

Hano Homes

Boston, MA

Massachusetts Decarbonization Retrofit Case Study

COMPLETED

Built in 1888, Hano Homes is a series of 10 duplex townhome-style buildings that completed a deep energy retrofit in 2025, providing 20 units (15 with affordability requirements) with clean, comfortable living upgrades.



Building overview

Building typology **Townhomes**

Stories **2**

Units **20**

Floor area **22,700 square feet**

Performance target **80% EUI reduction***

Retrofit approach **All at once**

Construction completion **2025**

Enclosure approach **Exterior overclad**

Building team

Building owner **Allston Brighton CDC**

Property manager **Maloney Properties**

Architect **Onion Flats Architecture**

General contractor **Haycon Building LLC**

Owner representative **Tierney Development Services**

Building science firm **Sustainable Comfort**

Solar consultant **Resonant Energy**

Decarbonization scope of work

	Existing	Post-retrofit
Walls	R-16 walls with 4" of closed cell spray foam	~R-36 walls with ZIP system air barrier, 5.5" of R-20 PEFC-certified wood fiber insulation applied to the exterior, and fiber cement siding
	U-0.39 double hung windows	U-0.17 triple-pane uPVC casement windows
	Uninsulated brick foundation walls	R-30 foundation walls, with 6" of EPS from wall sill to grade over perimeter brick foundation walls
Roof	~R-55 roof with 8" closed cell spray foam and 4" of polyiso insulation	R-69 roof with added R-14 from 2" of new polyiso insulation
Heating & cooling	Decentralized hydronic baseboard heating from gas boiler (one per unit) Window AC units, no central cooling system	Electric, non-ducted Daikin heat pump systems for heating and cooling (one per unit)
Ventilation	Exhaust-only ventilation system in kitchen and bathrooms	Panasonic energy recovery ventilation (ERV) systems (one per unit)
Domestic hot water (DHW)	Gas DHW systems (one per unit)	65-gallon Rheem electric heat pump hot water heaters (one per unit)
Lighting, appliances, & other	Mixture of fluorescent and CFL bulbs Gas-fired kitchen ranges	New LED fixtures. Photocell and motion sensing lighting on exterior fixtures Electric, Energy Star ranges and refrigerators Low-flow plumbing fixtures
Renewable energy	No existing renewable energy sources	67.6 kW rooftop solar PV system generating 68,882 kWh/yr and covering an estimated 95.5% of the building's projected energy use

Decarbonization narrative

At Hano Homes, pursuing Phius certification meant taking a hard look at the building enclosure. During demolition, the team uncovered extensive mold and moisture damage, especially in the exterior framing—issues only visible once the walls were exposed. These findings reinforced the importance of a robust, airtight envelope and well-ventilated interior.

With careful detailing, high-performance windows, and continuous wood-fiber insulation, the team delivered a durable enclosure that will protect indoor air quality and improve efficiency for years to come.



*EUI refers to Energy Use Intensity, a metric used to measure a building's relative energy efficiency, measured in annual energy usage per SF. 80% represents a projected reduction with on-site solar. See more on building performance on the next page.

Emissions & energy

Project stage	Approximate annual energy costs (\$/yr)	EUI (kBtu/sf/yr)
Pre-retrofit (actual 2021)	\$53,000	69.9
Post-retrofit (projected)	\$38,300	27.5
Post-retrofit with solar (projected)	\$20,500	13.5

Building Emissions Reduction and Disclosure Ordinance (BERDO) is a local law requiring large buildings in Boston to report annual energy and water use, and to meet emissions standards starting in 2025 or 2030 that decline over time toward net-zero by 2050.

By targeting air pollution and GHG emissions, BERDO offers a strong baseline for assessing project emissions and planning long-term decarbonization in Boston and statewide.

Emissions timeline	Emissions without solar (kgCO2e/sf/yr)	Emissions with solar (kgCO2e/sf/yr)	BERDO standard (multifamily) (kgCO2e/sf/yr)
Baseline (using 2025 emissions factors)	3.16		-
2025	1.5	0.9	4.1
2030	1.0	0.6	2.4
2035	0.8	0.5	1.8
2040	0.6	0.4	1.1
2045	0.4	0.2	0.6
2050	0.2	0.1	0

The GHG emissions factors used in this case study align with those established for the City of Boston’s BERDO policy, as outlined in the Boston Buildings Emissions Performance Standard prepared for the City by Synapse Energy Economics Inc.

Sources & uses

Source type	Source	Total	Per unit
Performance-based sources	EOHLC Climate Ready Housing Program	\$1,350,000	\$67,500
	City of Boston Retrofit Fund	\$1,000,000	\$50,000
	DOER Affordable Housing Decarbonization Grant Program	\$800,000	\$40,000
	IRA Electrification Rebate	\$400,000	\$20,000
	Mass Save Income-Eligible Deep Energy Retrofit Incentive	\$338,000	\$16,900
	Solar Tax Credits	\$151,000	\$7,550
	MassCEC EmPower Grant	\$150,000	\$7,500
	Mass DEP Gap Energy Grant	\$90,000	\$4,500
	MHP Grant for commissioning	\$15,000	\$750
	Liberty Mutual Grant	\$15,000	\$750
	Mass Save PH Modeling Funds	\$10,000	\$500
Various grants	Eastern Bank Foundation	\$120,000	\$6,000
Loans, fees, reserves	Permanent Loan	\$2,750,000	\$137,500
	Deferred Developer Fee	\$363,700	\$18,185
	Replacement Reserve	\$69,300	\$3,465
	Operating Reserve	\$62,100	\$3,105

Uses	Notes	Total	Per unit
Enclosure	Drywall, windows, doors, siding, roofing, insulation, demolition	\$2,224,100	\$108,720
Mechanical	Hot water, plumbing, heating, ventilation, electrical	\$1,976,500	\$98,825
Renewable energy	Rooftop solar panels	\$300,000	\$15,000
Other scope	Lighting, flooring, specialties, finish carpentry, decking framing, landscaping	\$433,600	\$21,680
Soft costs		\$1,578,500	\$78,925
Developer costs		\$1,171,500	\$58,575
Total development costs		\$7,684,200	\$384,210

Sources and uses are based on final construction budget from June 2024 and are rounded to the nearest \$100. All costs represent actual or estimated hard construction pricing and are site-specific. Variations may occur based on scope, site conditions, wage requirements, and cost escalation. Estimates include general conditions, overhead and profit, and a contingency if applicable. Figures are for preliminary guidance only and not intended for final planning.



Project features

Minimizing disruption: Strategic project staging and minimal interior scope limited relocation of residents to just two weeks, with two units under construction at any given time. Residents were relocated to a vacant unit on site and provided storage for their belongings.

Embodied carbon: Building material choices matter—especially in cold climates where higher insulation levels are essential. At Hano Homes, wood fiber insulation was selected to reduce emissions through the carbon-storing properties of bio-based materials.

Noise and pollution reduction: Being located less than 300 feet from the Massachusetts Turnpike, noise pollution and exhaust are major factors impacting resident well-being. Added insulation, air sealing, and a new ventilation system provide a cleaner and quieter indoor environment for residents.