

Breathing Easier: Advancing Health and Climate Resilience in D.C.'s Affordable Multifamily Housing

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ABSTRACT

Safe, energy-efficient housing is foundational to public health, yet many low-income families in Washington, D.C. live in older multifamily buildings with poor ventilation, inefficient heating and cooling, mold, and pests that increase energy burdens and exacerbate asthma. With more than 12% of children in D.C. affected by asthma, health inequities intersect with high energy costs, climate risks, and aging housing infrastructure. This paper offers the D.C. Healthy, Green and Affordable Housing Program as a model for integrating health, housing, and energy interventions. Led by the National Housing Trust, the program unites cross-sector partners spanning public health, housing, legal aid, and community-based organizations to advance and scale retrofit projects. Together, partners developed a novel approach that combines pediatric asthma data, energy performance metrics, and building energy + health assessments to identify and prioritize six high-need properties, while embedding structured resident engagement to inform retrofit design. Planned retrofits, including electrification, ventilation upgrades, and moisture and pest mitigation are projected to cut on-site carbon emissions by 75%, reduce energy use by 41%, lower resident utility costs, and decrease asthma-related emergency room visits by at least one-third. The paper focuses on the value of an integrated, evidence-based model and lessons learned to date. Key insights show how cross-sector collaboration aligns climate and health goals, health and energy data drive retrofit action, project aggregation enables scale, and resident-centered approaches improve equity and outcomes. Together, these findings offer a practical framework for advancing healthy, climate-resilient affordable housing at scale.

Introduction

Housing and health are inseparable. For families with low incomes living in older multifamily buildings, substandard conditions such as poor ventilation, mold, and pest infestations can exacerbate chronic illnesses like asthma (Colton et al. 2015). In Washington, D.C., these challenges intersect with affordability pressures and energy costs, creating systemic barriers to well-being. The burden is not evenly distributed: asthma rates are significantly higher among D.C.'s communities of color (Teach and Quint 2012), while low-income households face energy burdens more than three times higher than those of other residents (Napoleon et al. 2025). Together, these conditions reinforce persistent health and economic inequities.

Addressing these challenges in affordable multifamily housing requires coordinated, whole-building solutions that integrate energy efficiency, decarbonization, and healthy housing upgrades. The objective of this case study is to overcome systemic barriers to such integrated retrofit projects in multifamily properties, for the benefit of low-income resident families. This case study explores key questions for stakeholders: How can policymakers better align climate and public health goals? How can evidence-based data drive action in retrofit projects? How can

affordable housing retrofit efforts achieve scale? How can projects reflect the lived experiences of residents?

The D.C. Healthy, Green and Affordable Housing (D.C. HGA Housing) Program offers a model for tackling these questions. Led by the National Housing Trust, the pilot program provides technical and financial assistance to six non-profit affordable multifamily housing property owners to implement whole-building electrification, energy efficiency, and healthy housing upgrades for more than 800 households across six multifamily properties. Because of the high rate of childhood asthma in the District, the program focuses on properties that are home to a prevalence of children with asthma. The initiative brings together cross-sector partners to address retrofit barriers through combined expertise in housing, health, energy, and community engagement. By integrating pediatric asthma data with building energy data and centering resident input, the program demonstrates how data-driven, collaborative approaches can catalyze building retrofit projects, align priorities, and deliver healthier, more resilient, and more affordable housing outcomes.

Health, Energy, And Resilience Challenges In Washington D.C.

D.C.'s disadvantaged communities experience numerous challenges related to climate impacts, exposure to indoor and outdoor air pollution, and unhealthy living conditions. Residents are primarily Black, have an average annual household income of \$20,000 (USA Facts 2023), and are acutely vulnerable to negative environmental and social conditions prevalent in these areas.

High Rates of Asthma. In the U.S., Black and Latin children disproportionately suffer from chronic asthma (Akinbami et al. 2014). Washington, D.C. provides a powerful case study of this disparity. More than 12% of children (16,000) in D.C. suffer from the disease (Shelef et al. 2022), with the rate of asthma more than five times greater among non-Hispanic Black youth than non-Hispanic white youth (Teach and Quint 2012).

Poor indoor air quality (IAQ). Common IAQ conditions that exacerbate asthma include inadequate or poorly maintained heating and ventilation systems, moisture and mold, pest infestations, carpeting, and inadequate air sealing that allows outside air pollutants to enter the home.

Fuel combustion in residential appliances poses additional health risks. Gas stoves emit nitrogen dioxide (NO₂), a pollutant that can trigger asthma and other respiratory conditions. Gas stoves are responsible for roughly 12.7% of childhood asthma cases nationwide—on par with the risks associated with secondhand smoke (Gruenwald et al. 2023).

Vulnerability to climate impacts. These communities are also vulnerable to climate impacts that can exacerbate poor health conditions and increase energy costs. Higher temperatures and ozone levels increase asthma symptoms, especially among children (Huang, Wu and Lin 2022). D.C. is a well-known urban heat island, with recorded temperatures hotter than the surrounding

counties (Zink 2021). Summer temperatures are projected to increase by 10 degrees over the next 60 years, and heat emergency days are expected to triple by 2050 (DC DOEE 2022).

Low-lying neighborhoods near the Anacostia River are more likely to be impacted by groundwater flooding from increased incidents of storms due to climate change. More frequent storms and heavier rainfall inundate drainage systems, causing water to overflow into nearby properties, putting homes at risk of structural damage and posing health risks to residents exposed to moisture and mold.

High energy burdens. Low-income residents living in energy inefficient buildings spend a higher proportion of their income on energy costs than other residents. High energy burdens can increase health and safety vulnerabilities as families may forgo food or medicine or leave their homes at unsafe temperatures to afford energy bills. On average (mean), D.C.'s low-income households spend 7.7% of their income on utility bills, compared to 2% for non-low-income households (Napoleon et al. 2025)

Barriers to affordable multifamily housing retrofits. Non-profit affordable multifamily housing owners have limited financial resources and staff capacity to plan for and implement energy and health improvements. They have extremely tight operating budgets with limited reserves to spend on capital improvements due to the reality of accepting below-market rents. Financing capital improvements is problematic, as owners often cannot afford to service additional debt through their operating budgets. Further, the multifamily retrofit process is more complex than in single-family housing, and utility or state energy efficiency incentive programs often pass over multifamily buildings due to the numerous technical challenges involved with their retrofits. Yet low-income residents of older, sub-standard buildings with older appliances and deferred maintenance issues frequently pay the highest energy bills per square foot and need relief the most.

Building Cross-Sector Partnerships

To address the challenges above, the D.C. HGA Housing Program provides technical assistance to the six property owners through an innovative partnership among a diverse group of organizations—each contributing expertise to resolve challenges that no single entity can address alone.

- **National Housing Trust** leads the program, providing deep technical assistance in sustainable affordable housing retrofit development;
- **Children's National Hospital (CNH) IMPACT DC Asthma Clinic** and the **Children's Law Center (CLC)** contribute clinical and legal insights into child health and housing remediation and have helped build relationships with local government;
- **Latino Economic Development Center (LEDC)** brings strength in resident engagement and community organizing;
- **VEIC** and its **D.C. Sustainable Energy Utility (DCSEU)** subsidiary offer technical energy efficiency expertise and construction management capacity; and
- **D.C.'s Department of Energy & Environment (DOEE)** leverages its public-sector leadership and funding mechanisms to scale impact. Together with committed property

owners, these partners combine complementary strengths to tackle barriers and advance healthier, more climate-resilient homes for families.

Financial support plays a pivotal role: NHT won a competitive \$3 million grant from **JPMorgan Chase** that catalyzed program development. With CNH IMPACT DC, CLC and VEIC named as sub-grantees, the award motivated all partners to align decarbonization goals with healthy housing priorities, demonstrating how catalytic funding can accelerate progress and unify diverse objectives.

The Benefits of Integrating Health and Energy Data

The program sought to identify buildings both with high rates of children with asthma and energy upgrade needs. However, barriers to accessing administrative data from housing providers and health care systems can make it difficult to see intersecting challenges in buildings. CNH IMPACT DC, CLC, and local partners developed the DC Pediatric Asthma Registry and an interactive map to identify multifamily properties in D.C. where children with asthma live. The asthma registry is a city-wide population health database that tracks children and adolescents with physician-diagnosed asthma living in Washington, D.C., to improve care and evaluate how environmental and socioeconomic factors impact the disease. Data from the registry powers CNH's IMPACT DC Healthy Housing Map.

The Healthy Housing Map is a publicly available geospatial tool that combines anonymized patient data, such as emergency room (ER) visits, with housing condition complaints to pinpoint multifamily housing properties with both high rates of asthma ER visits and unhealthy living conditions (see Figure 1). The result is a clear picture of which buildings pose the greatest health risks and need remediation. The map identifies 200 multifamily properties of concern. It provides a unique lens for understanding DC's housing, health, and climate conditions, and results from more than ten years of work by CNH IMPACT DC and CLC to address childhood asthma in DC through clinical care, family education, and legal advocacy. Because the map is publicly available and uses anonymized patient data, NHT did not need a data user agreement with the hospital to access the data.

In addition to health indicators, the program integrated publicly available energy performance data to strengthen property selection. Using Open Data D.C.'s Building Energy Performance dataset, NHT assessed each property's ENERGY STAR or Energy Use Intensity score, enabling it to identify multifamily properties that not only house high concentrations of children with asthma but also suffer from poor energy performance. The ENERGY STAR score measures a building's overall energy efficiency and compares it to similar properties nationwide on a 1–100 scale.

By layering health and energy performance data, the D.C. HGA Housing Program identified six multifamily properties—home to more than 800 households, including 178 children with asthma—that needed IAQ and energy improvements. The data-driven approach reframed conversations with property owners and policymakers. When presented with clear evidence linking certain buildings to pediatric asthma patterns and poor energy performance, combined with in-depth technical assistance, owners who were previously hesitant to undertake retrofit improvements committed to participate in the program. For government decision-makers,

the integrated dataset underscored the urgency of aligning housing programs with public health and climate goals, reinforcing the need for coordinated decision-making across sectors.

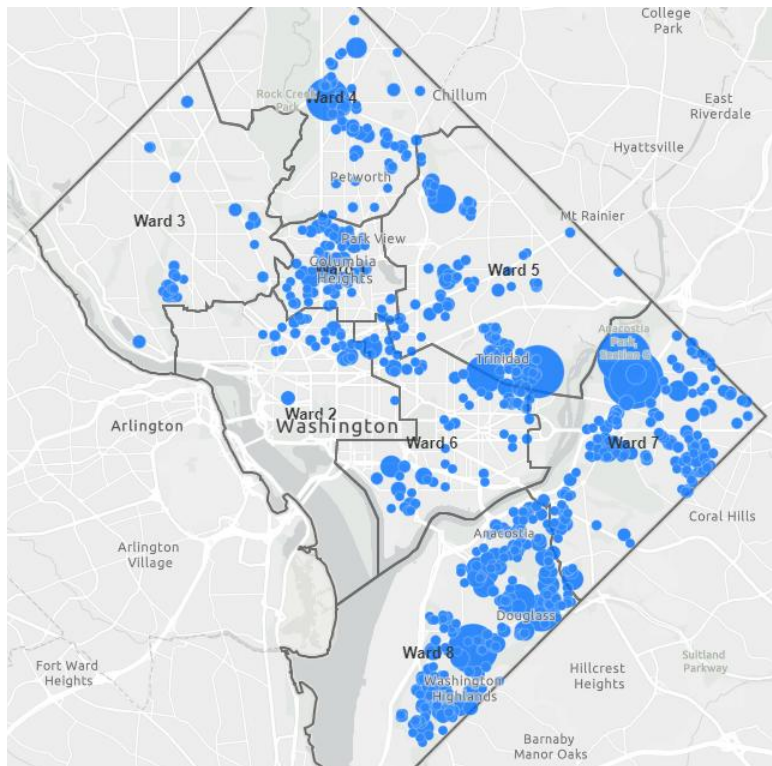


Figure 1. Interactive [Healthy Housing Map](#) of multifamily housing properties in D.C. with pediatric asthma Emergency Room (ER) use. Circle size indicates smaller to larger number of children's ER visits. *Source:* Children's National Hospital, IMPACT DC, 2024.

Integrated and Transparent Scope of Work Development

When implementing energy efficiency retrofit projects, the first step in developing a scope of work is to conduct an energy audit. The program commissioned ASHRAE Level II energy and decarbonization audit for each property, and integrated healthy housing assessments with the audits to understand specific healthy housing retrofit needs. Based on the National Center for Healthy Housing's "Keep It" principles (keep it dry, keep it ventilated, etc.) (see Figure 2), the assessments identified conditions that may impact the health and safety of residents and proposed actionable recommendations. Priority measures to improve IAQ in apartments included exterior and interior moisture management, ventilation system efficacy, replacing gas-fueled appliances with electric, building envelope and compartmentalization air sealing, and pest management. The result was a package of holistic retrofit measures that address both energy and IAQ concerns.

National Center for HEALTHY HOUSING

THE PRINCIPLES OF A HEALTHY HOME

Housing conditions can and should support good health. But what makes a healthy home environment? Since the 1930s, public health and housing stakeholders have offered guidance on fundamental housing characteristics as they relate to health. Today, NCHH supports the following 11 principles as a framework for describing the critical components of a healthy home. Healthy homes are:

DRY



DRY: Damp houses provide a nurturing environment for mites, roaches, rodents, and molds, all of which are associated with asthma.

CLEAN



CLEAN: Clean homes help reduce pest infestations and exposure to contaminants.

PEST-FREE



PEST-FREE: Exposure to mice and cockroaches increase asthma episodes in children. Inappropriate treatment for pest infestations can exacerbate health problems as pesticide residues pose risks for neurological damage and cancer.

VENTILATED



VENTILATED: Increasing the fresh air supply improves respiratory health.

SAFE



SAFE: Falls are the most frequent cause of residential injuries to older adults and children, followed by injuries from objects in the home, burns, and poisonings.

CONTAMINANT-FREE



CONTAMINANT-FREE: Chemical exposures include lead, radon, pesticides, volatile organic compounds, PFAS, and environmental tobacco smoke. Many of these exposures are far higher indoors than outside.

MAINTAINED



MAINTAINED: Poorly maintained homes are at risk for moisture and pest problems. Deteriorated lead-based paint in older housing is the primary cause of lead poisoning.

THERMALLY CONTROLLED



THERMALLY CONTROLLED: Prolonged exposure to excessive heat or cold when homes do not maintain adequate temperatures put residents at risk for various health problems.

ACCESSIBLE



ACCESSIBLE: Increased accessibility in and outside the home can help reduce trips, falls, and isolation, and improve mental health and physical activity.

AFFORDABLE



AFFORDABLE: High housing cost burdens can lead to housing instability, with frequent moves, overcrowding, and homelessness. High housing costs can force families into substandard housing, and contribute to damaged credit, job loss, lack of nutritious food and adequate healthcare, and poor mental health.

READY



READY: When natural disasters strike, many people take shelter at home. State and local agencies, builders, code officials, landlords, property managers, renters, and homeowners can all proactively take steps to ensure that residential environments are safe places to be before, during, and after extreme weather events.

Learn more. Visit: http://bit.ly/HH_principles
March 2025.

NCHH

Figure 2. The Principles of a Healthy Home. *Source:* National Center for Healthy Housing, March 2025.

For the energy audit report, the team requested that the auditor show the utility cost savings of proposed energy efficiency measures for residents and property owners separately, to better understand the cost impacts to both parties. This provided transparency for planning purposes and isn't standard in multifamily audits. Each property owner signed a program participation agreement pledging that residents would not incur additional costs from retrofits, including inadvertent utility cost increases resulting from switching from natural gas to electrical appliances. NHT pledged to work with property owners to identify strategies to offset any cost increases to residents from fuel switching. Future strategies may include prioritizing energy-efficiency measures that reduce energy consumption and costs; enrolling residents in D.C.'s Solar for All community solar program and/or low-income utility rate discount programs to reduce their energy bills; installing on-site solar PV; adjusting resident utility allowances; or implementing alternative electric metering configurations.

NHT and VEIC then prepared a property incentive analysis for each property, aligning available public funding incentives with the specific measures recommended in the audits. DCSEU, as D.C.'s energy efficiency program implementer, has begun awarding incentive packages, putting scopes of work out to bid and overseeing contractor work.

In 2024, NHT won a highly competitive U.S. EPA Community Change grant totaling \$20.1M to cover a significant portion of the six properties' construction scope-of-work costs. However, the grant was terminated in May 2025 due to a shift in federal priorities, causing a severe setback in the program. The loss means that funding for stand-alone healthy housing measures (those without associated energy savings), such as moisture intrusion and mold remediation, is lacking. The team continues to work with property owners to identify additional funding sources. Meanwhile, measures that can demonstrate energy savings have qualified for incentive funding through the D.C. Department of Energy and Environment (DOEE). To date, the program has helped five of its six participating properties qualify for up to \$16.8 million in energy efficiency incentives through DOEE's income-eligible Affordable Housing Retrofit Accelerator Program, funded through the federal U.S. Department of Energy's Home Energy Rebate Program. Retrofits are underway at two properties, including installing heat pumps, smart thermostats, and lighting and air-sealing upgrades.

Centering Resident Engagement

Resident voices and experiences in communities of color are often overlooked when designing building interventions, which can lead to unintended harms that worsen rather than disrupt systemic climate, housing, and health inequities. The D.C. HGA Housing program centers resident needs in the development of each retrofit project. As part of their program agreement, property owners pledged to engage residents in the retrofit planning process.

The program's approach includes:

Building Trust. NHT partnered with LEDC to facilitate resident engagement. The partners developed a resident engagement plan and culturally appropriate resident outreach and education materials. LEDC identifies a resident leader (RL) at each property to help customize the engagement plan and serve as a liaison to residents. With the RL, LEDC conducts outreach

through door knocking, tenant association meetings, flyers, and electronic media to invite them to a kick-off event.

Convening. NHT collaborates with LEDC, RLs, and property management to host a kick-off party to introduce the topic of green retrofits to residents. The family event features games and activities for children, a DJ and a catered dinner. There, residents sign up to attend small group discussions (15 residents per group) to share their energy and healthy housing-related priorities and concerns in a deeper dive. Residents receive monetary compensation for their participation in the discussions.

Collaborating. Resident RLs, LEDC staff, and project partners meet with the property owner to present residents' priorities and concerns and explore retrofit project implementation ideas.

NHT has held ten small group discussions to date, engaging 123 residents. Residents' concerns about housing conditions impacting their health largely aligned with upgrades recommended in the energy audits. For example, many residents reported constant dust build up on their apartments' vents and surfaces despite frequent cleaning, which affirmed audit recommendations to air seal or replace aged, leaky ventilation duct work.

During these sessions, residents told us they've experienced firsthand the negative health and safety impacts of fossil fuel equipment and climate change impacts and want their health and safety prioritized. They're concerned they'll bear the brunt of energy and decarbonization investments through higher utility bills or rent. They fear they'll be the last to benefit from clean energy investments if, as in the past, their communities are not prioritized. Residents want to be involved in decisions directly impacting their homes and lives, expressing eagerness to be part of the project development process, and the importance of clear, consistent communication about construction processes throughout their communities.

Targeted Results

The D.C. HGA Housing program is on track to achieve the following results, based on energy audit models and healthcare utilization studies:

- Measures that improve indoor air quality will reduce related ER visits among children with asthma by at least 33%, based on a recent study of children with asthma living in homes that received energy efficiency improvements (Wilson et al 2023). Children will miss fewer school days due to asthma, and families will miss fewer days off work to care for children, bolstering educational achievement and household earnings.
- Across the six participating properties, reduce on-site carbon emissions by approximately 75% and on-site energy usage by 41% on average (estimates derived from energy audits' modeled energy savings). Replacing the properties' natural gas furnaces and domestic hot water heaters with heat pumps drives most of the carbon reduction and energy savings.
- Upgrades will reduce resident energy burdens by cutting annual energy costs between \$500 to \$600 per housing unit. (BEI 2020). (Resident cost savings will depend on the buildings' metering configurations and utility allowance structures.)

- Climate resiliency measures that protect from the impacts of extreme heat and groundwater flooding will benefit all residents, particularly vulnerable residents with cardiovascular or respiratory disease, COPD, diabetes, and obesity who are at greater risk from heat exposure.

Lessons Learned

The D.C. HGA Housing Program offers insights into what works at the intersection of housing and health. Hospital utilization data related to asthma not only helped identify properties in need, it also proved to be a powerful catalyst for action, motivating property owners and policymakers to understand the urgency of problems at specific properties and commit to retrofit projects. The data also shifted conversations with property owners from basic code compliance goals—like removing mold but not necessarily the sources of moisture—to deeper whole-building strategies—like commissioning a property moisture assessment study to identify water intrusion issues at their source.

The program has achieved scale by aggregating a pipeline of projects, but challenges remain. The program demonstrates the benefits of aggregating multiple projects to secure funding and provide technical assistance to building owners. The pipeline of 800+ housing units appealed to public funders, such as DOE and the U.S. EPA, who were seeking scale to deploy funding. However, a major challenge has been the shift in federal political priorities, which has left a funding gap in each property's project scope. Specifically, the loss of the EPA grant means healthy housing measures that don't have associated energy savings are left unfunded, as currently the only source of public funds originates from U.S. DOE's Home Energy Rebate Program. Federal influence has also significantly delayed project implementation timelines, as the delivery of federal funds to DOE's Retrofit Accelerator program has slowed. Currently, only two of the six retrofit projects have started implementation, revealing the risks of relying on government programs subject to volatile political headwinds.

Nevertheless, the program's evidence-based approach created buy-in across sectors and bridged traditional silos. For example, initially, CNH IMPACT DC and CLC were skeptical about prioritizing climate goals, as they had long focused on improving IAQ by remediating moisture, mold, and pest infestations. NHT provided research and data showing that gas stoves produce numerous indoor air pollutants that pose health risks to occupants, including nitrogen dioxide, carbon monoxide, and formaldehyde. This demonstrated that electrifying stoves and other gas appliances can yield health and climate benefits. At the same time, the Healthy Housing Map's asthma data helped NHT and partners recognize the need to include healthy housing remediation measures—like integrated pest management—into project goals. We also learned from CNH IMPACT DC and CLC that unit-by-unit asthma remediation generally had limited effect in multifamily buildings, because many asthma triggers, such as poor ventilation and pest infestations, require building-wide interventions. Thus, the program takes a whole-building approach to resolving the sources of asthma triggers. The program's cross-sector partnerships helped us see the larger industry silos that exist—and the need to bridge them.

Meanwhile, by embedding resident experiences alongside health and energy data and housing conditions, the program team was able to develop retrofit scopes that reflect resident priorities and strengthen trust.

Policy and Practice Recommendations

To replicate and scale this model, several elements are essential.

- **Promote cross-sector partnerships.** Collaboration across public health, housing, energy, legal aid, and community-based organizations expands capacity and aligns disparate priorities toward shared outcomes.
- **Provide technical assistance to owners.** Affordable housing staff are stretched thin. Providing assistance to identify funding, commission energy audits and assessments, engage residents and develop scopes of work is critical to retrofit implementation.
- **Use cross-sector data to target interventions.** Integrating clinical health, housing conditions, and energy performance data—such as asthma prevalence, emergency room utilization, and ENERGY STAR scores—motivates decision makers and ensures that retrofits address the most pressing needs.
- **Align decarbonization investments with health outcomes.** Structuring retrofit priorities around both energy savings and resident health outcomes builds broader support and maximizes long-term impact.
- **Aggregate projects to achieve scale.** Bundling multiple properties into a single initiative makes projects more attractive to government agencies, technical partners, philanthropy and lenders, allowing for greater efficiency, funding competitiveness, and streamlined implementation.
- **Center resident engagement as a core practice.** A structured, community-driven engagement model—using resident leaders, trusted CBO partners, listening sessions, and continuous feedback—helps ensure retrofit scopes are equitable, culturally responsive, and free of unintended harms.

Conclusion

The D.C. HGA Housing Program is a blueprint for other cities grappling with overlapping housing and health challenges. The program demonstrates how cross-sector partnerships supported by robust data and aligned incentives can deliver measurable benefits for families and communities. However, adequate funding that integrates energy and healthy housing measures is critical to realize the full promise of this approach. Families deserve homes that support their well-being, and communities deserve strategies that address root causes—not just symptoms. Hospitals, housing advocates, and policymakers nationwide can replicate this approach to create healthier, more equitable housing systems.

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