

Spring 2022

## BuildingWell

### A NOTE FROM THE VICE PRESIDENT

#### Decarbonization Program Updates

April was an exciting month for the advancement of key programs focused on the decarbonization of existing affordable housing in Massachusetts, many of which are being supported by the team at New Ecology.

We are excited to announce that the first four recipients of the MA Clean Energy Center Triple Decker Retrofit Pilot program in the affordable housing track have been awarded. Congratulations to The Boston Neighborhood Community Land Trust, HRI, Neighborhood of Affordable Housing, and Worcester Common Ground for their selection into this program. In partnership with the CEC, NEI will be providing technical assistance to develop a retrofit approach that achieves ambitious emissions reductions in the context of occupied rehabilitation. We will evaluate current building performance, develop strategies for cost effectively reducing the energy loads of the buildings and electrifying, provide construction phase inspections and oversight, and track and measure the impacts of these improvements post-construction.

MassHousing and MHP, in partnership with LISC Boston and the MA DHCD, recently accepted pre-applications to their Climate Ready Housing program. Supported by funds from the Commonwealth's Economic Development Bond Bill, the goal of this program is to support affordable multifamily housing projects that drastically reduce carbon emissions. Year one will include a \$1.6-million investment that will be leveraged to support 2-3 highly rated projects that represent achievable and replicable approaches to existing building renovations and achieve very low emissions through either a Deep Energy Retrofit (DER) or Zero Carbon Emissions Over Time (ZOT) approach. NEI is working with many of the teams that have applied to this program, and we're hopeful that our contributions will make them competitive candidates for this grant. For more information, visit the [LISC Boston webpage](#).

To keep up to speed with rapidly evolving decarbonization programs and policies, including opportunities for trainings and resources, sign up for the [Energy Cohort](#), a learning community supported by MA CDC, LISC Boston, and NEI.

— Lauren Baumann  
NEI Vice President

### Strategic Decarbonization: Planning the Path to Net Zero Operational Carbon

WRITTEN BY REBECCA ANSOLABEHRE, ENERGY ENGINEER;  
EDITED BY RYAN MONTONI, PROJECT MANAGER

Recent IPCC reports confirm that urgent and aggressive action to significantly reduce the carbon emissions of our built environment is necessary to mitigate a global climate disaster. Responding to this challenge, many municipalities have made strong commitments to achieve carbon neutrality by 2050. In Massachusetts, Boston and Cambridge specifically are leading by example by implementing maximum operational greenhouse gas emissions thresholds for existing buildings, varying by building type.

Emerging policies mandating operational emissions disclosure and optimization have started to move affordable housing owners and operators toward developing property specific plans for decarbonization. New Ecology (NEI) is actively working with affordable housing owners to identify the most beneficial pathways to decarbonization through strategic short and medium-term projects focused on energy efficiency, system electrification, and renewable energy integration.

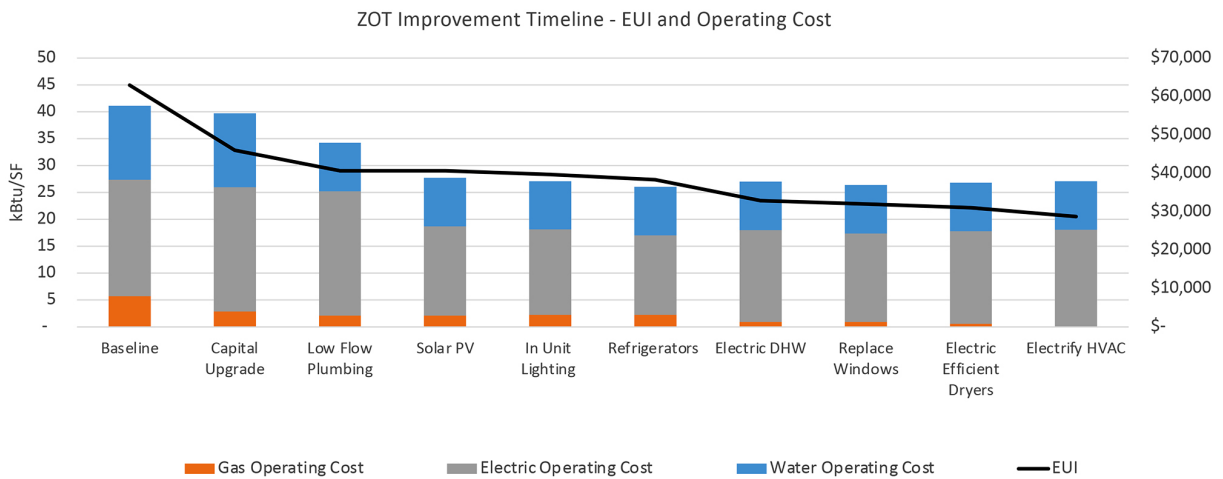
#### Nonantum Village Apartments

Originally built in 2004, Nonantum Village is a thirty-five-unit affordable senior housing development in Newton co-owned and operated by CASCAP and HRI. Needing very specific capital upgrades to maintain the building's durability and functionality, the owners approached the City of Newton and utilities for funding. As a condition of the provision of municipal funds, Newton requested that the design team demonstrate that the project will make improvements resulting in measurable and verifiable emissions reductions, thus contributing to the City's goal of achieving net zero emissions by 2050.

NEI worked with the team to evaluate current building performance, identify appropriate envelope and systems improvements, and quantify the predicted energy and emissions reduction potential, as well as operating cost implications of those measures. The Zero Over Time plan outlined strategic improvements that could be incorporated in both the short and medium term, leveraging expected near term and future investments.

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**FIGURE 1: ECONOMIC AND ENERGY OVERVIEW**



**FIGURE 2: CARBON EMISSIONS FOR BASELINE MODEL AND MODEL UPGRADES OVER TIME**

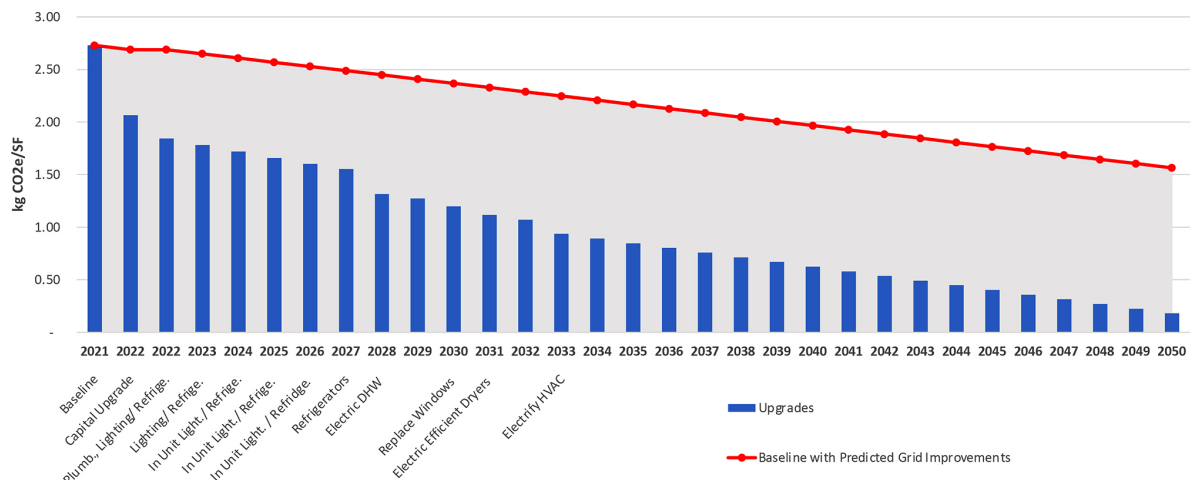


Figure 1. Economic and Energy Overview illustrates the electricity use, cost and emissions improvements for the Nonantum Village project given recommended upgrade/electrification measures.

Figure 2. Carbon Emissions Modeling Over Time illustrates the emissions improvements over time for the Nonantum Village project that includes assumed grid emission reductions.

In the short term, necessary roofing improvements on the building are being leveraged to increase the insulation value and reduce air infiltration. Replacement of the rooftop condenser for each unit provides an opportunity to integrate a unique hybrid heating electrification approach. The system will utilize all-electric heat pumps for heating when outdoor temperatures are moderate and system efficiency is high, and revert to an existing high efficiency condensing boiler when conditions are too cold to mitigate the increased cost of electric heating. Replacement of gas-fired rooftop units at the end of their useful life with heat pump roof top units will further reduce gas consumption.

In addition to the measures expected to be integrated with the pending capital project, NEI worked with the project team to identify strategies that can be incorporated over time, as operating and replacement reserves, as well as other types of funding sources, become available and systems reach the end of their useful lives. The impacts of these improvements were quantified in tandem with predicted emissions reductions for the electric grid as it transitions to lower emissions energy sources over time.

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### New Franklin Park

New Franklin Park is an affordable housing development owned and operated by The Community Builders (TCB) in Boston and includes fifteen scattered buildings ranging from five to twenty-nine units. The development is about to undergo capital improvements which TCB would like to leverage with reduced emissions of the development. TCB is also interested in piloting operations of fully electrified mechanical equipment.

**FIGURE 3: CARBON EMISSIONS REDUCTION OF THE ZOT IMPROVEMENTS FOR BERDO BUILDINGS**

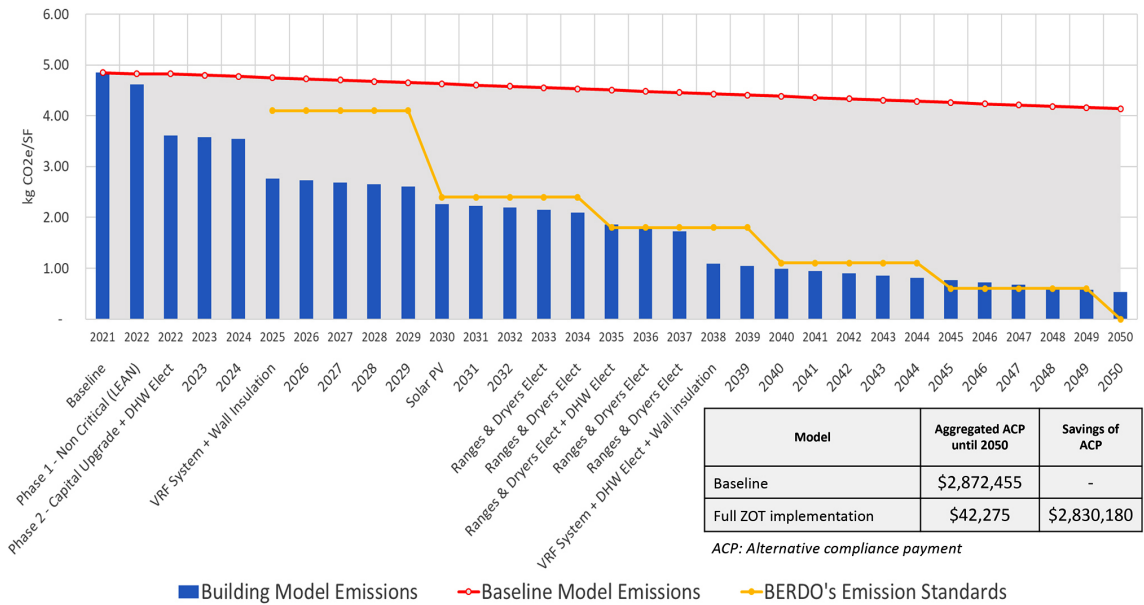


Figure 3. Carbon Emissions Reduction of the ZOT Improvements illustrates the emissions improvements over time for the New Franklin Park project given implementation of the various energy conservation/electrification measures recommended and includes grid emissions reductions over time as well as the BERDO emissions threshold.

Using the energy auditing process, NEI helped the design team determine a scope of work that would optimize energy use and emissions for the improvement project for each of the fifteen buildings, which vary in age, construction, and MEP systems types. NEI also worked with the design team to develop a building-by-building Zero Over Time plan that outlines both short and medium-term opportunities for decarbonization. Per that plan, some buildings would remain on gas-fired heating and domestic hot water systems until the end of the systems' useful life, while other buildings would offer opportunities to begin the electrification process as part of the pending capital improvement project. Two of the buildings have been identified by NEI as good candidates for immediate deep energy upgrades, including envelope insulation, conversion of heating & cooling and domestic hot water systems to air source heat pumps, and integration of rooftop solar photovoltaics (PV). These measures could reduce energy use by 85% and emissions by 60%.

While some of the measures recommended in this study could be absorbed into the improvement project budget, expense associated with many of the deep energy upgrades exceeds the financial resources currently available, and as such, the TCB team is actively investigating the ability to leverage additional resources to fill the financial gap. Sourcing additional funds has proved challenging due to the proposed deep energy retrofit design not being fully developed and "shovel ready".

During this planning process, the impact of electrification upgrades on the utility cost for the development were fully considered, with PV integration playing a key role in keeping electricity costs affordable. The reduction of emissions also helps mitigate any potential Alternative Compliance Payments (ACP's) for exceeding emissions thresholds that the development could trigger.

New Franklin Park and Nonantum Village represent the first in what we believe will be a large wave of developments actively evaluating carbon emissions reduction within the context of pending capital projects and capital needs planning over time. NEI is excited to be a part of developing this new project planning approach that integrates technical and quantitative expertise with longer term capital planning to find a decarbonization solution that works within the unique constraints and opportunities of affordable housing.



**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:*

- Director of Engineering
- Senior Project Manager
- Assistant Project Manager
- HERS Rater/Assistant Project Manager (Mid-Atlantic)

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

Pass this along to your professional networks!

**NEWSLETTER CONTRIBUTORS:**  
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## Documenting the Benefit of Improved Building Performance

BY PAT COLEMAN, DIRECTOR OF SPECIAL PROJECTS

NEI recently performed an analysis of residents' utility data in the first new construction property served by the **Energize Delaware Affordable Multifamily Housing Program**: Our Lady of Grace Village in Newark, DE. The analysis shows metered property-wide energy savings of 23% relative to the modeled performance of these homes meeting the baseline energy code. This improved performance delivers lower utility bills to households, enabling them to meet other critical needs.

Our Lady of Grace Village is composed of 60 affordable apartments in 12 townhome-style buildings plus a community building. With the support of the Energize Delaware program, which NEI manages, staff worked with the development team from the design phase in 2017 through completion of construction in 2020. All homes were awarded ENERGY STAR certification.

NEI enabled the design team to incorporate the requirements of the ENERGY STAR program into the project's construction documents, and then served as the ENERGY STAR Rater to provide testing and verification services that helped contractors meet these objectives on the jobsite. Each home is served by a gas-fired condensing furnace and central AC. Instantaneous gas-fired units provide hot water. A supply-side fresh air ventilator is also provided for each home, a rarity in the local market. After construction completion, NEI conducted a series of training sessions with management staff and created educational materials for residents regarding the operation of their homes.



The utility analysis focused on April 2020 to March 2021 and was relatively straightforward given that the property manager tracks utility usage through WegoWise. Of course, the current inflationary market, and the escalation of utility costs in particular, underscore the importance of building efficient homes from the start.

In addition to the savings delivered to tenants through the ENERGY STAR program, NEI was pleased to facilitate the procurement and installation of a solar PV system which offsets the owner-paid electric costs at the property. It is among the first renewable energy systems installed on affordable multifamily properties in Delaware.



## NEW ECOLOGY PROJECTS IN THE NEWS

NEI will work with Central Baptist CDC, Habitat for Humanity of New Castle County, Cinnaire Solutions, and Woodlawn Trustees to develop 36 high-performance, healthy, all-electric, climate-ready rowhomes in Wilmington, DE as a part of the Climate Smart Homes program, supported by \$800,000 in funding from the Energize Delaware Empowerment Grant. See the press release:

<https://www.wgbh.org/news/local-news/2019/09/23/dangerous-air-pollution-is-getting-into-schools-and-homes-near-highways-research-shows>

An NEI project in Baltimore, slated to become the city's First Zero Energy Multifamily Development, was mentioned in this article:

<https://www.prnewswire.com/news-releases/baltimores-first-zero-energy-multifamily-development-supports-penn-north-community-vision-for-affordable-housing-small-business-and-nonprofit-space-301421662.html>

## Integrative Design for K-12 Schools

BY JUSTIN IOVENITTI, ENERGY ENGINEER

The large number of stakeholders involved in the design, construction and operation of a school results in a complex process. Students, faculty, staff, caregivers, community groups, and others rely on school facilities to provide a comfortable and nurturing environment. Design teams and contractors are responsible for creating spaces that house a myriad of different activities throughout the day. To tie these threads together on projects in K-12 schools, NEI has used an integrative design process to provide timely feedback and ensure project success.

NEI is partnered with GWWO Architects on two Maryland public elementary schools in the early stages of construction. The new West County Elementary School in Anne Arundel County, and the renovated T.C. Martin Elementary School in Charles County will serve 600 and 700 students, respectively.

NEI's involvement began at the earliest design stages where team meetings focused on the clients' standards and HVAC system selection. As commissioning provider for both schools, NEI's responsibility is to ensure the owners' requirements are fully incorporated into the contract documents.

At T.C. Martin, existing structural systems and assemblies were a significant design constraint. For West County, NEI's scope exceeded traditional mechanical, electrical and plumbing commissioning by including other critical systems: the building enclosure, commercial kitchen equipment, and emergency generator. NEI reviewed GWWO's simple box energy models on West County to study the impact of fenestration percentages and orientation on heating and cooling loads. These findings impacted the school's massing, and consequently the design engineer's recommendations. Opaque wall assemblies were optimized to balance load reduction with first cost and constructability.

On both projects NEI reviewed drawings and specifications to confirm the building's goals would be attainable. Meetings were held with the owners to jointly examine the design and

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## BUILDINGENERGY BOSTON 2022

Earlier this year, almost 30 NEI staff members were able to meet up at the recent NESEA BuildingEnergy Boston conference, including some of our Mid-Atlantic members. This annual conference brings together practitioners in the fields of high-performance building and design, energy efficiency, and renewable energy to share information, strategies, and new developments in these fields. This is a great opportunity to not only share our knowledge but to gain some as well. We all had a great time and are looking forward to next year's conference!

Several NEI staff members also presented sessions at the conference. Please see links below for more information on their sessions.

**Tom Chase** (Senior Project Manager) and **Maciej Konieczny** (Senior Project Manager): [At the Finish Line: How Two Affordable Passive Projects Crossed the Hardest Hurdles](#)



**Lauren Baumann** (Vice President), **Eduardo Ramos** (Energy Engineer), and **Rebecca Ansolabehere** (Energy Engineer): [Planning for Carbon Neutrality: Preparing Affordable Housing for an Equitable Transition](#)

**Tom Chase** (Senior Project Manager): [Indoor Air Quality: Monitoring Strategies and Results for a Multifamily Passive House Project](#)

## DATA DRIVE SOLVING CHRONIC PROBLEMS, DELIVERING SUSTAINED EFFICIENCY

BY CHARLIE SIMEK, ENERGY ENGINEER



Computers built into today's hydronic heating systems hold the promise of increased efficiency through intelligent control. Unfortunately, the added complexity can often keep those savings out of reach and leave building maintenance with seemingly dysfunctional equipment. Problems stem from poor communications between interrelated components. Instead of working in concert, components often modulate within isolated feedback loops, complicating any attempts at diagnosing the inevitable problems that pop up as systems age.

This has repeatedly resulted in NEI working on high-efficiency systems that have decayed into a state of dysfunction and inefficiency. It was this need, to quickly generate an understanding of such a system's operations and the communication between its components, that spawned NEI's data analysis process.

After several years' work on over 100 projects, NEI knows what data and analysis is necessary to pull back the curtain and enable diagnosis of root causes of inefficiency and malfunctioning equipment. In one Boston building, NEI's approach ultimately achieved 52% gas savings and positioned this building to meet Boston's 2030 emissions requirements without further equipment upgrades. In Beverly, a building's fruitless seven-year investment of troubleshooting issues with HVAC contractors led them to engage NEI. We installed a data monitoring system, sorted through data patterns, found communication flaws, and iteratively made changes that led to a properly functioning system within months.

NEI's Jonah DeCola, Senior Energy Engineer, who can seemingly diagnose and fix practically any system without

the aid of data, realized that the time and expense associated with fixing these systems in the traditional manner was far beyond most owners. He recognized that a better process was needed to service these systems at scale, and helped to spearhead NEI's innovative data monitoring process.

*"In 2012 NEI gave me a "puzzler." I was asked to diagnose a recently swapped boiler plant that was consuming more energy than the system it replaced. I was given multiple studies from engineers and contractors who had been unable to figure out why this new "efficient" system's anticipated energy savings were unrealized, and why its negative cash flow couldn't help finance the new system. Luckily, years of mechanical experience has enabled me to interpret boiler room noises into identifying an HVAC control's sequence of operations. Six hours of patiently listening to the site's boiler room symphony allowed me to diagnose the cause of the wasted gas and electricity. Today, in under an hour, NEI engineers like me can use collected data to analyze patterns across even larger timespans and understand where efficiency has broken down. We can then address problems with confidence and use data to verify the results. If we don't like what we see, the data continues to educate us and guide us towards the root issues. We've had great success in solving complex problems that have gone unresolved for a long time." ~ Jonah DeCola*

In all cases, this iterative process, based on data analysis, facilitates NEI's cost effective repair of problematic systems and delivery of the sustained efficiency expected from these boilers.

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preemptively flag items for follow-up. For example, food service staff noted a plumbing conflict between the steamer and floor drain that had caused corrosion in an older school. NEI confirmed there was no such issue in the contract documents and a second review confirmed this along with other critical items: control sequences, equipment specifications, provisions for start-up, testing, warranties, and owner demonstration.

NEI's role begins as an interface between client and design teams, and takes the integrative approach a step further by serving as the bridge between design teams and contractors once ground is broken. Periodic commissioning meetings and site visits are continued throughout construction until substantial completion, at which time we facilitate the acceptance of the school by the staff responsible for day-to-day operations. NEI confirms the systems are

operating properly and that maintenance personnel are familiar with their functionality (reiterating that the steamer is not to be installed above the floor drain!). Not until the final near end-of-warranty review to flag any deficiencies requiring contractor attention will NEI's work be complete.



Alex with mushroom.

## 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](mailto:info@newecology.org) or call 617-557-1700.

## NEW ECOLOGY

Community-Based Sustainable Development

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| WILMINGTON

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## Staff Profile

**Name:** Alex Haworth

**Title:** Assistant Project Manager/HERS Rater - Baltimore

**What does your job entail?** I provide technical assistance, training, and verification for projects pursuing various green rating systems throughout the Mid-Atlantic. On any given day I might be constructing energy models, running diagnostic tests in the field, or helping to review construction documents for compliance purposes.

**What is a challenge that people in this industry face that you would like to solve?**

We have a large amount of unoccupied and neglected rowhomes throughout the Mid-Atlantic. In recent years there has been a push in Baltimore to demolish large swathes of this housing stock, which I think is a huge mistake from a climate and embodied carbon viewpoint, but also from a social perspective. These are sturdy buildings that were constructed for a thriving working class. Even amidst disinvestment and vacancy it's not hard to see that they can offer a high quality of life, promote social cohesion, and a good density compared to detached, single-family homes.

The challenge facing the industry is whether or not we can quickly scale deep energy retrofits of these rowhomes. There is huge potential to create resilient, highly energy efficient, affordable and healthy homes, but we must first refine best practices, convince

partners, and train the work force to undertake these retrofits. This is no small task, but I think NEI is poised to play an important role here.



Alex, partner Molly, and Piedy the beagle

**What do you do outside of work?**

Over the last five plus years my partner and I painstakingly restored the rowhome we live in. It's been a labor of love - bringing back to life what was an abandoned and derelict house (still no interior door knobs!). I also volunteer at Baltimore's Station North Tool Library where I teach home care classes and serve as a

librarian. When it comes to downtime, I love to cook with and for friends and to camp, hike, explore, and forage throughout the region every chance I get.

**What have you been doing lately to keep happy and healthy?** Mushroom foraging encourages me to get out and explore trails, parks and woodlands that I would never have otherwise found. It's good exercise and is also calming, and has taught me to pay much closer attention to my surroundings. Best case scenario, I come home with a few pounds of healthy, edible mushrooms to cook, worst case I took a three-mile hike in the woods, can't lose!

**What advice would you give to somebody looking to start in this industry?**

The work requires teams with a variety of skills and professional experience. We need engineers, and architects, but also educators, tradespeople, affordable housing experts and more. There are a lot of points of entry into this industry, some of them circuitous like my own. For me it began with an AmeriCorps placement in the wake of the 2008 ARRA stimulus. One building science class and BPI certification and I was hooked. I would encourage folks to dip their toe in by pursuing a green building credential for their own edification and then see where it takes them.