

NESEA Interview: a Surge in Affordable Multifamily Passive House in Boston



The Northeast Sustainable Energy Association, or NESEA, produces some of the most highly-regarded building energy-related conferences around. No organization, as far as I'm aware, puts more energy into curating content and supporting presenter success, and the effort pays off with top notch presentations. This year's [BuildingEnergy Boston](#) event on March 23–24 promises to raise this already-high bar and includes several sessions covering the exciting Passive House momentum that has been gathering recently in Massachusetts. (Register here.) I got the chance to interview Beverly Craig of Massachusetts Clean Energy Center ([MassCEC](#)), Julie Klump of [Preservation of Affordable Housing](#), and Nate Thomas of [The Architectural Team](#), about the policy catalysts behind this momentum and two affordable housing projects that have emerged from it. They will be presenting on these themes at NESEA Boston.



L to R: Beverly Craig, Julie Klump, and Nate Thomas.

Zack Semke: Would you like to lead things off, Beverly, talking about why this is an important session for the NESEA [Northeast Sustainable Energy Association] Boston event?

Beverly Craig: Sure. Why don't I backup and explain why we're even involved. So, in 2017, the [Distillery](#), which was the first multifamily Passive House building [in Massachusetts], got finished in South Boston—28 units. Fantastic project and really exciting. We were starting to hear a lot at MassCEC about Passive House in general, and we were a little concerned that Pennsylvania and Connecticut and all these other people were doing great things in affordable housing, but we weren't seeing it here. Of course, we knew the Pennsylvania background with Tim McDonald basically getting the ten points for Passive House into the QAP [ie. the scoring criteria for the awarding of Low Income Housing Tax Credits (LIHTCs)], and how that generated so much interest in so many Passive House projects. We had been trying to do that here in Massachusetts, but they [the Department of housing and Community Development who administered LIHTCs] were just really concerned about costs, and the Boston market. Even though they didn't see a lot of additional costs in the tax credit program in Pennsylvania, there was the concern that maybe that wouldn't be true here.

[\[Read more about Pennsylvania's LIHTC Passive House policy here.\]](#)

There's always this tension in affordable housing that, if it's more expensive to build it, you have less units; and so it's hard for them to think about maybe a 10% premium or something. It just sounded scary. So we said, okay, we're not going to be able to get it in the QAP right away. Why don't we create a market of people who understand what they're doing, demonstrate that the costs are really not as scary as they think, and we can have this conversation later?

So MassCEC put together a budget of \$1.8 million and put out the Passive House Design Challenge (<https://www.masscec.com/emerging-initiatives/passive-house>) for people planning to apply for tax credit new construction, and we offered a \$4,000 per unit incentive. We got a lot of great responses, ended up funding eight, and the two on the panel here are part of five that are breaking ground this spring. One is about complete in Cambridge—that's the [Finch Cambridge](#) Project—and then the other ones are either waiting for tax credits or may have just gotten them, but the financing is at a later timeframe.

So that's the history. I think we've kicked things off in the state, honestly. MASS Save 11 months later came up with their Passive House incentive for both affordable and multi-family. It's not quite as generous—it's \$3,000 per unit—but very generous with the upfront feasibility study and WUFI modeling or PHPP modeling. I think 37 buildings have applied, at least. It started out as just four stories or higher, and now it's anything that's five units or more that is eligible for the \$3,000 per unit incentive.

At the same time, DOER [Department of Energy Resources] has been pushing through larger projects that are proposed in the state that have to go through an environmental impact statement process, and through that negotiation of the environmental impact statement has secured quite a few commitments to Passive House. If the projects get their local approval, then they get their special permits and can actually get built. So between those three there's overlap. And then the last thing is we succeeded in getting DHCD [Department of Housing and Community Development] to add some additional points for Passive above LEED in this past round.

So we did succeed. Yay! We didn't get everything we wanted, but it does create a differential and a higher probability that you'll get funding if you come in with a Passive project.

Julie Klump: Zack, are you familiar with how the low-income tax credits are distributed?

Zack: Yes. I've been advocating with Washington State Finance Commission, which administers LIHTCs here, to replicate the Pennsylvania model, and we ran up against exactly the same issues that you described in terms of fear. We made no progress. So we've been working on a pilot project called the [20 by 2020 Building Challenge](#) to help show proof of concept that Passive House makes economic sense for larger multifamily

buildings. The Housing Development Consortium—which is a local coalition of affordable housing developers—has created a closely-related pilot initiative called the [Exemplary Buildings Program](#), and they've worked with Seattle City Light to create a \$4,000 per unit incentive to do Passive House for affordable housing, so it's very similar pathway. We're at least a couple years behind you guys, and I think that you're making more progress than we are, but it's a very similar trajectory, which is great.

Beverly: The last round of applications was due just recently, right? When was it?

Julie: Last Friday.

Beverly: But I'm very curious to see between the incentive that's out there—the \$3,000 per unit and the extra points for Passive—what percentage of the new construction projects came in with a Passive proposal. I don't know that yet, and I don't want to bug them yet, but I bet in the next couple of weeks we're going to find that out.

Zack: Very cool.

Beverly: Just to give you a perspective, the total number of units that are considering Passive House, and they may not actually all certify and they may not always get built, but it's 5,400 units. That is about a third of all new construction in 2019.

Zack: Wow.

Beverly: So we went from one building to this. It's unbelievable, really.

Zack: That's fantastic. That's just so fantastic. Thank you. We need more of that!

Beverly: Well, I do worry. It's easy to study and model, and then not do it. But I think it will lead to better buildings. What will really matter is how many actually certify.

Zack: And the learning. The transformation. The practice.

Beverly: We had a PHIUS builders training two weeks ago. Standing room only. 30 people. Total max.

Zack: Nice. That's heartening for sure. Should we dive into these two projects?

Beverly: Yes, yes.

Zack: Okay. Why don't we start with a high-level overview of the two projects. Julie, would you like to start?

Julie: Sure. Our project is called [Mattapan Station](#). It's 135 units. It was not designed initially as Passive House. We got the land through an RFP with the MBTA [Massachusetts Bay Transit Authority]. It was a parking lot that we're now developing. Because of the Mass Save incentive of \$4,000 per unit [for Passive House], we decided we wanted to do a feasibility study.

We [at Preservation of Affordable Housing, Inc.] have a basis of design, a higher level of efficiency that we require in our new construction and our rehabs. This project is the perfect transit-oriented development. There's a bus route that goes around it; across the street is a train station; there's access to a bike path that goes downtown; and the commercial center is a block away. We're actually designing it with very little parking, and the parking that's on the lot is really dedicated for the commuters that the MBTA wanted accommodated. There's public community space that's part of it, too.

The thing that we knew would happen, and did happen, is that when we started to price it, there were some concerns about the cost of the mechanical and getting the building airtight. So we did see some jumps in the numbers. However, our plan was to bring in consultants who we like to work with—one of them is an enclosure expert; one is a mechanical engineer expert—so the GC was very on board.

They have done all kinds of trainings. They've done presentations with us. They also have high level subs that they do initial estimating with and typically use in their projects. So we did a two-hour training with those guys on mechanicals, and then another group of framing and sheet rock subs with the enclosure consultant. And we just walked through the details that may look expensive or system layouts that they may not have seen, and anecdotally they told us the mechanical number. They told us it would go up \$2 million, and it actually went down \$2 million.

Zack: Wow. That's really dramatic.

Julie: The big thing that we continued to push with anybody we met and was going to touch this project was that we're not going to throw these drawings over the fence and expect you to hit the Passive House target. We will invest in diagnostic testing; we will have extra meetings to review upcoming details; we will have consultants out here; we

will have reps of products you haven't used. We're not going to leave you in the dark in trying to achieve this goal.

Zack: Can you summarize what went into that initial assumption of the big cost increase, and what happened in actual reality to achieve the big reduction?

Julie: You know, it was really interesting because it seems like sort of a simple change. We did have one-to-one heat pumps and we changed it to a VRF [variable refrigerant flow] system. We always had vertical fan coils in each unit with minimal ductwork there, so that didn't change. The ERV [energy recovery ventilator] was a rooftop ERV with vertical shafts and horizontal runs, and what we changed was we went to two ERVs per floor with the similar horizontal ductwork, but not those shafts. So the GC, if you asked him that question, they would immediately say it's the cost of building those shafts. But then the ductwork also horizontally becomes smaller because the units are closer, and then if you bring the ductwork into the units, if they're small enough, there's no fire damper. So it literally was like, "Oh, we're not building those shafts; the units are smaller." And I think, honestly, that's what it was.

Zack: Yeah. Simpler and smaller.

Julie: It sounds like a lot—\$2 million worth of shafts—but I think that had a lot to do with it. The domestic hot water is frustrating, it's heartbreaking to me, because I have to bring fossil fuel to this building for domestic hot water. We initially had semi-central heat pump hot water heaters, but the cost of electricity is so high in Boston compared to gas that the engineer told us that it's like 240% more you're going to spend to heat hot water than if you use gas. When the grid changes and the cost changes, we'll be able to convert it over to heat pump hot water, but, at this time, we can't really make those numbers work.



Old Colony's first Passive House. Rendering courtesy of The Architectural Team.

Zack: Sure. Nate, should we dive into the overview of your project?

Nate Thomas: Yeah, of course. This phase of Old Colony is the latest building of what has been a multiyear redevelopment of one Boston's and the country's original public housing projects. It's a relatively small building. It's 55 units, all one-bedrooms. It's aimed towards senior residents, and it's about 52,000 square feet or so. We actually did go into this building from the beginning with the assumption that it would be Passive House and with that goal. So, in some ways there was an advantage there for us because we could design that way from the outset. But because of its small footprint and some of the other wellness center and community room programs within the building, it's actually quite tight in terms of its efficiency on the floorplan, and so we weren't able to do similar approaches of ERVs per floor. We actually do have an ERV on the roof with shafts.

Zack: Got it. So we touched on the savings on mechanicals for the Mattapan Station project. If both of you were going to give advice to a project team doing an affordable multi-family Passive House project, where is it important to invest, and where are the opportunities for cost savings and simplification to bring the incremental cost premiums of the Passive House element of the project down toward cost parity with conventional construction?

Julie: Integrated design. We took our drawings for thermal bridges and our details and we just started meeting and hammering them out—simplifying every detail. We had everyone in the room—the GC, the superintendent, the project manager, the estimator, the consultant, the architects. Those meetings got kind of old, but we had a spreadsheet listing each detail we thought could be better, and we just hammered out each one so that when they're finally represented in the drawing, everyone knows what they're going to see. It's an investment of time, I guess, but it's also a way to get the drawings right.

Nate: I would agree with that sentiment. The biggest thing was just the amount of collaborative meetings that we had with the whole team discussing all the different options, and we started with probably six different schemes that we could have gone with—whether decentralized, semi-centralized, decentralized...all that—whether it was for ventilation, heating and cooling, domestic hot water. After five or six of these meetings, we were able to narrow them down to what we felt was the most efficient for the building, and I think that what's important to know is that it's never going to be the same answer for each building that you do, right? It's just making sure you're thorough with that approach for every single design you're going into.

Zack: That makes sense. Now, when you were thinking about the families or the people who'd be living in these buildings, what was top of mind in terms of occupant experience? What were your concerns during design and what are your hopes in terms of what these buildings will deliver for the people who live in them?

Julie: I think the effect of the indoor air quality is huge. Our residents will pay in-unit electric, but they won't pay anything else, and I think those units will be really comfortable. We will control humidity, and I think there's a lot to be said for having good indoor air quality, especially for people who have health issues.

Nate: Indoor air quality and user comfort are both huge things that we considered, especially with the building being targeted for senior residents. Temperature swings are inherently less in a Passive House building because of how airtight and insulated they are, so there's an advantage there, but being able to maintain a consistent user comfort was really important.

Zack: Is there anything else you'd like to add?

Beverly: Remember how I was saying everyone was so scared of the costs? I think one thing Julie didn't mention is that the construction contract they signed is less than a 2% premium from what they had before. So that's amazing news. Their baseline is high. It's higher than normal just because it's in Boston, so that may not hold everywhere in Massachusetts. The initial number was huge, but by educating the GC and the subs, getting the details right and the education done, it really brought it down a lot.

Julie: We went up as high as 8% [cost premium for Passive House], and then we just started working on education and demystifying the product or the performance standard, and right now we're looking at 2%. The GC is hopeful that there may even be some more movement there.

Zack: That sounds right in line with the experience in Pennsylvania, as well. I'm sure it took lots of creativity and smarts to get it there, so well done.

Julie: This experience in Boston is going to be so important for the lenders to see. They typically don't let us even run our financial models with the savings we can generate on an energy efficient non-Passive House, so if we can show that these buildings actually perform to the operating cost that we're projecting, then that just means more debt available for more units or more cashflow for the site so that we can invest in resident services.

I think there are some lenders that understand Passive House. We have a local lender and investment company that's providing 30 basis points for Passive House, and they're not sharing the risk. The risk is theirs. So I think there's lender education that can happen, and I think other developers that were maybe a little nervous about initial pricing exercises...with some time and some collaboration these buildings can happen.

Zack: Well, thank you so much. Kudos for the fantastic work that you're doing in the real world.

[Featured image above is a rendering of Mattapan Station, courtesy of POAH.]