

Winter 2022

BuildingWell

A NOTE FROM THE PRESIDENT

Carrot or stick? What is the best way to move multifamily affordable housing to reduce their carbon outputs to meet state and local climate goals? The short answer is that we need both.

Though our work on Zero Over Time planning, we have identified pathways to reduce carbon outputs from affordable housing in a measured, systematic way that leads to electrification of heating and hot water systems, improves air quality, provides efficient air-conditioning, and makes buildings more climate-resilient. That is the good news. The challenges are that these efforts are expensive and unlikely to reduce the costs of operations for either owners or tenants, and raise issues of fairness in shifting the costs of decarbonization to the less well-off. Yet, this is the only proven path to decarbonizing this housing.

The Stick: The 22-year history of NEI makes it clear that it is unlikely that market forces or a general concern about climate will compel the changes needed. We need regulations that require this work to be done over a 15 to 20 year horizon. To date, only a few cities have regulations in place. Without requirements, we will likely be having the same conversation in the future. Statewide regulation is needed. But regulation is not enough.

The Carrot: We need a multifaceted approach to pay for decarbonization. Examples include easy to access, property-based financing like PACE or other long-term, below-market debt; large incentives from utilities and government to help early adaptors find the smoothest path to electrification; controls over future electric costs and differential rates; and more incentives for community and onsite PV.

To direct the creative juices of the affordable housing industry toward solving the challenge of decarbonization, we need regulation and new resources (and a focus on fairness). Both a carrot and a stick.

— Edward F. Connelly
NEI President

Harbor Village: Utilizing Passive Design in Urban Spaces

BY RYAN MONTONI, PROJECT MANAGER

Sited on the thriving Main Street in historic Gloucester, Massachusetts, Harbor Village is another successful project undertaken by North Shore Community Development Corporation (NSCDC) and New Ecology, Inc. (NEI). After starting work in 2015, the project recently came to fruition, opening its doors in Fall 2021, and is now occupied by veterans and their families. This project is among the few in New England that have adopted strict passive building standards by targeting PHIUS Core certification.



Exterior of Harbor Village showcasing the local mascot (summer 2021).

The newly-constructed 30-unit, four-story building was designed by ICON Architecture. Other team members include Petersen Engineering (MEP engineers), Sustainable Engineering Systems (MEP commissioning agent), and New Ecology.

Our primary role was to provide contractor education and quality assurance services as they relate to Passive House. Our scope included air sealing, insulation and durability inspections and testing to verify that the thermal and air barriers perform as intended. We also completed sample testing on HVAC systems

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Looking to make a direct impact on your community? *New Ecology is looking to expand our team of mission-driven individuals. We are successfully working to on-board and train new hires remotely. We are currently hiring for:*

Boston:

- Staff Accountant
- Senior Energy Engineer
- Senior Project Manager
- Energy Modeler

Mid-Atlantic:

- Construction Project Manager
- Project Manager
- HERS Rater/Assistant Project Manager

Visit <https://www.newecology.org/category/jobs/> for more information and to apply.

Pass this along to your professional networks!

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within units to confirm heating, cooling and ventilation airflow rates align with the design intention, and tested to ensure that in unit duct work was well sealed.

All residential units are located on levels two through four. A resident lounge is located on the fourth floor, which includes a common laundry room that is excluded from the Passive House envelope due to concern of dryer make-up air adding to the common heating and cooling loads. The first level of the building includes office and retail storefronts, as well as vehicle parking that was excluded from the Passive House envelope.

Excluding the parking and first floor commercial space proved to be a challenge due to the difficulty of properly sealing all penetrations in the second floor deck above, and in the stair and elevator openings and trash chute protruding into the first level.

Several pressurization tests were conducted to determine the leakage rate of the Passive House envelope and to identify areas for additional air sealing. Throughout the process, NEI used several methods of investigation, including infrared imaging, whole building and unit-based compartment blower door pressurization and depressurization testing (sometimes paired with fogging and using a smoke pen), as well as audible and visual detection.

Over the course of the air sealing inspections and discussion with the project team, NEI was able to reduce the infiltration rate to 0.55 CFM50 per square foot of envelope area, which exceeds the stringent PHIUS Core requirement, and would allow the project to maximize the project's MassSave financial incentive for energy efficiency once the roof top photovoltaic (PV) system is installed.

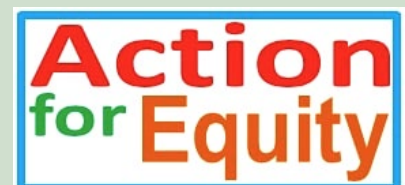
This project is well on its way to PHIUS Core certification. This unique site showcases the potential of what can be done to fit new housing into urban and semi-urban environments utilizing existing lots and spaces.

ACTION FOR EQUITY

New Ecology is happy to announce its partnership with **Action for Equity**, an organization focused on reducing disparities historically faced by communities of color and low-income communities in the greater Boston region. They work for Boston-area residents to have quality housing, good jobs and job access, environmental quality, and transportation access, among other things. New Ecology is helping Action for Equity tap into the Green Energy industry by providing information and recruiting opportunities so that they can eventually partner with other similar organizations, to help reduce barriers for all communities.

In 2021, New Ecology created a HERS Rater Trainee position with the goal of bringing in candidates who are new to the industry and help them grow by training, guiding, and getting HERS and OSHA Certified. With help from Action for Equity, who held information sessions and workshops, we were successful in finding a great candidate and are excited to bring them onboard and get started on their training.

This is a position that we hope to keep filling as our Trainees transition into experienced HERS Raters, and we will continue to work with Action for Equity to raise industry and job opportunity awareness.



NEW ECOLOGY NEWS + AWARDS

New Ecology Awarded Healthy Homes Grant to Study Particulates in Indoor Air in Passive House and Non-Passive House Buildings

By Tom Chase, Senior Project Manager

New Ecology is part of a team recently awarded a Healthy Homes Technical Study grant to investigate the impact of ventilation systems in multifamily housing built to Passive House standards on indoor particulate matter (PM2.5) versus more conventional buildings. NEI is partner to the [National Center for Healthy Housing \(NCHH\)](#) and Preservation of Affordable Housing (POAH) on the research team, and POAH, Homeowner's Rehab, Inc., Beacon Communities, and others will collaborate in providing access to passive house and conventional units for the project and guiding a study advisory panel's input. NEI has previously employed CO2 and other indoor air quality monitors in passive house and non-passive house multifamily projects, but has not yet employed PM2.5 monitors. PM2.5 is a known cause of asthma exacerbation, and recent research in multifamily homes has found that as much as 75% of PM2.5 in homes is generated from cooking, cleaning, and indoor smoking. The ultimate goal of the study is to better equip housing and community development programs and funders, financial institutions, and owners to adopt best practices in housing development and management for promoting occupant health.

New Ecology's Vice President Lauren Baumann was featured in a recent Marketplace newscast and accompanying article about affordable, net-zero and energy-efficient new construction housing. Listen and read the article:

<https://www.marketplace.org/2022/01/10/doing-the-numbers-on-affordable-car-bon-neutral-housing/>

Revitalizing West Baltimore

BY JUSTIN IOVENITTI, ENERGY ENGINEER

New Ecology is proud to be a part of a transformative redevelopment project in West Baltimore. Located in the Penn North neighborhood (a focus of the Freddie Gray uprising in 2015), seven aging rowhouses will be transformed to become the city's first Passive House certified mixed-use development. A total of 20 affordable apartments will be constructed, along with ground floor retail spaces.

The three resulting high-performance buildings will be all-electric, and feature solar arrays on their roofs. The commercial spaces are targeted at local, Black-owned entities. New Ecology is providing PHIUS+ Verifier services on the project, working closely with Onion Flats, CommONEcology, Passive to Positive, Schreiber Brothers Development and Modern Builders in the process.

[Read more about the project and its impact on the local community.](#)

New Grants Support High Performance Row Homes in Delaware

BY PAT COLEMAN, DIRECTOR OF SPECIAL PROJECTS

New Ecology, Inc. (NEI) was recently awarded over \$840,000 from the Energize Delaware Empowerment Grant and the Delaware Sustainable Energy Utility to launch the Climate Smart Homes (CSH) initiative in Delaware. NEI will use these grant funds to collaborate closely with development partners to achieve high levels of energy performance, climate-readiness, and improved indoor air quality through all-electric homes in the naturally-occurring affordable housing market segment. Funds will help cover the estimated incremental cost of development, relative to code requirements, and technical assistance provided by NEI.

Climate Smart Homes will be both gut rehabilitations of vacant, existing row homes and new construction of similar homes on vacant lots. Some homes will be affordable rentals, with the majority of homes sold to low- to moderate-income households. All homes will adhere to a design and construction template created by NEI, and specifically suited for the local building typology and climate. Homes are expected to achieve near-Passive House levels of performance, with some homes benefiting from rooftop solar PV.

In addition to assisting the design and construction teams working on supported homes, NEI will work through local a workforce development center to provide broader education and training opportunities regarding the unique elements of high-performance homes.

From an initial base in Wilmington's Eastside, CSH will soon expand to nearby neighborhoods and NEI will use the next year to plan for scaling the program statewide.

Construction on the first homes will begin in early 2022 with all currently-funded homes expected to be completed by the end of 2023.

Challenges of Historic Preservation

BY RYAN MONTONI, PROJECT MANAGER, AND TOM CHASE, SENIOR PROJECT MANAGER

Simultaneously prioritizing both the preservation of historic features and improving operational energy performance in rehabilitation projects is often difficult because both goals generally require physical interventions that are at odds with each other.

This challenge is particularly evident for the current rehabilitation ongoing at 140 Clarendon Street in Boston, a 14-story, 150,000 square foot building located in the Copley neighborhood of Back Bay. For the redevelopment process, this

building was subject to MA Energy Code and City of Boston Article 80 and Article 37 "Green Buildings" standards, which New Ecology, Inc. helped the project team navigate and document compliance. MA Energy Code requires the project to follow the ASHRAE or IECC prescriptive pathway, mandating that any systems that are updated as part of the renovation be brought up to current code, including the building enclosure. NEI performed an ASHRAE Level 2 Energy Audit to comply with this requirement.

The building was originally constructed in 1929, under the ownership of the Young Women's Christians Association (YWCA). The organization has a deep history in Boston, and has been dedicated to eliminating racism, empowering women, and promoting peace since its founding in 1866. The building was listed on the National Register of Historic Places by the US National Park Service in 2004, and now includes space for several uses including a school, library, laundromat, performance facilities for the Lyric Opera, and 210 units of affordable housing, including dedicated units for formerly unhoused individuals.

For this project, insulation was added to the roof. The energy audit helped determine that adding insulation to the exterior walls was neither cost effective, nor allowed by National Park Service restrictions for exterior or interior insulation on exterior walls. Replacing custom historic replica windows with triple pane may be possible in the future, but is cost prohibitive at this time.

For mechanical systems, space heating and domestic hot water will continue to be generated by the district steam loop which is served by a combined heat and power plant operated by Vicinity Energy. Since Vicinity Energy has announced intentions to reduce carbon emissions, the audit instead focused on identifying supporting equipment that may need to be replaced with new and more efficient models such as the cooling tower, heat exchangers, and air handler

components. Most of the residential units being updated were previously renovated in 2004, so only a few water-source heat pumps in these areas will require replacement.

To meet Article 37 requirements, the City directed the project to utilize LEED or Existing Buildings instead of LEED or New Construction. LEED or New Construction is primarily a new construction and gut renovation rating system, and 140 Clarendon would not be able to meet the LEED energy reduction threshold given the existing condition, historical restrictions, and proposed scope. The owner, Beacon Communities, and the City share a common interest in making this building as high-performance as possible given the current conditions, and have drafted a plan to explore electrification and decarbonization of the building over time, recognizing that the improvements planned in the current renovation also represent a significant reduction in carbon emissions. Importantly, the redevelopment project will also preserve the building and the majority of the embodied carbon attributable to the materials already in place.

While the project will generate modest operating carbon savings in the short term, the historic preservation of 140 Clarendon will prevent the emission of significant embodied carbon that would have been generated by a similar building constructed new from the ground up. The project broke ground in December 2021.



ABOVE: Exterior of the historical 1929 building. RIGHT: The 1929 sign still stands, marking the building's historic significance.



The Future of Energy Engineering: A Conversation with the Rising Generation of Professionals, Part II

BY FRANK STONE, PROJECT MANAGER

Karthik Arumugam is a fifth-year mechanical engineering student at Northeastern University. He plans to work either in energy engineering or in the building industry field. Karthik recently completed his co-op, working as part of the Engineering team at New Ecology. He shared some of the insights and lessons he has learned both at Northeastern and at his work placements.

Q1: HOW WOULD YOU DESCRIBE WHAT YOU ARE WORKING ON?

My main focus is calculations related to historical energy analysis (HEA) and (ASHRAE) Level 1 calculations that are done on a building. The purpose of this is to look at the historical weather data and utility use of a building to understand energy use per month and per year.

The Level 1 calculations determine what savings can be achieved by implementing certain upgrades called Energy Conservation Measures or ECMs. The next step is a Level 2 analysis, which takes the process further, analyzing choices of insulation, building materials, windows, etc.

I am also starting to work on and learn more about energy modeling using SketchUp and WUFI to do Passive House analysis on some projects.

Q2: HOW DID YOU GET INVOLVED WITH THE WORK YOU ARE DOING HERE?

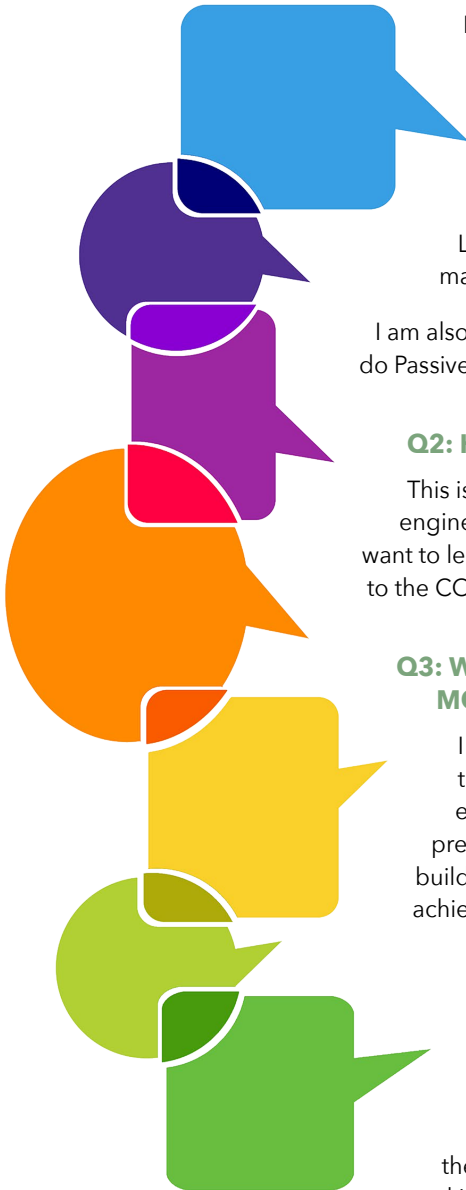
This is my third co-op that I'm doing at Northeastern. I'm currently a fifth-year mechanical engineering student. I plan on graduating in the Spring of 2022. My work at NEI aligns with what I want to learn more about in terms of energy systems, and how energy usage has been changing due to the COVID pandemic. I see that as a potential field that is growing now.

Q3: WHEN THINKING ABOUT THE AFFORDABLE HOUSING SECTOR, WHAT IS THE MOST IMPORTANT PRIORITY TO YOU?

I like that the answer is in the question-- always looking for affordability and making everything cheaper. Our analysis lowers costs by reducing the energy usage of a building. Choices include either upgrading the machinery to higher-efficiency equipment, or controlling the pre-existing equipment to reduce energy use. Part of the work is using data analysis to show building owners that it does get cheaper over time if we make these upgrades and how this is achieved. So, that's the priority; affordability and making costs cheaper by reducing energy use.

Q4: HOW HAVE YOU USED YOUR SKILLS TO TACKLE A PROBLEM IN YOUR WORK AT NEW ECOLOGY?

One of the biggest is my experience with Excel. At a previous job, the main tool that they used was Excel, so I learned tools and methods to make working in Excel a lot easier such as using macros and group analysis and functions. I'm now expanding upon the library of functions that I already knew, and I'm able to do analysis faster by building my skillset, making my work easier!





Wen at Grand Canyon National Park.

LET'S TALK

New Ecology is eager to work with partners who are interested in learning more about our work and how we can help you to achieve your project's goals. We have worked on hundreds of projects for owners in market sectors including housing, office, retail, education, healthcare, government, arts, and nonprofit.

Our passion and commitment is best demonstrated by the fact that we have been at the leading edge of community-based sustainable development since 1999.

At the same time, our reach, approach and successful model have helped us attract and retain a talented staff known for its desire to make advances in a new and growing field.

Interested in learning more? Contact info@newecology.org or call 617-557-1700.

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Staff Profile

Name: Ching-Wen Hsiao

Title: Building Energy Modeling Analyst

What does your job entail? I create energy models and run computational simulations to compare architectural design strategies and HVAC systems. The simulation results help me analyze energy savings, cost savings, and carbon emissions. The analysis is a part of the required submission documents for LEED, Passive House, and Enterprise Green Communities certifications, as well as utility rebates and building permits.

What is the most inspiring/interesting part of your job? I felt inspired when I learned that my job helps clients improve their buildings' energy performance.

What is a challenge that people in this industry face that you would like to solve? I used to work in architectural design firms, and all I cared about was aesthetics, texture, colors, and functions. I have completely changed my point of view since I took this role. My job as an energy modeler allows me a different lens to look at architectural design. Now, I care more about heat transfer, lighting, HVAC efficiency, and thermal comfort when reviewing design drawing sets. I hope that more architectural design professionals adopt my views and prioritize thermodynamics over aesthetics.



Wen in New York City

What do you like to do outside of work?

Play the piano, listen to podcasts, go to classical concerts, visit museums, create content for my Instagram account, go hiking and rock climbing, enjoy great food, and travel.

Favorite movie/TV show/band? Movie: *In the Mood for Love* by Wong Kar-Wai / TV: *Succession* (HBO) / Band: Third Eye Blind.

What have you been doing lately to keep happy and healthy? Taking a long walk along the Charles River.

What advice would you give to somebody looking to start in this industry? Take workshops in building science, energy modeling, and building codes.