leaded Single Pane +	✓	✓	X likely \$1.79/1 (includes energy benefits)
Repairs Create Significant Health Savings			
Injury Prevention/Minor Home Repairs +		✓	Data not available
Radon Testing +		✓	X \$51/1
Radon Mitigation (if work increases radon>EPA threshold) +		✓	X \$47/1
Remove Unvented Gas Appliances		✓	X likely >\$1/1
Smoke Alarms +		✓	X \$33/1
Smoking Cessation Client Education & Referral +		✓	X likely >\$1/1
Repairs Recommended by EPA Protocols			
Carbon Monoxide Detectors +			X \$1.25/1
Ventilation Upgrades			Data not available

3. **Five housing conditions lead to deferrals, preventing a significant number of energy upgrade jobs from proceeding.** These deferrals challenge the state’s ambitious goal of weatherizing 80% of Connecticut homes by 2030.
 - Asbestos on energy systems and in vermiculite insulation
 - Gas leak (approximately 20% of homes with gas fuel)
 - Knob & tube wiring
 - Significant moisture or mold issues
 - Significant lead hazards from severely deteriorated paint in pre-1978 homes

4. **The costs of priority health and safety repairs range from \$0 to \$1,500 per action, and many produce net benefits, where combined health and energy savings exceed repair costs.** These measures include: smoke alarms, carbon monoxide detectors, minor moisture repairs, radon testing and mitigation, and replacement of older windows with lead paint. Other low cost repairs are likely to produce net positive benefits, although the HIA team has insufficient evidence to provide a quantitative estimate (e.g., repairing gas leaks, removal of unvented gas appliances, referrals for smoking cessation and smoke free housing).

5. Due to incomplete information, it was not possible to fully explore the tradeoff of including added health and safety measures thus increasing the costs of weatherization against the reduced number of homes that could receive weatherization if the per home cost of the work increased.

Recommendations

In light of the pending decisions about weatherization funding and the selection of health and safety measures to include as part of energy efficiency upgrades, the HIA team makes the following set of recommendations. The recommendations are ranked on the basis of feasibility, from most feasible to those most challenging to implement as part of the current decision-making.

- 1. Ensure that the Connecticut Weatherization plan submitted to DOE in 2013 provides the flexibility to undertake priority health and safety repairs allowed by DOE.** Include asbestos encapsulation by qualified professionals, repair/replacement of red tagged heating systems, minor electrical repairs to knob and tube wiring, smoke alarms, carbon monoxide alarms, minor moisture repairs, integrated pest management, radon testing, removal of unvented combustion space heaters, referrals for smoking cessation and smoke free housing, and ventilation improvements.
- 2. Fund energy efficiency programs fully to achieve both energy and health and safety benefits.**
- 3. Refer Connecticut residents who receive Department of Social Services benefits to energy efficiency programs, leveraging existing state investments in population health.**
- 4. Provide funding and financing to resolve the health and safety issues that would otherwise cause eligible households to be deferred from weatherization.** These include gas leaks, asbestos and vermiculite insulation, knob and tube wiring, significant lead hazards from severely deteriorated paint in pre-1978 homes, and significant moisture/mold repairs. Addressing these root causes of deferrals enables the state to administer utility ratepayer and US Department of Energy (DOE) Weatherization Assistance Programs more cost-effectively and moves Connecticut closer to its goal of weatherizing 80% of homes by 2030.
- 5. Incorporate priority health and safety repairs into energy efficiency programs using a combination of energy efficiency funds, financing, and/or other resources. Give priority to repairs that produce a net positive health and energy benefit, including air sealing including pest exclusion, minor moisture repairs needed for energy work to proceed, window replacement of single pane windows (pre-1950) likely to have lead paint.**
- 6. Identify sustainable funding sources to address additional priority health and safety repairs that yield significant health benefits and which can be undertaken by the energy efficiency workforce and related professions.** State health, environment, social service and housing agencies, utilities, and non-governmental organizations should collaborate to secure the necessary resources. Support will be needed to provide the following: smoke alarms and carbon monoxide detectors (if owners cannot provide), radon testing/radon mitigation for income eligible families, removal of unvented

appliances, referrals for smoking cessation and smoke free housing, injury prevention repairs, integrated pest management, and ventilation upgrades.

- 7. Conduct evaluations to track the health benefits of added health and safety repairs during energy work.** Identify measures that are most effective in reducing health inequities among Connecticut residents.

Reporting and Monitoring

The HIA findings and recommendations are being presented before a number of decision makers during the first half of 2013, including deliberations by the:

- CT Department of Energy and Environmental Protection (DEEP) as it prepares its state weatherization plan for submission to the U.S. Department of Energy, for the DOE's low-income Weatherization Assistance Program
- Energy Efficiency Board (EEB), as it advises both DEEP and PURA on the allowable health and safety measures for residential energy efficiency upgrades both for DOE WAP and for the utility ratepayer-funded weatherization programs, HES and HES-IE.

The HIA will be used in multiple ways, in addition to its role in influencing policy, funding, and programmatic decision-making concerning weatherization in Connecticut, specifically

- As an example for the Connecticut Academy of Science and Engineering's study for the General Assembly and state agencies, regarding the value of HIA for Connecticut decision makers; and
- As a model for replication by other state Weatherization Assistance Program grantees and local sub-grantees.

NASCSP will use the CT HIA as the centerpiece for HIA training and technical assistance for the WAP network as part of the Weatherization Plus Health initiative.

The monitoring plan for the HIA relies on narrative quarterly reports to HIA stakeholders, to be compiled by CAFCA and New Opportunities, Inc., in collaboration with NASCSP, to track and report the impacts of:

- the HIA on DEEP, EEB, and PURA decision-making around DOE WAP and HES/HES-IE programs, regarding funding for and extent of health and safety measures;
- adopted HIA recommendations and their effect on deferral rates due to health and safety concerns; and
- decisions by other WAP state programs and sub-grantees to pursue HIA for WPH.

A copy of the monitoring plan is attached as Appendix B.

Conclusion

In recent years, health impact assessments have become a powerful tool for decision-makers in land use planning, transportation, and the development of new energy sources, to document the likely consequences for population health of decisions made outside of the health arena; see for example an interactive map of HIAs nationally at the website of The Health Impact Project (www.healthimpactproject.org). Anticipating and planning for health consequences can reap benefits for public programs and help decision makers invest resources in ways that best support their goals. Beyond its value in advising on large infrastructure projects, Health Impact Assessment can bring an evidence-based, analytic focus to decisions about policy, programmatic, and funding decisions about social programs and income supports, decisions that have the potential for as dramatic an impact on health as the building of a new highway.

Connecticut's Weatherization Plus Health pilot, hosted by CAFCA and New Opportunities, Inc., has offered a unique opportunity to introduce HIA as a new tool for the network of Weatherization Assistance Program grantees and their local sub-grantees to consider, when providing input to state public service commissions, residential utility providers or others deliberating on the value of health and safety as an integral part of crisis fuel assistance, regulated utility consumer protections, and residential energy efficiency upgrades (weatherization). This rapid HIA has identified a set of priority health and safety measures for consideration by Connecticut decision-makers, to be incorporated into the allowable scope of work and budgets of both DOE WAP and the utility ratepayer funded HES programs, as well as strategies to expand partners and funding supports for a Weatherization Plus Health approach. In addition, the HIA offers a series of evidence-based recommendations for maximizing the positive impacts of weatherization within the state on health, while minimizing adverse consequences.

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