



Building America Case Study

Retrofitting Garden-Style Apartments

Brooklyn, New York

PROJECT INFORMATION

Construction: Existing buildings

Type: Multifamily, affordable

Partners:

Consortium for Advanced Residential Buildings, carb-swa.com

L+M Development Partners, Inc., lmdevpartners.com

Size: Studio to 5-bedroom units

Price Range: Rentals

Number of Units: 625 in 32 buildings

Dates Completed: 2015–2016

Climate Zone: Mixed-humid

PERFORMANCE DATA

Existing billing data: \$1,800,000

Projected annual energy cost savings: \$479,600

Cost of energy-efficiency measures: \$3,687,500

Projected simple payback: 7.7 years

Projected savings-to-investment ratio: 2.0

Projected source energy savings: 26.5%

The Building America team Consortium for Advanced Residential Buildings (CARB) partnered with L+M Development Partners, Inc., to improve energy savings in a Mitchell-Lama Housing Program project: Marcus Garvey Village in Brooklyn, New York (Climate Zone 4A). The Mitchell-Lama Housing Program is a form of housing subsidy in the state of New York that provides affordable rental and cooperative housing to moderate- and middle-income families. Marcus Garvey Village was founded in 1975 and is located in the Brownsville neighborhood of eastern Brooklyn, New York City. The 625 garden-style apartment homes are located within 32 buildings and range from studios to 5-bedroom units.

The existing heating and cooling system was in need of updating. Air conditioners were provided by the tenants, and often window air conditioners were installed in the through-wall sleeves. Both window and in-sleeve air conditioners were not well sealed, which invited air leakage. Where through-wall sleeves were not used, a plate was simply installed over the exterior gap, which left an uninsulated cavity behind it. Baseboard heaters had dial controls that could easily be left on even during the summer—especially if furniture blocked the controls. Such controls are easily forgotten. Both the through-wall sleeves and the dial controls provided great opportunities for energy savings.

Simulations predict that the measure package implemented will yield a source energy savings of 26.5%. At a cost slightly less than \$3.7 million and with utility bill savings of nearly \$480,000, this package was deemed cost-effective with a simple payback of 7.7 years. In addition, this scope was successfully carried out in an occupied 625-unit complex.



Existing condition of exterior wall insulation (left). Air sealing and insulating through-wall air-conditioning sleeve and exterior wall (right).

Key Energy-Efficiency Measures

HVAC

- Oil-filled electric baseboards with temperature-limiting thermostats allowed for nighttime setback and warm-weather shutdown (controlled by management)
- Window air-conditioner sleeves
- Central exhaust ventilation.

ENVELOPE

- Concrete-masonry-unit block wall construction with face brick on exterior; interior insulation is 1 in. of existing extruded polystyrene (XPS) rigid insulation with gypsum wall board (GWB) that was covered by another layer of 1-in. XPS and GWB
- Existing 2 × 4-in. XPS rigid insulation on flat roof deck
- Existing double-pane, low-emissivity, aluminum windows that were replaced in last decade.

LIGHTING, APPLIANCES, AND WATER HEATING

- 100% compact fluorescent lighting in units
- 100% LED lighting in common areas and outside
- ENERGY STAR® refrigerators
- Low-flow fixtures for bathrooms and kitchens
- Centralized sealed-combustion natural gas boilers (85% thermal efficiency).

For more information see the Building America report *Retrofitting Garden-Style Apartments in Brooklyn, New York* at buildingamerica.gov.

Image credit: All images were created by the CARB team.

Measures	Cost	Annual Cost Savings	Payback (Years)	Savings-to-Investment Ratio	Source Energy Savings
Air Sealing	\$380,000	\$31,000	12.5	2.0	1.4%
Wall Insulation	\$944,000	\$73,000	12.9	1.9	3.4%
Electric Baseboard Controls	\$779,500	\$201,000	3.9	3.9	9.2%
Electric Baseboard Warm Weather Shutdown	\$6,500	\$39,000	0.2	90.0	1.8%
Domestic Hot Water	\$1,000,000	\$51,000	19.6	1.3	5.2%
Exterior Light Emitting Diode (LED) Lighting	\$60,000	\$7,600	7.9	1.9	0.3%
Unit Lighting	\$203,000	\$12,000	16.9	0.9	0.6%
Unit Refrigerators	\$283,000	\$36,000	7.8	1.9	1.7%
Low-Flow Fixtures	\$31,500	\$29,000	1.1	13.8	2.9%
Total	\$3,687,500	\$479,600	7.7	2.0	26.5%

Summary of estimated cost, projected savings, and cost-benefit analysis.

Lessons Learned

- The single largest challenge to implementing energy conservation measures at Marcus Garvey is working within occupied spaces. For only 40 of the units, the building owner performed retrofit work when units were vacated and prior to re-renting. All other units are being renovated while fully occupied. Measures are being implemented in phases to minimize disruption. The wall insulation, sealing of the through-wall air-conditioning vent, and installation of new electric baseboards are conducted at one time to limit disruption to the living room space. In a similar fashion, the kitchen and bathroom work is performed in separate passes. In addition to the energy conservation measures, cosmetic upgrades are also being made. Checkerboarding residents—the process of moving residents to different units to allow for construction in a vacant unit—is not being done in this development, but it is one option to deal with the occupancy concerns during a retrofit.
- This measure package is very replicable because it is practical to implement in occupied apartments. The owners of this property say they feel comfortable with the scope of work they undertook and have already replicated some of the measures in other properties—specifically the electric baseboard controls measure. The owners have already installed electric baseboard controls at some of their other properties and will continue to do so in the future to gain additional benefits from the insulation retrofits already completed on those properties.