



Brewster Woods

Brewster, Massachusetts

PROJECT SNAPSHOT

Development Type: Low- and Moderate-Income (LMI) Multifamily Housing

Completion Year: 2022

Developer: Local Housing Authority, Preservation of Affordable Housing

Architect/Designer: Catalyst Architecture

Passive House Consultant: Building Evolution Corporation

Verifier: CLEAResult

Contractor: Delphi

Mechanical Systems Designer: Griffith & Barry

Code Pathway: Building 30 and 40 were permitted under the Stretch Energy Code (780 CMR Appendix AA), but pursued Phius Certification. Building 30: Phius 2018 Source Zero, Building 40: Phius 2018

PROJECT OVERVIEW

Brewster Woods is a 30-unit, **100% affordable multifamily housing** development located in Brewster, Massachusetts. The project consists of two residential buildings, Building 30 (7 units) and Building 40 (23 units) designed to serve **low- and moderate-income households**, including households earning below 30% of Area Median Income (AMI).

Building 30 was constructed to **Phius 2018 Source Zero** standards and incorporates **on-site solar** designed to generate more energy annually than the building consumes. Building 40 was constructed to **Phius 2018** standards.

At the time of permitting (December 16, 2020), the town of Brewster had adopted the Massachusetts Stretch Energy Code, effective January 1, 2020. While this code established the baseline energy performance requirements for the project, Passive House was not yet incorporated as a compliance pathway.

This multifamily project was developed using Low-Income Housing Tax Credits (LIHTC), which are administered through a state-level competitive allocation process. In Massachusetts, LIHTC-awarded developments must meet the Massachusetts Stretch Energy Code, regardless of whether the project is located in a Stretch Code community.



Brewster Woods – Building 40 exterior. Preservation of Affordable Housing, Brewster Woods
Source: [Preservation of Affordable Housing](#)

Project Overview (cont.)

In addition, the state's Qualified Allocation Plan awards competitive points for enhanced energy performance, including compliance with the Specialized Stretch Energy Code and Passive House certification, making higher-efficiency design strategies a key factor in project competitiveness and selection.

Within this context, Brewster Woods pursued Phius 2018 certification as a performance framework, exceeding baseline Stretch Energy Code requirements through enhanced envelope design, high-efficiency mechanical systems, and on-site renewable energy. Although Passive House was not required under the Stretch Energy Code at the time of permitting, its adoption reflects a strategy to strengthen the project's competitiveness within the QAP scoring framework. Phius-based performance pathways were later incorporated into subsequent iterations of Massachusetts' Stretch and Specialized Energy Codes.

The project achieved final Phius certification in June 2023 and represents the **first multifamily Passive House-certified development on Cape Cod**. As part of an early cohort of affordable housing projects in Massachusetts pursuing Passive House standards, Brewster Woods provides an example of affordable multifamily housing achieving net-zero energy performance.

Design & Construction Approach

Within the LIHTC framework, where long-term ownership and performance are key considerations, Brewster Woods incorporated high-performance design strategies across both buildings. Building 30 was designed to meet Phius 2018 Source Zero, while Building 40 pursued Phius 2018 certification. Although both buildings were permitted under the Massachusetts Stretch Energy Code, the project elected to implement Passive House standards to support enhanced energy performance and durability.

Isaiah Grigos, Senior Building Scientist & Passive House Consultant, Building Evolution, emphasized that while high-performance buildings can be achieved without formal Passive House certification, the Phius framework provides rigorous oversight, structured modeling, and clear performance targets grounded in building science. This framework helps align the architect, engineers, consultants, and contractors around measurable goals, supporting the creation of moisture-safe assemblies, continuous air barriers, and properly sized mechanical systems.

Envelope

Brewster Woods utilizes conventional wood-frame construction with concrete foundations and prefabricated wood roof trusses. Both Building 30 and Building 40 are constructed with **2x6 stud wall assemblies** and **exterior continuous insulation**.

The project utilized a ZIP System sheathing assembly as the primary air and water barrier. Rather than a traditional house wrap, **ZIP sheathing** panels provide an integrated air- and water-resistive barrier, with seams sealed using proprietary tape and liquid flashing to create a continuous air barrier. Because airtightness is central to Passive House performance, the team paid close attention to seam taping, detailing, and transitions to ensure proper adhesion and continuity.

High-performance windows further reinforce the enclosure. The buildings incorporate hurricane-rated tilt-and-turn windows. Building 30 and Building 40 were constructed with **double-pane windows** as part of the airtight strategy.



Mechanical Systems

Brewster Woods is designed as an **all-electric development**, with no on-site combustion equipment except for a backup generator. Both buildings use a Mitsubishi **variable refrigerant flow** (VRF) system that provides high-efficiency central heating and cooling while allowing individual zone control within each unit. **Rooftop energy-recovery ventilators** deliver balanced ventilation to all spaces, supporting healthy indoor air quality and consistent temperature control throughout the buildings.

Heat pump water heaters located in closets along the residential corridors supply domestic hot water.

Solar & EV Infrastructure

Brewster Woods is a **fossil-fuel-free** development featuring a large rooftop photovoltaic array projected to generate over **175,000 kWh** annually. The on-site solar system is sized to **fully offset the energy consumption** of Building 30 and meet the majority of Building 40’s needs. Both buildings achieved Phius certification in June 2023, with Building 30 meeting Phius + Source Zero standards, demonstrating net-positive energy performance.

Performance Results

Assembly/System	Material	Performance Metric	Building 30	Building 40	Notes
Walls (Exterior)	2" Polyiso	R-value	R-12	R-12	Continuous exterior insulation
Walls (Cavity)	Dense-pack cellulose	R-value	R-21	R-21	
Roof/Ceiling (Building 30)	Closed-cell spray foam + loose fill fiberglass	R-value	R-66		2" closed-cell spray foam + 15" loose fill fiberglass (vented attic)
Roof Ceiling (Building 40)	Closed-cell + open-cell spray foam	R-value		R-50	Buildi3.5" closed-cell spray foam (R-25) + 6.5" open-cell spray foam (R-25), unvented attic
Slab Insulation	EPS	R-value	R-14	R-14	3"
Windows	Double pane	U-factor / SHGC	U-0.17; SHGC 0.44	U-0.17; SHGC 0.44	Yaro Energy Plus Calumen 46.6 F2 Double pane
Heating		Coefficient of Performance (COP)	2.11 @ 17°F; 3.59 @ 47°F	2.11 @ 17°F; 3.59 @ 47°F	Central VRF system Mitsubishi VRF system
Cooling		Integrated Energy Efficiency Ratio (IEER)	24.05	24.05	Mitsubishi VRF system
Whole-Building Airtightness	Continuous air barrier	Air leakage	0.0326 CFM/ft²	0.05 CFM/ft²	Phius 2015–2021 benchmark: 0.06 CFM/ft²
Solar PV	Rooftop array	System size / annual generation	80.1 kW; 88,110 kWh/year	80.1 kW; 71,775 kWh/year	PV size enables Building 30 to achieve Phius 2018 Source Zero

Cost Insights

Brewster Woods is a 100% affordable housing community where families earning below 60% of AMI can access high-quality homes. The development serves a range of households, including **seven project-based vouchers for families earning below 30% of AMI** and **three Section 811 supportive housing units** for individuals with disabilities transitioning from institutional settings. The project's energy-efficient design, combined with on-site solar generation, allows residents to live with **zero utility bills**.

Funding for Brewster Woods came from a mix of state, local, and philanthropic sources, including:

- \$1.68 million from a **MassWorks grant** for site clearing and infrastructure
- \$2.4 million in loans from the **Massachusetts Housing Partnership**
- \$1 million from **Affordable Housing Trust Funds** via MassHousing
- \$1 million from **DHCD Housing Stabilization Funds**, supplemented by \$450,000 from CEDAC
- \$550,000 from the **Brewster Community Preservation Act**
- \$450,000 from the **Community Economic Development Assistance Corporation**
- \$800,000 in combined local and state **HOME funds**, (\$250,000 from the local HOME Consortium and \$550,000 from DHCD-administered HOME funds)
- \$7.3 million in **Low-Income Housing Tax Credit (LIHTC)** equity from Bank of America
- \$7 million construction loan from Bank of America

In addition, Brewster Woods partnered with **Cape Light Compact** to support the installation of **high-efficiency, all-electric HVAC systems**, further enhancing the project's energy performance and sustainability.

Beyond upfront financing, long-term ownership considerations play a critical role in shaping design decisions. Affordable housing developers, who typically retain ownership over extended periods, are often motivated to invest in higher-performance building strategies.

"... [affordable housing developers] owners typically push for higher performing buildings, more durable buildings than market rate simply because affordable housing developers typically own the buildings for a long time. It's in their best interest to reduce the operational cost, make sure the enclosure is moisture safe and much better protected from leaks, air leaks, water leaks, and similar issues." - Isaiah Grigos



Brewster Woods – Building 30 exterior.
Source: [Preservation of Affordable Housing](#).

Outcomes & Lessons Learned

Project lessons highlighted the impact of building size and typology on achieving Passive House metrics. Larger multifamily buildings, like Building 40 may benefit from more favorable surface-area-to-volume ratios and internal heat gains, which can reduce heat loss per unit floor area compared to smaller building types. Smaller buildings, such as Building 30 or townhouse-style developments, typically require additional insulation and higher-performing components to achieve comparable performance. This **scaling effect** means that design strategies must be tailored to building size and typology.

Contractor experience was another key factor in project success. Engaging Delphi, a contractor with extensive experience delivering Passive House projects, supported smoother execution, stronger coordination across trades, and more reliable cost control. Their familiarity with enclosure detailing, sequencing, and airtightness testing contributed to maintaining performance targets throughout construction.

Special thanks to Isaiah Grigos, Senior Building Scientist and Passive House Consultant at Building Evolution, for sharing his insights for this case study.

To view additional Massachusetts case studies, visit the link below:

<https://neep.org/code-collaboratives/massachusetts-case-studies>