



Building America Case Study

Conway Street Apartments

Greenfield, Massachusetts

PROJECT INFORMATION

Project Name: Conway Street Apartments: A Multifamily Deep Energy Retrofit

Location: Greenfield, MA

Construction: Multifamily (gut rehabilitation of a vacant school building)

Type: Rental apartments

Partners:

Olive Street Development,
zaccheoproperties.com

Consortium for Advanced Residential Buildings,
carb-swa.com

Size: 12 apartments; 1-2 bedroom,
500-1,100 ft²

Price Range: \$900-\$1,600/month

Date completed: 2014

Climate Zone: Cold

PERFORMANCE DATA

HERS indices: 10-20

Source energy savings:

50% not including PV; 72% including PV

Projected annual energy costs: \$300-\$400 per apartment (included in rent)

Projected annual energy savings:
\$1,500-\$2,000 per apartment

In western Massachusetts, Olive Street Development transformed an empty school building into 12 high-end apartments with extremely low energy costs. This three-story brick building (nearly 100 years old) needed a lot of work, but it was structurally quite sound. To make an excellent thermal envelope, the developer insulated the walls (R-25 to R-30) and roof (R-50) and installed new triple-pane windows. Outside, solar thermal collectors (installed over windows) provide water heating and a 30-kW photovoltaic (PV) system (installed over the parking area) will provide most—potentially all—of the building's electricity. The Consortium for Advanced Residential Buildings (CARB) Building America team provided support during the design process, and CARB is monitoring performance of several of the advanced systems related to domestic hot water.

The advanced energy features helped rent the apartments quickly; in fact, all apartments were rented before they were complete on April 1, 2014. Hot water (mostly from solar) is included in the rent, and each tenant is allocated a share of the total PV generation. If the tenants use less than this share, they pay nothing for energy. If they exceed it, they pay for extra energy.



Key Energy Efficiency Measures

HVAC

- Ductless heat pumps with good cold-climate performance
- Auxiliary electric resistance heat in bedrooms
- Efficient exhaust ventilation
- ENERGY STAR® ceiling fans in all rooms

ENVELOPE

- 4- to 5-in. closed-cell spray foam inside brick walls, both above and below grade (R-25 to R-30)
- Rigid foam above roof deck, closed-cell spray foam in rafters (R-50)
- Triple-pane windows (U: 0.18)
- R-10 insulation below slab

LIGHTING, APPLIANCES, AND WATER HEATING

- Solar thermal system to provide 50%–70% of annual water heating energy
- Auxiliary water heating from condensing gas boiler
- Drain water heat recovery
- Demand-controlled hot water recirculation
- Light-emitting diode light fixtures
- ENERGY STAR appliances

RENEWABLE ENERGY

30-kW PV system above parking area

For more information, see the Building America report, *Conway Street Apartments: A Multifamily Deep Energy Retrofit*, at: buildingamerica.gov

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



Ductless heat pumps provide most of the heating and cooling for the apartments. Finding room for all the outdoor units was a challenge; most were tucked on the rear wall of the building.

Lessons Learned

- Ductless heat pumps allow for much lower first costs than conventional heating and cooling systems. With an efficient envelope, operating costs are also very modest.
- During the first months monitored (late May to early October), the solar thermal system provided 88% of water heating energy.
- Initial results show better coordination was needed to effectively implement drainwater heat recovery and demand-controlled hot water recirculation.
- The developer was able to take advantage of substantial utility, state, and federal subsidies for efficiency and renewable energy.
- All apartments were rented by the time they were complete. An open house drew 300 people, and the high-profile solar systems led to good press in local TV and newspapers.
- Olive Street Development is planning its next project: another deep energy retrofit in Montague, Massachusetts. The developer plans to use many of the same systems, and—with more space for solar collectors—hopes to achieve zero net energy performance.



Closed-cell spray foam inside the brick walls provided excellent air sealing as well as insulation. With triple-pane windows and R-50+ roof insulation, the thermal loads on the apartments can easily be met with small heat pumps.