ENVIRONMENTAL PROTECTION AGENCY (EPA)
Environmental Justice Government-to-Government Program (EJG2G)
EPA-R-OEJECR-OCS-23-02

1.0 Program Objectives. a. Project Summary Page. i. Applicant Information: *Organization*: City of New Haven Office of Climate & Sustainability (OCS); *Address*: [redacted] New Haven, CT [redacted]; *Point of Contact:* [redacted]

ii. Environmental Issue(s): Indoor Air Pollution, Residential Buildings Sector Emissions

iii. Project Abstract: This grant would fund an initiative by the City of New Haven and community-based organizations (CBOs) to enroll energy-burdened New Haven residents in a new program aimed at the electrification of aging heating and cooking systems. These systems are often costly, inefficient, and can exacerbate health conditions related to indoor air quality, such as asthma and heart disease. Replacing these systems with new high efficiency electric appliances such as heat pumps and induction stoves can reduce energy bills, improve public health, and reduce climate pollution. Over the three-year grant timeline, we will partner with local CBOs providing utility assistance to enroll 400 households in energy counseling and energy efficiency programs and to electrify heating and cooking systems in 50-100 "example project" households who have recently received utility assistance. We plan to concentrate engagement in disadvantaged community census tracts in West Rock/West Hills, Newhallville, Dixwell, the Hill, Fair Haven, and the Annex neighborhoods, which are primarily low-income communities of color. Through resident engagement and implementation of the example projects in a variety of neighborhoods, we aim to communicate and demonstrate the beneficial anticipated effects of home electrification: lowered greenhouse gas emissions and indoor air pollution, reduced energy burdens, increased resiliency through improvements to structures' passive survivability and installation of air condition systems for extreme heat-events. Through a partnership with researchers at Yale University, we will evaluate the effectiveness of this program through monitoring indoor air quality before and after conversions to heat pumps and electric stoves, weatherization, as well as conducting qualitative research (interviews and focus groups) before and after these interventions.

iv. Project Type: Small-Scale Construction, Indoor Air Quality Monitoring, Research

v. Underserved Communities and Vulnerable Populations addressed by project (include geographic and location info, such as zip code, city or county): one-to-four-unit owner-occupied properties in disadvantaged communities (specifically West Rock/West Hills, Newhallville, Dixwell, the Hill, Fair Haven, and the Annex)

vi. Special Considerations: Climate change resilience

vii. Project Partners: Community Action Agency of New Haven (CBO), Junta for Progressive Action (CBO), Neighborhood Housing Services of New Haven (CBO), Yale University (academic), City of New Haven Livable City Initiative (government)

iix. Will you need to develop a QAPP for your project? Yes.

b. Disproportionate Environmental and Public Health Issues Impacting Underserved Communities: (1) Communities Impacted. The project seeks to electrify heating and cooking systems in the homes of energy-burdened residents of New Haven's least affluent neighborhoods. Outreach to and engagement of residents will be focused on State of Connecticut "environmental justice communities" (EJ communities), neighborhoods in which 30% or more of the population lives below 200% of the federal poverty level. The Connecticut Department of Energy and Environmental Protection's (DEEP) 2022 map of CT EJ communities classifies the large majority of census block groups in New Haven as EJ communities, but the project will focus on the West Rock/West Hills, Newhallville, Dixwell, the Hill, Fair Haven, and the Annex neighborhoods, where all census block groups meet this criterion, and concentrate on the neighborhoods with the oldest housing stock and worst health outcomes.

In these neighborhoods, City property assessment data indicates that more than two thirds of housing units in these neighborhoods are in one-to-four-unit properties. Most of these homes are aging, built before insulation or energy efficiency codes. Except for West Rock, two block groups in Fair Haven, and two in the Annex, ACS data indicates that a majority of homes in each block group were built before 1960. More than two thirds of homes were built before 1960 in all of Newhallville, most of Dixwell and Fair Haven, and much of the Hill.

EJScreen data shows how the legacy of redlining, underinvestment in housing, and other social determinants of health have resulted in poor health outcomes for these communities. Low life expectancy is in the 95th percentile for all of Newhallville, the 90th percentile for all of Dixwell, as high as the 96th and 91st percentile in much of the Hill, and 78th percentile in Fair Haven. These life expectancies correspond to the percentage of population who identify as people of color: between 90th and 99th percentile in Newhallville, 79th and 95th percentile in Dixwell, 82nd and 99th percentile in Fair Haven, and 73rd and 91st in the Hill. Heart disease incidence is in the 80th percentile across Newhallville and as high as the 80th and 99th percentile in the Hill. New Haven consistently reports one of the highest hospitalization rates for asthma in the state and ranks as one of the communities with the highest asthma prevalence in the country. EJ Screen data underlines the extremity of asthma prevalence in New Haven's disadvantaged communities: 99th percentile in Newhallville, 98th percentile in Dixwell, between 94th and 97th percentile in Fair Haven, and between 97th and 99th percentile in the Hill.

(2) Environmental/public health issues: The link between gas stoves, particularly when unvented, and indoor air pollution is well-documented. Recent studies have also strengthened evidence linking gas stoves – even with ventilation – to elevated health risks. The danger is particularly acute for the most vulnerable populations: increased risk of asthma and asthma attacks in children, and lung infections and other respiratory issues, especially among the elderly and those with difficulties breathing. Cooking in older, poorly ventilated, and confined kitchen areas can increase the risk of exposure to volatile organic compounds (VOCs), particulate matter (PM) and nitrogen dioxide, increasing the risk of heart disease, cancer, and respiratory illnesses. These types of kitchen spaces are more prevalent among low-income populations and in communities of color, such as the neighborhoods of focus in this project. In response to growing health concerns regarding gas stoves, the City of New Haven's HUD-funded Healthy Homes

program recently added the replacement of gas stoves with electric alternatives to the program's approved list of interventions.

The link between oil-based heating systems, which release VOCs, nitrogen dioxide, aromatic hydrocarbons (PAHs), PM, and other hazardous air pollutants, and indoor air quality is less well understood. A key objective of this project would be to partner with Yale researchers to monitor and evaluate the changes in indoor air quality in the home before and after the conversion from an oil-based heating system to a heat pump. Both gas stove and oil-based heating system conversions will have positive effects on ambient air quality in disadvantaged communities, including a reduction in ozone precursor emissions.

Connecticut has the sixth highest electricity rates in the United States. Recent Yale research of Connecticut residents shows that high energy bills cause psychological and physical health issues, as residents forego necessary expenses on food and medication, worsen chronic conditions by keeping the home too hot in summer or cold in winter, and suffer severe stress and anxiety. This builds on research from the Washington Heights neighborhood in New York City, which found that energy burden itself is a threat to both mental and physical health, leading to anxiety, depression, poor sleep, and asthma and pneumonia. Poor mental health, in turn, increases the risk of physical health problems, including diabetes, heart disease, and stroke.

Neighborhood Housing Services, a community-based nonprofit dedicated to community stabilization and neighborhood revitalization, hosts the I Heart My Home (IHMH) CT program, which provides free one-on-one counseling and technical assistance to residents and property owners interested in energy efficiency and electrification. As of April, 2023, IHMH is helping to make whole house energy upgrades that lead to electrification in over 550 one-to-four unit residential buildings representing approximately 775 households statewide. 45% of the buildings served by IHMH have residents with incomes at or below 60% of the State Median Income level.

(3) Environmental/Public Health Results: Through electrification of aging home energy and cooking systems, we seek to achieve an improvement in indoor air quality and a reduction of perceived energy burden and insecurity for the households that participate in this program. The Yale researchers who will partner with the City for this project will perform monitoring of indoor air quality both before and after the electrification has been completed. The City also intends to partner with researchers on qualitative pre- and post-intervention interviews with participating households. Research on perceptions of energy burden before and after deep energy efficiency measures suggests that these interviews will indicate a reduction in these residents' energy-related stress and other improvements to their mental health due to lower annual energy costs. Furthermore, we anticipate these benefits to inspire the neighbor effect and to see an increased likelihood that interviewees recommend energy-efficient appliances and heating systems to their community. Focus groups and interviews will explore whether participants experience perceive benefits in terms of energy costs, other housing costs, comfort, and health as well as question of why participants opted to participate, why eligible residents did not participate, and whether the project had the desired demonstration effect.

Additionally, efficiency and electrification improvements will reduce air pollution and improve ambient air quality in these communities, nearly all of which are currently suffering the effects of some of the most polluted air in the country (see: EJSCREEN asthma percentiles, heart disease). Improvements to indoor and ambient air quality benefits public health, reducing rates of asthma, heart disease, and other respiratory illnesses.

This project will also improve the climate resilience and emergency preparedness of these disadvantaged communities while lowering their carbon footprints. The enrollment of participating households in programs such as the Home Energy Solutions – Income Eligible (HES-IE) program will allow them to receive an energy audit that can lead to insulation projects at no cost and other deep energy efficiency measures, with no cost or at a heavily reduced rate. These measures will improve these homes' passive survivability, insulating households from extreme heat and retaining heat better in cold months.

c. Organization's Recent Efforts to Directly Support Underserved Communities. (1) Recent Efforts: In 2022, the City launched its I'm Home Initiative, providing renters with security deposit assistance and expanding the City's downpayment assistance program. Residents with annual income below 300% of the federal poverty level qualify for security deposit benefits and are eligible for an increased level of downpayment assistance. These programs provide direct relief to vulnerable populations as they recover from the economic impact of the pandemic.

In 2022, the City organized many smaller meetings with residents and two community-wide public meetings at the local neighborhood school regarding the City's proposal to relocate the City's adult education program to the 188 Bassett St building in the heart of the Newhallville neighborhood. The former Connecticut Department of Social Services office building had sat vacant for many years and needed asbestos remediation. Communitywide meetings built trust between the City and the Newhallville community, where residents had consistently felt overlooked by City development activity. The first communitywide meeting surfaced residents' concerns that the proposal would increase demand for parking and did not directly meet neighborhood desires for community space. In response, the City acquired two adjacent parcels to increase parking capacity and amended its plans for the 188 Bassett St building to provide 3,000 square feet of dedicated, separately accessible community space.

The City worked with resident activists and the State of Connecticut to design, fund, and construct the new Q House, the Dixwell neighborhood's community center, which reopened in 2021. The previous Q House was a private center that closed in 2003 due to lack of funding. Through the Q House Advisory Board, residents were directly involved in development of plans and now govern the operations, programming, and finances of the community facility.

In 2021 and 2022, the City held a series of workshops with Fair Haven community members to redevelop the long-vacant Strong School. These workshops solicited resident input on how to structure a request for proposals and received resident feedback regarding the request for proposals responses. This feedback informed the decision of the selection committee to move forward with Massachusetts developer Pennrose's plan for deeply affordable housing and artist residences in the building.

(2) Work with Community Residents and/or Community-Based Organizations of Underserved Communities: Since the outbreak of the COVID-19 pandemic, the City of New Haven, led by the New Haven Health Department (NHHD), partnered with CBOs and faith communities to create and disseminate effective, culturally- and linguistically-sensitive messages to the communities most at-risk of COVID. NHHD established a Community Messenger program engaging trusted community members to deliver critical public health messages to their respective communities. Analysis from local data analysis nonprofit DataHaven indicates that 10,000 lives were saved in Connecticut at the onset of the pandemic due to public adoption of social distancing measures advocated by the NHHD and others. Spurred in part by NHHD campaigns, vaccination rates increased considerably, with 78% of Hispanic residents and 62% of Black residents now having received at least one dose of the COVID-19 vaccine.

In 2020, the City of New Haven, through its Environmental Advisory Council (EAC), Board of Alders, and Mayor Justin Elicker, supported resident-led efforts to oppose the expansion of the Murphy Road Recycling transfer station, which would have allowed for the handling of putrescible waste in proximity to the Fair Haven and Annex neighborhoods and the Quinnipiac River. The proposed expansion would have brought 500 tons of trash per day from the suburbs into the Annex, just across the river from Fair Haven. City officials and the all-volunteer EAC commission joined neighborhood residents and local advocacy group Save the Sound in calling for DEEP to reject the permit. The permit was withdrawn in early 2021, protecting the vulnerable communities adjacent to the transfer station from further truck emissions, odors, noise, and rodents. In spring of 2022 when Murphy Road's local permit was up for renewal, NHHD staff testified regarding smells, noise, and truck proximity to dwellings, substantiating residents' concerns. This was instrumental in reducing the permit from 5 years to 2 years and imposing new conditions on the use of the site related to noise, idling, and proximity to residential dwellings.

In 2019, when the U.S. Nuclear Regulatory Commission (USNRC) and DEEP approached the City of New Haven regarding the remediation of the former United Nuclear site in Newhallville, the City immediately contacted local Alders and the Community Management Team (CMT) to develop a plan for community engagement. The site is part of the Winchester Repeating Arms complex, with unremediated properties stretching from southern Newhallville into the neighboring town of Hamden. Some properties, such as the site of the now-closed Hamden Middle School, were used by local government despite the history of contamination, undermining public trust in the remediation process. The City worked with the Alder for the United Nuclear site and canvassed the blocks around the site, inviting neighbors to the CMT meeting where USNRC and DEEP initially briefed the community on the remediation plan.

The City supported and reinforced residents' requests for biweekly air quality monitoring reports and monthly project status reports in person from the remediation team throughout the cleanup. These reports were delivered regularly for more than a year. The City coordinated site visits for residents to view the cleanup process before, during, and after remediation, informing residents who shared observations at CMT meetings. By allowing residents to determine the frequency and format of reports on the remediation process, the City helped to build trust in the remediation process and open channels for communication with residents.

(3) Involvement of Residents in Decision-Making: In its outreach to the Newhallville community, the City made it clear that residents' voices would guide the City's approach to the relocation of Adult Education programming and that an alternative location was available. The City stated at both communitywide meetings that it would not propose the relocation to the Board of Education, the body with decision making authority, without community consensus in favor of the relocation and without addressing resident concerns. The City Engineer worked with the Adult Education program on a new design to respond to community concerns, doubling the amount of dedicated community space and identifying an adjacent property that could be acquired through tax foreclosure for increased parking. A second community meeting was convened at which community members expressed support for the updated proposal. At this point the City raised the item at the Board of Education, where residents voiced support and the proposal passed, enabling the City to obtain state funding for remediation of the building.

In 2020, City officials engaged directly with residents to oppose the expansion of the Murphy Road Recycling transfer station, responding to and amplifying community concerns. Residents, represented through the EAC, had communicated their opposition to the expansion to the previous mayor. But the administration did not validate these concerns, instead writing to the transfer station owner in support of the expansion. As a result, DEEP issued a temporary determination in favor of expanding the facility. Under newly-elected Mayor Justin Elicker, the City changed its approach, centering community concerns and urging DEEP to deny the permit application. The Mayor publicly denounced the temporary determination and coordinated with concerned neighbors and Save the Sound to testify to the state in opposition. This support proved decisive: the planned expansion was dropped after three years of community advocacy.

While this issue has not resurfaced, OCS has been in regular dialogue with the Environmental Advisory Council and area residents regarding emissions and operations of the petroleum tank farms adjacent to the transfer station. The Office has assisted residents by requesting information from DEEP and joining a status conference meeting related to these facilities Title V permits.

d. Project Linkages. Objective 2.1: Promote Environmental Justice and Civil Rights at the Federal, Tribal, State, and Local Levels. a. Building a Program that is Responsive to Community Concerns and Increases Climate Resilience: A key objective of the project will be to listen to, understand, and develop community capacity to respond to resident concerns regarding the implementation of new heating and cooking systems. This is a particularly important consideration for CBOs that provide utility assistance as the concerns of staff must first be understood and addressed before the organization can effectively respond to community concerns. As staff are educated on the benefits and constraints of new electric systems, they will be better able to respond to concerns and advise community members on why to enroll in the program and convert to new systems.

Supporting communities as they build resiliency and adapt to climate change is also central to promoting environmental justice at the local level. Most community members would not associate deep energy efficiency measures, such as insulation, and heat pump installations with climate resiliency. Educating underserved community members and the public at large regarding

the cooling potential of heat pumps and the increased passive survivability of energy efficient structures will be just as critical as making the energy and resiliency improvements themselves.

b. Achieving Tangible Results in Impacted Communities: Poor air quality disproportionately harms our most vulnerable community members – low-income residents, young people, the elderly, and those suffering from respiratory conditions. As Americans increasingly adopt technologies that reduce or eliminate local air pollution – such as heat pumps, induction cooktops, and electric vehicles – adoption in inner-city, low-income communities lags far behind less affluent ones, threatening to deny the benefits of indoor and ambient air quality improvements from those who need them the most.

It is critical that inner-city residents have tangible, lived examples of these transformative new technologies in their communities and that they are empowered with the knowledge of how to replicate these examples in their own lives. The "neighbor effect" in solar adoption, of neighbors being more likely to adopt solar after seeing it and hearing of it in their neighborhood, is well-documented. Although less visible, induction stove and heat pump adoption holds similar potential to change perceptions of how residents of all income levels can use high efficiency electric appliances to safely, reliably, and affordably cook their food and heat and cool their homes.

e. Partner and Collaborate. A. Partnerships: OCS will partner with CBOs, academia, and associated government agencies to (1) identify and engage eligible households, (2) design and complete electrification and deep energy efficiency improvements in these residents' homes, (3) quantify the scale of improvement to indoor air quality, and (4) qualify resident participation, participants' perceived benefits of improvements, and public perception of electrification improvements.

To identify low-income households in EJ communities that may be interested in implementing deep energy efficiency and electrification upgrades to their home, the City will partner with Community Action Agency of New Haven (CAANH) and Junta, two CBOs focused on poverty alleviation that have experience connecting income-eligible residents to utility assistance. These partners were selected through the City's competitive procurement process for their proven ability to maintain relationships with income-eligible residents and manage the cases of utility assistance program participants. The CBOs will enroll residents in the program and serve as a point of contact for project participants, helping to manage relationships with these residents and communicate with them as improvements are completed.

The City's partnerships with CBOs serve a dual purpose in this project. With respect to the near-term objective of implementing efficiency and electrification improvements and demonstrating their value in demographics with low participation in electrification, the City is seeking low-income residents with oil-based heating systems and increased engagement among Spanish-speaking residents. CAANH maintains records of and relationships with residents who heat with delivered fuels, have participated in heating assistance programs before, and have incomes below 60% of the state median income. New Haven's largest and fastest growing demographic is the Latine community – partnering with Junta will help ensure that this community, which

historically has had lower rates of participation in energy efficiency programs, is included in outreach and engaged in participation.

With respect to the City's long-term objectives in promoting awareness about the benefits of energy efficiency and electrification to low-income communities, the partnership will ensure that staff at the CBOs are educated about heat pumps and other electric alternatives so that they may recommend and assist residents with heating system replacements in their work beyond this project. In their outreach and recruitment work for this project, they will play a key role as trusted community voices disseminating this knowledge across the city's EJ communities, educating the broader community about the benefits of energy efficient and electric systems. Even when individual households decline to participate, the community will benefit by virtue of their increased awareness of the health and financial benefits presented by electrification and energy efficiency.

After households have been identified and engaged in the project, the City is partnering with Neighborhood Housing Services (NHS) to assist residents with designing energy efficiency and electrification upgrades, accessing incentives and rebates to reduce or eliminate the cost of these improvements, and advising them in selecting contractors to ensure the work is carried out effectively. For 44 years, NHS has been renovating and building housing in New Haven's low-income neighborhoods and providing advice to residents about homeownership and energy efficiency. To help implement unfamiliar systems for heating and cooking, NHS is a trusted housing and energy improvement agency in the neighborhoods of focus for this project. NHS' I Heart My Home program has bilingual staff with expertise in the design of energy efficiency and electrification improvements and demonstrated experience in guiding residents through accessing energy efficiency program, including determining eligibility, providing required documentation, completing applications, connecting with relevant vendors, and working with local electric utilities. NHS was selected for this project through the City's competitive procurement process.

NHS staff will assist residents in accessing forgivable loans through our partner agency's, the City of New Haven's Livable City Initiative's (LCI), Energy Efficiency Rehabilitation Assistance Program (EERAP) as well as funds set aside through this grant to pay for electrification improvements. NHS has already partnered with the City of New Haven Health Department (NHHD) to begin referring residents in need of financial assistance for the remediation of barriers blocking energy efficiency improvements to NHHD's Healthy Homes program.

The City will partner with Yale's Pollitt Lab to quantify the changes in indoor air quality as a result of this project. This partnership would be structured as a research service agreement obtained through a sole source procurement of expert services. The City sought advice from Omari Burell about whether this type of procurement of a specialized academic stakeholder partner would be admissible and he indicated that this concept sounded reasonable. Pollitt Lab have the expertise and specialized equipment (e.g., indoor air quality monitors and passive samplers) to produce a pilot study (30 to 50 homes) of changes in PM, nitrogen dioxide, and VOCs in the winter heating season before and after the conversion from oil-based heating systems to electric heat pumps. This pilot will help guide and inform future research on this

topic. Pollitt Lab is currently conducting similar, pilot scale research on indoor air quality in Connecticut.

***Community Action Agency of New Haven (CAANH)** -- CBO*

Role: Identifying households that are eligible for and interested in participating in this project. Engaging these households in the project and supporting them as they plan and install deep energy efficiency measures and electrification improvements.

Resources: As one of Connecticut's nine designated anti-poverty nonprofits, CAANH is the local agency responsible for administering the state's energy assistance program. CAANH's staff bring extensive experience engaging with and managing the cases of low-income renters and homeowners seeking utility assistance and weatherization services. CAANH maintains records of which households have participated in heating assistance and, for delivered fuel customers, records of which households have participated in cleaning, tuning, and testing of their oil heating systems. This experience and these two datasets will be critical to identifying and engaging residents who may be eligible for incentives and rebates to help reduce the cost of efficiency and electrification improvements and who may be interested in participating in this project.

Partner's Interest: CAANH's subaward will support two outreach workers tasked with enrolling households in the program and acting as an initial point of contact for them. To date, CAANH has largely focused on like-for-like replacements of residents' heating systems. Participating in this project will help staff develop a better understanding of the available high efficiency electric alternatives to traditional heating systems, the rebates and incentives available to support heating system conversions, obstacles to resident participation and physical constraints to installation. As CAANH seeks to empower its clients through financial stability, it has a strong interest in lowering energy bills through new high efficiency electric systems. Furthermore, typically greater financial assistance is available for residents on electric heating systems than delivered fuels, lowering the energy burdens of residents who remain on utility assistance after the conversion of their heating system.

***Junta for Progressive Action** -- CBO*

Role: Connecting with Latine households that are eligible for and interested in participating in this project. Engaging these households in the project and supporting them as they plan and install deep energy efficiency measures.

Resources: Since 1969, Junta has provided social services to a predominantly Latine community in Greater New Haven. Junta is a leader in the Fair Haven community, and can repurpose existing outreach materials, listservs, and ongoing engagement campaigns to focus on engaging Latine New Haveners in this energy efficiency and electrification initiative. This work will allow Junta to identify a list of predominantly Spanish-speaking, Fair Haven-based candidates for energy efficiency projects.

Partner's Interest: Junta's subaward will support the administrative staff, outreach materials, and other costs related to their engagement work. Since the onset of the pandemic, Junta's financial empowerment work has increasingly focused on rent and utility assistance, giving the

organization a strong interest in promoting community participation in programs that reduce energy burden. The Latine community is concentrated in the Hill and Fair Haven, two neighborhoods vulnerable to extreme heat. This gives Junta a strong motivation to socialize the adoption of systems to provide relief from extreme heat events, such as air source heat pumps.

Neighborhood Housing Services of New Haven (NHS) *-- CBO*

Role: Connecting participants with energy efficiency programs and rebates, supporting them through the application process, designing an energy efficiency plan, and assisting residents in engaging reliable contractors.

Resources: NHS has provided energy efficiency and energy efficiency resources education to seniors, renters, homeowners and property owners through classes, resource lists and informal one-on-one conversations since 2005. Throughout this work, NHS has fostered many strong connections with local residents, community organizations, and vendors. The organization has developed lists of recommended contractors, designed personalized energy efficiency plans, and assembled local, state, and federal resources to assist.

Partner's Interest: NHS's subaward will support the staff providing energy counseling services to customers referred by the outreach partners that are selected by the City of New Haven. NHS' I Heart My Home (IHMH) CT program has been successful, serving 278 households in New Haven since it was founded in 2020. With a goal of engaging 400 low-income households through this project, NHS can more than double their impact in New Haven and increase to an even greater extent the amount of low-income participation in the IHMH program. This level of growth could help attract more interest in their energy counseling model, which has already led IHMH to advise similar programs in Ann Arbor, Detroit, and the Hudson Valley.

Maintaining Relationships with CBOs

The City has worked closely with CAANH, NHS, and Junta to publicize energy efficiency programs and assistance resources and to improve financial empowerment through the City's Financial Empowerment Center. Both the Financial Empowerment Center and OCS have funding through the end of 2026 to carry out their missions to stabilize residents' finances and lower energy bills in partnership with organizations like CAANH, NHS, and Junta. The City has resolved to promote community-wide electrification of its building stock by the end of 2030 and the Board of Alders has highlighted environmental justice as one of five pillars of its legislative agenda, both of which will motivate continued engagement with CBOs focused on increasing participation in electrification among low-income residents.

Yale University *– Academia*

Role: Quantifying the scale of improvement to indoor air quality and qualifying resident participation, participants' perceived benefits of improvements, and public perception of electrification improvements.

Resources: Air quality monitors (Purple Air sensors and passive air samplers), surveys

Partner's Interest: Pollitt Lab will conduct an indoor air quality monitor study of homes with heating system conversions. Their subaward would fund equipment, lab time, and associated research costs. The Pollitt Lab has an interest in pursuing this research, as the impacts of oil-based heating on indoor air quality are underexamined and this project represents an important first step in addressing that research gap. The project aligns with the research objectives of the Pollitt lab, which is focused on using mass spectrometry techniques to characterize personal environmental exposures to understand the relationship between exposure to complex mixtures of air pollutants and disease.

OCS has also held discussions with potential academic partners, such as Yale School of Medicine professor Annie Harper, who can provide a qualitative evaluation of the impact of heating system conversions. Professor Harper is currently partnering with the Pollitt Lab on a pilot study investigating the split incentive problem (barriers to renters accessing energy efficiency) and tracking indoor air quality in rental properties. Researchers like Professor Harper who focus on the mental health impacts of energy- and debt-burdened households have a strong interest in understanding why residents do or do not participate in energy efficiency programs, and how participants and other community members perceive their benefits. OCS intends to work with participating CBOs and experts like Professor Harper to implement a qualitive evaluation of the project utilizing interviews, surveys, and focus groups to answer these questions.

Relationship Maintenance Plan: With the City's resolution to electrify its own buildings and promote the electrification of the building stock citywide by the end of 2030, OCS anticipates further opportunities to partner with local experts at Yale to study the impact of the electrification of heating, cooking, and water heating systems.

Livable City Initiative *– Government*

Role: LCI administers EERAP and may be able to provide additional funding and support to project participants.

Resources: LCI will continue to provide funding through its EERAP program to reduce the cost of conversion for residents and both LCI and OCS will seek increased funding for the EERAP program through the City budget to extend the benefits to more low- and moderate- income families.

Partner's Interest: With the support of NHS, project participants will navigate the EERAP application process and secure funding for their home energy efficiency improvements. The enrollment of up to 100 households in EERAP substantiates the program's necessity for the City and lays the groundwork for sustained increased enrollment, as enrolled project participants engage their neighbors and community members in EERAP as well.

Relationship Maintenance Plan: OCS, founded in December of 2022, is committed to promoting energy efficiency in residential buildings. Prior to OCS' foundation, LCI served as the City's center for home energy efficiency projects, so OCS and LCI continue to work closely to advance residential energy efficiency.

2.0 Project Activities/ Milestone Schedule/ Detailed Budget Narrative. a. Project Activities:

The overarching goals of this program are: (1) to reduce the energy burden for low-income residents New Haven's disadvantaged communities, (2) to improve and study air quality in homes in these communities, (3) to increase the climate resilience of these homes and to reduce their greenhouse gas emissions, and (4) to generate interest in deep energy efficiency and home electrification measures among these communities. Our objectives are to: (1) engage 400 energy-burdened households in state energy efficiency programs, (2) utilize rebates, EERAP forgivable loans, and proceeds from this grant to fund the conversion of 50-100 oil heating systems to air source heat pumps, and the replacement 20-50 of these households' gas stoves with electric induction ranges, (3) evaluate the changes in indoor air quality (PM, nitrogen dioxide, and volatile organic compounds), and (4) evaluate the feasibility of this type of electrification and energy efficiency intervention in terms of resident interest; the benefits as perceived by residents living in upgraded units (specifically focusing on energy costs, other housing costs, related stress, health, and comfort), and general public change in perception of the value of electrification.

Year One. Junta for Progressive Action (Junta) and Community Action Agency of New Haven (CAANH) will aggregate their records of households in West Rock/West Hills, Newhallville, Dixwell, the Hill, Fair Haven, and the Annex neighborhoods that have oil-based heating systems and have received heating assistance. Outreach workers at CAANH and staff at Junta will contact these households directly and through community engagement events to recruit participants, who will be enrolled in NHS' energy counseling program and Connecticut's Home Energy Solutions – Income Eligible (HES-IE) energy efficiency program. Collectively, CAANH and Junta estimate that they can enroll 350 to 750 participants, and NHS has capacity to provide energy counseling services to 400 households. Neighborhood Housing Services of New Haven (NHS) will then work with these households to develop plans for energy efficiency improvements and home electrification, assisting residents identifying and applying for federal High Efficiency Electric Home Rebates, state Heat Pump Installer Network (HPIN) rebates, EERAP assistance and direct assistance from this grant through the City, and other programs for which they are eligible (such as NHHD's Healthy Homes remediation program for removal of barriers to energy efficiency improvements).

Through HES-IE, residents should be eligible for free energy audits, free insulation, and free or low-cost window replacement. OCS anticipates fully funding 50 to 100 oil to heat pump conversions as well as 20 to 50 gas to induction range conversions through the combination of HEEHR, HPIN, EERAP, and EJG2G grant funding. As NHS assists residents in selecting contractors and qualifying for incentives, Junta and CAANH will provide a second layer of support to residents should questions and concerns arise. CAANH, Junta, NHS, and OCS will collaborate on public workshops and events to engage with community members in the disadvantaged neighborhoods about the benefits and objectives of the project.

Yale researchers will spend the first part of the first year also planning, designing, and receiving Institutional Review Board (IRB) approval for their air monitoring work. In partnership with OCS, researchers will develop and submit a Quality Assurance Project Plan (QAPP) to EPA for approval of their studies.

Year Two. Yale researchers will begin their air quality monitoring in Year Two. As a condition of enrollment in the funded heating system conversion component of the project, households will provide their consent to having air monitors installed in their homes for two weeks in the winter heating season before and after the conversion to heat pumps. Before heat pumps are installed, researchers will perform their monitoring work to establish pre-intervention conditions. Given the winter heating season, researchers must focus their efforts on the end of Q4, Q1, and the beginning of Q2. To reduce the confounding effects of seasonal weather on indoor air quality, researchers will conduct their measurements at the same time each year. The project team expects that some households will not be enrolled in programming in the first year of the project, and that in the second year we will continue to conduct outreach and engagement to reach our goal for enrollment. The Yale researchers will initiate pre-intervention monitoring in homes in Q4 of the second year. The project team anticipates completing our 20-30 electric induction conversions in the previous year. CAANH, Junta, NHS, and OCS will collaborate on events to publicize the financial, health, and environmental benefits of heat pumps and electric induction stoves.

Year Three. To avoid interference with research, further electrification improvements will not occur in homes studied by Yale researchers in the final year of the project. For households that received heat pump conversions prior to deep energy efficiency measures, NHS will continue to work with households to implement deep measures. NHS will continue to support all enrolled households to implement their individualized energy efficiency and electrification plans. NHS will monitor and report progress on implementation to the City. In the final year, researchers will complete post-intervention monitoring and will assemble a final report summarizing key findings from their studies. CAANH, Junta, NHS, and OCS will collaborate on second round of events publicizing the benefits of electrification.

b. Milestone Schedule

Q1: Dec-Mar *Q2: Mar-Jun* *Q3: Jun-Sept* *Q4: Sept-Dec*

		PY23-24				PY24-25				PY25-26			
Objective	**Strategies & Activities**	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Community Outreach & Engagement													
Enroll Target Households	Create list of potential participants from partner records	■	■										
	Develop recruitment plan	■											
	Host community meetings, canvassing events, phonebanks.		■	■	■								
	Enroll 400 households in IHMH with 50-100 households enrolled in this project			■	■	■	■						
Household support	Create energy efficiency plan and identify eligible rebates			■	■	■	■	■	■				
	Monitor progress of households through programs and answer questions		■	■	■	■	■	■	■	■	■	■	■

Energy Efficiency Measures and Electrification													
Gas stove conversion	Replace 20-50 gas stoves with induction												
Heat Pump Installation	Install heat pumps in 30-50 homes where research is occurring												
	Install heat pumps in 20-50 homes where research is not occurring												
Deep Energy Efficiency Measures	Install insulation, replace windows, and implement additional deep measures												
Disbursement of funds	Disburse $470,000 in project funding to participants												
Research & Evaluation													
Air Quality Monitoring	Pre-intervention indoor air quality monitoring in 30-50 homes												
	Post-intervention indoor air quality monitoring in 30-50 homes												
Qualitative Research	Pre-intervention interviews												
	Post-intervention interviews & focus groups												
Reporting	Produce semi-annual and final reports												

c. Itemized Budget Sheet: Submitted as attachment.

3.0 Environmental Results. a. Anticipated Outputs. Number of households served (enrollment in energy coaching and HES-IE, oil to heat pump conversions, gas to induction stove conversions, deep energy efficiency measures (insulation, windows), electrical wiring improvements, and/or new electric panels). CAANH Junta, and NHS will host community meetings and events for the purpose of raising awareness about this project and the benefits of home energy efficiency measures with the goal of enrolling 400 households, 50-100 oil to heat pump conversions, and 20-50 gas to induction stove conversions. NHS will design roadmaps for all enrolled households to guide them through the various steps toward full home electrification.

Number of disadvantaged communities reached through outreach activities and energy and electrification improvements. The project intends to reach all of New Haven's state-designated EJ communities. These are the neighborhoods of West Rock/West Hills, Newhallville, Dixwell, the Hill, Fair Haven, and the Annex.

Anticipated Outcomes. Air Quality & Health Benefits: 27% of Connecticut households depend on a gas stove and those with heating with oil consume, on average, 629 gallons of fuel oil per year. Gas stoves can release NO_2 and other harmful pollutants at more than twice the national standard. Replacing these gas stoves with electric induction stoves can decrease indoor NO_2 levels by 50% or more. The link between heating oil and indoor air quality is more poorly understood, but the air quality monitoring conducted in this project aims to address this gap in the research. However, studies have linked No. 2 fuel oil, the most common type of heating oil in Connecticut, to PM2.5, NO2, and other harmful air pollutants that are associated with adverse

health outcomes. We therefore expect that the gas stove conversions and heat pump installations implemented in this project to lead to a improvement in both indoor and ambient air quality. Over the long term, we may see these reductions in air pollution to lead to fewer emergency room and hospital visits due to respiratory illness, particularly among children, in the households and neighborhoods served in this project.

Energy Burden: Households served in this project will eliminate their spending on fuel oil, and will reduce or eliminate their natural gas costs. Weatherization, insulation, and other efficiency improvements will reduce the cost of energy needed to heat and cool homes. One study by the Connecticut Energy Efficiency Board found that without any building envelope upgrades residential ductless mini split heat pump installations–the variety we will implement in this project–can save customers $415 in the year of installation and $1,598 over the life cycle of the heat pump, when accounting for the repayment of Energize CT loans to finance installation. We expect savings in this project to exceed those totals, as our purpose is to conduct deep energy efficiency measures with no or a highly reduced amount of financing for participants. As a result of these savings, participants' energy burden will shrink and we anticipate that associated energy-related stress, anxiety, and depression will improve.

Resilience to Climate Change and Emissions Reductions: In the near-term, weatherization will be a critical defense against the climate crisis' impacts on extreme temperature, as weatherized, insulated homes can better maintain heat in the winter and cool air in the summer. Weatherization, insulation, and efficiency improvements will reduce emissions associated with heating and cooling homes. Furthermore, the shift from fuel oil and natural gas to electricity will dramatically lower the greenhouse gas emissions associated with any household, even when accounting for upstream emissions.

Awareness of Energy Efficiency Measures & Programs: A significant barrier to energy efficiency in the Greater New Haven region is the lack of awareness of technology like heat pumps, the benefits that such technologies and home improvements can bring, and the programs available, particularly to low-income residents, to help reduce the costs of energy efficiency and electrification improvements. This project will serve to raise awareness about all three elements: the technology, the benefits, and cost assistance. Both through the CBOs' outreach, including door-knocking and town meetings, and via the neighbor effect after the improvements have been completed, we expect interest in home energy efficiency and electrification to increase significantly among New Haven's environmental justice communities as a result of this project.

b. Performance Measurement Plan: In the initial six months of the project, the project team will convene project partners and educate CBO staff regarding the characteristics of heat pumps and induction ranges, the project objectives, and key milestones. The project team anticipates holding one meeting with all stakeholder organizations and two follow up meetings with CAANH, Junta, and NHS to build staff capacity at CAANH and Junta and to establish clear workflows between the three agencies. A project coordinator will be identified at each organization and 2 outreach workers will be hired and trained at CAANH. Through holding information sessions, phone calls, and other outreach to former clients, CAANH and Junta staff will then develop a list of households that are eligible and willing to participate, seeking to enroll 300-600 households (CAANH) and 50-150 (Junta). Both CBOs will report the number of households they contacted, level of interest among those households in the project, and the number of households that have committed to participating in a shared database (e.g. Google Sheets). 50-100 households that are willing and eligible to receive heat pumps will be selected

Performance Metrics

Community Outreach & Engagement

- # of households contacted
- # of households with at least some interest in energy efficiency measures
- # of confirmed participants

Energy Efficiency Measures & Electrification

- # heat pump conversions planned & implemented
- # electric convection conversions planned & implemented
- # houses with insulation improvements planned & implemented
- # electric wiring improvements planned & implemented
- # electric panel improvements planned & implemented
- State & local funding sources for which participants are eligible & successfully obtained
- Project funds used

Research & Evaluation

- Initial, final, and % change in PM, NO_2, aromatic hydrocarbons
- # individual interviews with individuals who agree to participate and those who do not, before and after intervention
- # of focus groups with neighboring residents who did not participate, to assess demonstration effect

during this time.

As residents commit to the program in the first six months, NHS will contact them to make plans to install energy efficiency upgrades in their homes and to coordinate the installation of these upgrades over the course of the next 12 months. In this planning phase, NHS will add to the database the numbers of planned heat pump conversions, electric induction conversions, insulation upgrades, electric wiring improvements, and new electric panel installations, as well as any remediation barriers to energy efficiency. NHS will support these participants in enrolling in cost-reducing state and local programs and, for the 50-100 households receiving heat pumps, will support them in making use of the $470,000 in funding from this grant allocated for direct improvements, tracking the amount and type of subsidies available and obtained.

Outreach will be completed in the first year of the project, so performance metrics for the second year will be primarily recorded by NHS and OCS in tracking the completion of the energy efficiency and electrification upgrades. As residents begin receiving rebates and grant monies through the state and local programs to which they applied in year 1, they will move forward with installations, and NHS will record the types of improvements completed in the database. In this second year, Yale researchers will begin their work, coordinating with NHS to ensure that they can record pre-intervention indoor air quality and qualitative data before any installations have been made in the 30-50 homes that have agreed to participate in their research. If any of the remaining 20-50 homes receiving funding via this grant opportunity have gas stoves, they will have those stoves replaced with electric induction cooktops.

In the final year of the project, final installations will be completed and logged in the database, as will post-intervention research in the 30-50 homes with new heat pumps that have consented to participation. Researchers will prepare a final report describing the project's effect on indoor air quality and participants' attitudes toward heat pumps and other energy efficiency measures.

c. Sustainability Plan and Environmental Justice Integration: To sustain the project, we will work with NHS institutionalize efforts within LCI, OCS, and CAANH through internal policy preferring conversion to electric appliances and ongoing staff training on communicating the

benefits of electric appliances to residents and assembling available incentives to make conversions accessible to low- and moderate-income families. LCI will continue to provide funding through its EERAP program to reduce the cost of conversion for residents and both LCI and OCS will seek increased funding for the EERAP program through the City budget to extend the benefits to more low- and moderate- income families. OCS and NHHD will continue to promote the benefits of converting from gas to electric induction cooking appliances as NHHD continues outreach to vulnerable residents through its Healthy Homes program.

OCS and CAANH will advocate to other community action agencies and partners at the state energy assistance program for extending the conversion program to energy assistance program participants across Connecticut. OCS will share the results of the final technical report, as well as qualitative and quantitative research, with peers at Connecticut municipalities and nationally through the Urban Sustainability Directors Network. Yale researchers will seek additional resources to extend the indoor air quality monitoring and qualitative surveys to more low- and moderate-income households in Connecticut.

4.0 Programmatic Capability. a. Organizational Experience: OCS staff have significant experience in project management including the development of sophisticated timelines, work plans, and completion of deliverables. OCS staff closely monitor progress towards deliverables on a regular basis and collaborate internally to proactively identify and troubleshoot barriers that could delay progress. While OCS is a new department, the City of New Haven has a proven track record of accomplishing project objectives on schedule.

OCS staff have collaborated with NHS and CAANH to publicize home energy assistance, energy efficiency counseling services, and alternative electricity generation suppliers. OCS staff are currently collaborating with Junta and a local workforce training organization on a Buildings UP application aimed at residential decarbonization in the Fair Haven neighborhood. LCI has for many years assisted low- and moderate-income residents with energy efficiency improvements through its EERAP program.

OCS staff will engage monthly with the CMTs in the environmental justice neighborhoods to build relationships directly with civic leaders. OCS will meet twice monthly with both CBO staff and program participants to ensure that the project is implemented successfully and that vulnerable populations are served.

b. Staff Experience/Qualifications of Project Manager: Steve Winter, Executive Director of OCS, brings to this project manager role 13 years of experience managing the operations and financials of for profit and nonprofit corporations with annual revenues ranging from $50,000 to $900,000. This includes the management, bookkeeping, and reporting for over $500,000 in funds received by Catalyst Cooperative from three grantors between 2019 and 2023.

Steve served as the Alder for New Haven's 21st ward for 5 years. In this role, Steve regularly engaged with community events run by community-based and faith-based organizations as well as CMT meetings for the Newhallville, Dixwell, and East Rock neighborhoods. Steve helped engage and organize residents and community organizations around key issues affecting their neighborhoods, including development proposals, affordable housing projects, and additional park space in underserved areas. At the citywide level, Steve led the Board of Alders in passing a resolution to promote community electrification and at the neighborhood level assisted

Newhallville residents in accessing energy efficiency programs and solar energy improvements. Steve is currently serving as general contractor for the electrification of his three-family home in Newhallville, with one unit fully electrified and two units in progress.

Max Teirstein, Sustainability Analyst and Engagement Coordinator at OCS, has experience managing grant applications and the budget of a nonprofit in Illinois, conducting climate policy research for the New York Attorney General's Office and the Center for Biological Diversity, and engaging environmental justice communities in adaptation and resilience projects for nonprofit research organizations like the University of Maryland's Center for Community Engagement, Environmental Justice, and Health, and the Yale Center for Environmental Justice.

c. Expenditure of Awarded Grant Funds: The City's accounting system maintains expenditure control at the given appropriation level. The Project Manager will be responsible for establishing, administering, and overseeing program finances. Working with the Office of Management and Budget, the Project Manager will manage accounting and use of funds reporting; assist in drawdowns and eLOCCS-related transactions; provide budget information; and track any matching expenditures. The City's accounting system, MUNIS, maintains expenditure control at the budgetary appropriation level with a purchase requisition and purchase order system. An independent CPA firm annually audits all City financial transactions. External auditors annually audit the City's internal controls for compliance with Generally Accepted Accounting Principles as they relate to Purchasing, Payroll, Accounts Payable, and Cash Management. OCS follows the City's contractor procurement and hiring practices.

5.0 Past Performance. The City has successfully completed and managed the assistance agreements identified below. All agreements were implemented according to the agreement guidelines and were appropriately closed at the end of the term.

- HUD Lead-Based Paint Hazard Control and Healthy Homes - $3,321,610 (2016-2019); $5,600,000 (2020-2023)
- Office of Minority Health, HHS Advancing Health Literacy - $4,000,000 (2021-2023)
- HUD Community Development Block Grant - $3,397,159 (2019-2020)
- HUD Housing for People with Aids - $1,064,772 (2019-2020)
- CT Department of Public Health Enhanced Detection, Response, Surveillance, and Prevention of COVID-19 - $1,269,567 (2020-2024)

The City has met all reporting requirements for the assistance agreements identified above, including the submission of programmatic reports, evaluation and technical reports, and financial reports. The City has experience reporting regularly to federal agencies and providing reports as requested, and consistently provides progress updates toward the achievement of expected outputs and outcomes on a timely basis. Should unforeseen issues arise, the City communicates with the funder immediately and provides a plan to address unforeseen issues.