Passive House Multifamily at Scale

Policy and Practice
PH incentive enrollment:
- 198 Buildings
- Over 13,000 Units
- 12 Passive House Certified
- 66 Design Certified
Multifamily Passive House Incentives: Massachusetts Momentum

Passive House Buildings - # Stories

- Low Rise (1-3 stories) 58 units
- Mid Rise (4-9 stories) 129 units
- High Rise (10+ stories) 11 units

Passive House Units

- Low Income: 39.3%
- Market Rate: 60.7%

We are Mass Save:
Massachusetts Did This: You Can Too!

1. Demonstrate
2. Normalize
3. Educate
4. Energy Code
Passive House Skepticism

PASSIVE HOUSE?

SOUNDS EXPENSIVE
1. Demonstrate: Incremental Cost

Passive House Design Challenge

- $4,000 per unit incentive
- 8 Affordable Projects: 540 Units
- 6 Occupied; 2 Under Construction
1. Demonstrate: Incremental Cost

Harbor Village 1.8%

North Commons 4.3%

Mattapan Loop 2%

Old Colony 3.5%

Cambridge Finch 1.4%

Holbrook Maple 1.6%

Kenzi 1%
1. Demonstrate: Incremental Cost

Average incremental cost: 2.4%

Typical capital cost increases:
- Ventilation upgrades to supply fresh air to living and bedrooms
- Window & door upgrades
- Thermal bridging breaks and air sealing
- Additional testing and verification

Typical capital cost savings:
- Significantly reduced heating and cooling equipment because lower capacity needed
PH Building used 63% less energy per sq. ft. than median new multifamily in Boston.

Data from Boston Energy Disclosure 2020 sorted for new construction multifamily built since 2008; Cross checked for LEED certification; properties with suspected lack of full building energy report are removed.
1. Demonstrate: Energy Performance

Philadelphia 2019 Affordable:
PH buildings used **57% less** energy per sq. ft. than median code

Data from Philadelphia Energy Disclosure 2019 cross checked for LIHTC multifamily; Credit to Green Building United, Katie Bartolotta
Demonstrate: Energy Performance

PH used **49% less** energy per sq. ft. than Gilford Village Knowles II LEED built 2008 (same building, different standard)

Graphic representation of study by Resilient Building Group (2020 Report of average 3 year energy usage data ending in 2019)
PH Multifamily
New Construction Incentives

- Feasibility Study up to $5K
- 75% of PH Energy Model up to $20K
- $3K per unit
Prioritize PH in Affordable Housing Scoring (QAP)

States with differentiation of PH for more points for PH as compared to LEED/EGC see Passive house adopted

- Pennsylvania
- Connecticut
- Vermont
- Massachusetts
- South Dakota

Having LEED/EGC as equivalent points to PH is not effective way to incentivize PH
2. Normalize

Use Environmental Impact Statements to Push Large Developments to PH

Large projects triggering MEPA need to have GHG analysis

DOER encourages PH as a mitigation strategy
3. Educate

Mass Save ½ Cost Training Reimbursement

Passive House Massachusetts (PHMA)
• SWA Construction Workshops
  ✓ Carpenters, Window Installers, Air Barrier, Insulation Trades
  ✓ HVAC & Plumbing Trades
• Cost Estimating for Passive House
• What to Expect When You're Expecting PH

Passive House Accelerator Video Library

Phius Workshops and Recordings
Common Challenging Parts: Consult Others

• Podium construction
• Sequencing
• Adding to an existing building
• Specialized subs

Advice
• Make sure team is educated
• Plan in mid construction blower tests

- Create an optional “stretch code” that cities/towns can choose to adopt.
- Provides a pathway to more ambitious efficiency AND creates an energy efficiency community.
EMBODIED CARBON REDUCTION CHALLENGE

THE CHALLENGE: REDUCE UPFRONT CARBON OF BUILDINGS

ENTRIES DUE MARCH 31, 2024 | 5:00 PM

**Competition**
MensaCEC has engaged Built Environment Plus (BE+) to conduct an Embodied Carbon Reduction Challenge for actual new construction and major renovation.

**Events & Trainings**
BE+ will host a series of events and trainings including an overview of embodied carbon tools for different design phases, tips and tricks for Tally LCA and One Click LCA case.

**Resources & Tools**
BE+ will be providing licenses for participants (one shareable license per Lead Applicant) for Tally LCA ($695 value) or One Click LCA ($1250 value).
Find High Performance Pros with proven experience

Find a Pro
Search

Profession Type
All

Project Type
All

Show Me*
Professionals by # of Projects

SEARCH
1. Everything is interconnected. Professionals to Projects, Projects to Companies, and Companies to Professionals.

2. Filtering and sorting is super-powered by project data. The results reward companies and individual professionals with proven high-performance project experience.

3. Search users are guided to contact a professional directly. Results are ranked by relevant industry and project experience, and once they discover a potential collaborator, they are always guided to a selected contact.

4. Companies, pros, and projects can be anywhere in the U.S. Architects, contractors, developers, engineers, sub-contractors, and sustainability consultants who work on commercial and large residential buildings are welcome.
POAH’s Affordable Multifamily Housing

Passive House Units in Design/Construction:

Connecticut 257
**Washington, D.C.** 94 347 (of 900)
Florida 1,356
**Illinois** 2,155 60
Kentucky 41
**Maine** 123 123
Massachusetts 3,426 267
Maryland 100
Michigan 645
Missouri 1,538
New Hampshire 264
Ohio 1104
Rhode Island 1,007
TOTAL 13,000 units

CORPORATE OFFICES: BOSTON | CHICAGO | KANSAS CITY | WASHINGTON, D.C.
COMPLETED PASSIVE HOUSE* PROJECTS

134 Units Boston, MA*

281 Units Salem, MA

30 Units Brewster, MA
Precertified Passive House Projects in Construction: Asberry & C40

- 110 Units Barry Farm, DC
- 60 Units C40, Chicago, IL
39 Units Mashpee, MA

55 Units Boston, MA

Emergency Back-up Solar/Storage System (battery)

Precertified Passive House Projects in Construction: Kenzie & Le Claire
Passive House Projects in Design

- 46 Units Wellfleet, MA
- 42 Units Bourne, MA
- 51 Units Scarborough, ME
- 122 Units Barry Farm, DC

Passive House Projects in Design
48 Units Boston, MA

127 Units Salem, MA

47 Units Brewster, MA
- Design did not start as passive house
- Lots of modulation in enclosure
- Tight urban site prevented a construction sequence that would have allowed for effective in-process testing
- Misconception that good compartmentalization test results meant that enclosure airtightness was ok
- Per-floor ventilation design required above standard practice air sealing of louvers, ductwork, connections from equipment to exterior of building
- Passive House boundary didn’t include commercial spaces so challenge to create air-tight boundary with MEP systems passing through PH boundary
- Overall building air tightness testing .07 cfm50/sf (4x better than a PHI project)
- Compartmentilization tests passed the PHIUS required air tightness

Lessons Learned at the Loop at Mattapan Station
1. Commit to Passive House early
2. Engage a design/engineering team that knows Passive House or is at least interested in learning it
3. Conduct pre-bid conferences for enclosure and MEP Subs
4. Bring Verifier into project (design) and establish testing protocols and timing
5. Conduct Bi-weekly Passive House Meetings
6. Work with GC to schedule blower door tests before sheetrock is installed. Explain that if test results are unacceptable sheetrock or really any finish will be removed to find holes
7. Have Verifier provide training for each sub working on enclosure (framing, sheetrock, windows, roof, etc.) and MEP trades as they begin work on-site
8. Consider including commercial spaces into passive house boundary to minimize the challenge of the compartmentalization boundary
9. Establish site visits for the window manufacturer to see window install early and during air and water tests or in near future, especially if there are failures

Passive House Multi-family Lessons Learned in Practice
Questions?