Connecticut Green & Healthy Homes Needs Justification Statement
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The Integrated Delivery of Energy, Health and Housing Interventions in Connecticut

Families in low-income communities are often unable to afford or access the installation of measures to reduce energy costs, especially when there are costly health hazards in their homes that need to be remediated first. Residents in low-income communities experience poorer health outcomes related to housing quality, specifically asthma, household injury and lead exposure. The state bears the cost burden of these health outcomes – in healthcare dollars, special education spending, costs of crime, and lost earning potential, and the costs of higher energy burdens on families, businesses and the public sector. The State of Connecticut has the opportunity to innovate its approach to health, energy, and housing by adopting systems change to better integrates previously uncoordinated energy, health, housing, and social service programs, and identifies innovative sources of funding for these services, which recognize the potential for long-term public sector cost savings.

The Connecticut Green & Healthy Homes Project is designed to explore safer and more energy efficient housing as a platform for improved health outcomes through comprehensive, evidence-based home interventions. These interventions will seek to generate substantial medical and energy cost savings through improved health outcomes related to asthma, lead poisoning, and household injury along with reductions in energy consumption. Through this project, the Connecticut Green Bank, the Department of Public Health, the Department of Social Services, the Department of Energy & Environmental Protection, the Department of Housing, the Department on Aging, the Department of Children and Families, the Office of Early Childhood, the Office of Chief State's Attorney, United Illuminating, and Eversource are researching the feasibility of implementing an innovative pilot project that utilizes an integrated model for funding and coordinated service delivery of home interventions. The goals of the pilot will be to quantify the degree to which comprehensive housing interventions can cost-effectively produce healthier housing, and can result in energy and healthcare cost savings. Pilot results may prove out the business case for investing in housing interventions for low- and moderate-income families, and unlock sustainable funding from the health sector to fill the existing gap in resources for green and healthy homes across the state. One could envision a future, for example, where any family in Connecticut – whether they come to a health facility for treatment of asthma, contact their utility for energy efficiency services, or seek housing repairs from a local social service nonprofit – would get the package of interventions needed to make their home green, safe and healthy.

The first phase of this work, a Connecticut Green Bank-funded feasibility study specific to Connecticut, is planned to examine the extent to which, with sustainable public and private funding, a comprehensive housing intervention approach could be scaled to include a variety of communities state-wide. The Connecticut Green Bank, the Connecticut Department of Public Health, the Connecticut Department of Social Services, and other stakeholders are exploring and validating the health benefits and potential healthcare cost savings associated with energy and housing improvements; examining options for implementing a statewide energy, health and housing intervention strategy; and identifying potential innovative funding mechanisms that could support any proposed integrated model. Development of a Connecticut Green & Healthy Homes Pilot Project will provide a base of evidence that a coordinated weatherization and preventive health care model in Connecticut can improve health outcomes, lower energy costs and garner a significant return on investment. The pilot phase of this project will serve as a

national model and enable partners in Connecticut to build the business case for other sustainable funding streams for this work.

The Burden of Unhealthy and Energy Inefficient Homes in Connecticut

Access to safe, energy efficient and affordable housing is limited for many low-income families. Substandard housing is the source of many environmental health hazards known to cause or exacerbate illness.[1] Deficiencies in the quality of housing - roof and plumbing leaks, structural defects, heating and cooling system inefficiencies, pest infestations, and lead-based paint hazards – are directly linked to asthma episodes, lead poisoning and household injury for residents, especially children and older adults.[4] Poor housing quality disproportionately affects impoverished neighborhoods and impacts families' ability to succeed and thrive over a lifetime.

Nationally, over 30 million low-income families live in unhealthy, energy inefficient housing.[2] The State of Connecticut's aging housing stock is the oldest housing in the country in terms of the number of homes built before 1950.[2] In Connecticut, nearly 85% of housing was built before 1980 and 29% of housing statewide was built before 1940.[2] In buildings built before 1980, there is a higher probability of substandard conditions and lead-based paint hazards.[2] Over 97,000 Connecticut households received assistance from the LIHEAP-funded Connecticut Energy Assistance Program (CEAP) in 2015.[3] An older housing stock also increases the likelihood for energy inefficiencies in housing.

The U.S. Census Bureau's American Housing Survey (AHS) is a sample of housing conditions in major metro areas nationwide. Data from an AHS Hartford survey in 2013 gives a clear indication of housing quality problems that are indicative of Connecticut's housing stock as a whole. Over 74,000 Hartford households reported experiencing uncomfortable cold or heat in their home in the past 12 months including 42,700 of those because of utility interruption. Sixty-nine thousand households reported moisture infiltration and leaks and 63,000 reported problems with mice. Nearly 20,000 households reported cracks or holes in their interior or floors, and 7,600 reported chipped or peeling paint.[8] Each of these deficiencies are directly related to environmental health hazards and energy inefficiencies.[1]

Unhealthy and inefficient housing costs the U.S. billions of dollars annually in energy, medical and social costs such as the long term societal impacts of illness, poor school performance and loss of worker productivity.[1] Energy inefficient housing also increases the burden of annual energy costs for families.[5,6] For the estimated 436,483 million low- and moderate-income Connecticut households, high energy costs can make the difference between making ends meet and falling short each month.[3] Connecticut's low-income households pay about 60% more than the national average. The average energy burden for a low-income household ($1,250 to $2,500 per year) is over 30% higher than the national average.[3]

A 2016 report by the American Council for an Energy Efficient Economy (ACEEE) shows energy burden, or the portion of annual income spent on home energy needs, is related to social equity. Within each region of the country, and regardless of state energy prices, low-income families and multifamily renters have an energy burden equal to or greater than the region's median energy burden.[5] Investments in energy efficient, safe, and healthy housing for low-income communities can be directed to establish greater social equity by reducing the extent and severity of housing, health and energy burdens experienced by such populations.

In Connecticut, unhealthy and energy inefficient housing places a substantial burden on low- and middle-income families, their communities, and the state. However, Eversource, the largest utility in the state, reports that 25% of homes can't be served due to H&S issues.[7]

These same conditions present an opportunity to address social determinants of health in housing throughout the state, particularly in lower-income communities with older, pre-1980 housing stock, as they contribute directly to health and financial burdens including:

- **Asthma:** Over 295,000 adults and 85,700 children are currently diagnosed with asthma in Connecticut.[9] Connecticut's asthma rates are higher than the national average for both children and adults.[9] In 2014, Connecticut had 4,261 hospitalizations and 21,678 emergency department visits related to asthma.[9] The annual asthma hospitalization rate among Connecticut children is just under 16%, and the annual ED rate is 104% (indicating that these children visit the ED, on average, more than once per year) . Connecticut adults experience asthma-related hospitalizations at a rate of over 10% per year, and ED visits at a rate of 53% per year.

  However, there are vast racial and ethnic disparities in asthma health care utilization rates in Connecticut. Black, non-Hispanic children experience asthma hospitalizations at a rate of 37% annually, and ED visits at an annual rate of 217% (indicating that these children visit the ED, on average, more than twice per year). Connecticut's Hispanic children are hospitalized for asthma at an annual rate of 21%, and visit the ED at a rate of 172% per year. Connecticut's asthma hospitalization rates are highest among children 9 and under, and asthma-related ED rates are highest among adults 18-44 years.[9]

  Statewide asthma-related healthcare costs have increased steadily since 2000.[10] In 2014, Connecticut incurred $135 million in acute care charges due to asthma, including $92.8 million for hospitalizations and $42.5 million for ED visits.[10] As asthma severity increases, children are more likely to miss school.[11] Children in low-income communities miss more school due to asthma than children in middle or higher income communities, which can impact school performance.[11] Asthma is one of the leading causes of chronic school absenteeism among elementary and middle school students in Connecticut.[12]

- **Lead Poisoning:** The most common source of lead exposure for children is lead-based paint in pre-1978 housing and the contaminated dust and soil it generates.[13-17] Nearly 550 children were identified with elevated blood lead levels over 10 μg/dL in Connecticut in 2015, and 2,156 with levels at or above children 5 μg/dL.[18] Black and Hispanic children are twice and 1.6 times, as likely to have elevated blood lead levels as white children in Connecticut.[18] According to the American Academy of Pediatrics: "Lead exposure is a causal risk factor for diminished intellectual and academic abilities, higher rates of neurobehavioral disorders such as hyperactivity and attention deficits, and lower birth weight in children."[19] For every $1 spent on lead hazard control programs there is a $17 to $221 return on investment, depending on the level and cost of the intervention and regional costs related to lost productivity and education, criminal justice, healthcare, and other services.[20]

- **Household Injury:** Injury is the leading cause of hospitalization and death for children in Connecticut[21] and the home is among the likeliest places for a child to be injured.[22] The top five causes of residential injury, falls, unintentional poisonings, fire/burns, choking/suffocation, and drowning, result in approximately 730 deaths, over 10,000 hospitalizations, and more than 110,000 emergency department visits among Connecticut

residents annually.[21] The result is annual injury-related healthcare costs of over $695 million in Connecticut.[21]

- **Energy Costs:** Household energy burdens disproportionately impacts lower income households. In Connecticut, the average energy bill for low income households is over $3,000, while the average low-income household has an income of $25,810.[3] The energy burden for the average low income household is 11.8% of income.[3] However, the energy burden is substantially higher for low-income Connecticut households. Energy accounts for 13.3% of annual income for low-income households who heat with fuel oil, 30.6% for households with income below the federal poverty guideline, and 58.2% for households with income of less than $10,000.[3]

  The Connecticut Energy Assistance Program (CEAP) covers about 16% of the average energy bill for low-income Connecticut households. Many CEAP recipients still have a high energy burden even after receiving assistance. Households with natural gas heat and income below the federal poverty guidelines have average energy benefits of nearly 25% of income after CEAP. Households with electrical heat that earn less than the poverty guidelines have average energy burdens of almost 14% of income after CEAP. Households with fuel oil heat and income below the federal poverty guidelines have average energy burdens of 29% of income after CEAP.[3]

- **Medicaid Spending on Care for Older Adults:** Caring for older adults in skilled nursing facilities carries a high cost burden. Connecticut spends approximately $2,500 in Medicaid dollars per person per month for healthcare for older adults and those with disabilities - more than 2.5 times the amount spent on other beneficiaries.[23] Research has shown that modifications to the home environment can make it possible for seniors to age at home, reducing the cost burden of facility-based care.[24]

- **Mental and Behavioral Health Burdens:** When studying the impact of housing on children's mental health, researchers have found that poor housing quality is the strongest and most consistent predictor of emotional and behavioral problems in low-income children.[25] Poor housing quality is associated with increased rates of anxiety and depression in both adults and children.[25]

- **Housing Insecurity and Its Effect on Health and Development in Young Children:** Studies have associated housing insecurity with poor health, risk for developmental delays and low weight for age.[26] In Connecticut, more than half of renters and one in four owner-occupied households statewide experience housing insecurity, which means that housing expenses exceed 30% of their household income annually.[27] Housing insecure families move often, face overcrowding, and are likelier to experience homelessness – all of which impact children's ability to grow, excel in the classroom and develop in healthy ways.[26] Energy burdens and rent burdens combine to drive up housing costs and result in economic inequalities such as utility-related debt and energy insecurity, or the inability to adequately meet household energy needs.[7]

Many of these factors are greatly improved by investing in integrated housing interventions, through an approach that reduces known environmental health hazards and makes housing more energy efficient and affordable. Those most affected by poorly weatherized homes that contain environmental health hazards in Connecticut are the most vulnerable: low-income individuals, children, and the elderly often experience socioeconomic barriers that result in poorly maintained homes. Housing is recognized as a chief social determinant of health and has

serious effects on a wide range of health, functioning, and quality outcomes and risks.[1] Low-income families are often living in homes that are energy inefficient and which contain environmental health and safety hazards that create unnecessary financial, health, employment, educational and social stressors and burdens. Evidence-based interventions around the country have linked specific home remediation strategies to improvements in these health outcomes, especially with regard to asthma.[28]

Building the Business Case - Example: Evidence for Asthma Intervention Services

Home-based, multi-trigger, multi-component environmental asthma interventions are an important model for success in coordinated housing interventions.[28-34] Forty percent of all asthma incidents are attributable to home-based environmental health hazards,[35] indicating that one of the most effective solutions to reducing the prevalence of the disease must occur outside the traditional continuum of care, with active coordination with the family and their healthcare providers. Nationally, cost-benefit studies on home-based, multi-trigger, multi-component environmental asthma interventions show a return of $5.3 to $14 for each dollar invested, depending upon the level and cost of the intervention, and the healthcare market.[28, 36-42]

Treating, managing, and ultimately reducing the burden of childhood asthma requires coordinated interventions that integrate community-based approaches into patient care, and address the underlying housing quality and stability factors that lead to asthma exacerbations.[28, 43] To effectively reverse the negative asthma trends in low-income communities in particular, asthma diagnosed children need a local asthma prevention program that couples medical case management and in-home health education with physical housing interventions that eliminate asthma triggers in the home.[32-37] Housing services addressing asthma triggers are successful examples of community-based solutions that help relieve low-income families from the negative impacts of unhealthy housing.[28] Unfortunately, children at high risk for asthma exacerbations have limited access to these evidence-based interventions because coverage for these services is not traditionally part of clinical care or is not yet approved by Connecticut Medicaid. Connecticut is a national leader in expanding Medicaid and increasing coverage while reducing per-person costs.[23] The opportunity exists for Connecticut to innovate and continue to move toward investments in Medicaid dollars that will garner greater savings from preventive healthcare expenditures for high-utilizer populations.

The Opportunity for Connecticut

Connecticut can achieve greater energy affordability and health benefits by utilizing existing resources and implementing a comprehensive, integrated housing assessment and intervention model as well as infusing sustainable new private and public funding sources such as Medicaid. While it begins with the residential intervention focused on a specific target population, this initiative can demonstrate how a comprehensive health, energy and housing intervention strategy can improve at risk communities by improving health and supporting economic benefits as well. In addition to reductions in asthma episodes and related medical costs, housing service delivery platforms coupling energy efficiency with health interventions produce a number of other health benefits and non-energy benefits.[44,45] The integrated model being considered for this project has the potential to produce economic benefits across multiple levels by coordinating interventions that: lower energy costs and increase financial stability for ratepayers[5,7], and lower healthcare costs and societal costs related to lead exposure, household

injury and asthma including costs related to special education, criminal justice, care for seniors and lost productivity.[11,20,23,26,46]

Importantly, these interventions may produce benefits for individuals and families that transcend improved health or lower utility bills. Improving the overall quality of the home environment can have a positive impact on mental health and wellbeing.[25] Fewer asthma episodes and lower rates of lead poisoning lead to improved school attendance and better educational outcomes for children, and better work attendance and career advancement for adults.[11,20] Lower utility bills and improved property values due to energy efficient upgrades lead to wealth retention and asset-building, especially for low-income families for whom high energy costs account for a significant portion of their monthly budget.[5] Reducing energy cost burdens can also help prevent homeowner foreclosure[47] and tenant eviction by addressing previously deferred housing maintenance and repair costs and high utility bills, thereby improving housing stability and keeping families from the threat of being imminently homeless.

A more systematic integration of housing programs can increase government efficiencies, offer opportunities for cross-training and clean energy job creation[47] and may contribute to the growth of housing and energy-sector jobs at the community level. Comprehensive housing models increase access to healthy, safe, and energy efficient housing. This innovative approach has a transformative effect at the systems level, both by strengthening coordination within and outside of government programs and by garnering support for this work from philanthropic, private, and other public funders.

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