Building America Case Study

Trade-Friendly Retrofit Insulated Panels for Existing Buildings

Albany, New York

PROJECT INFORMATION

Project Name: 150 Lark Drive

Location: Albany, NY

Partners:

Home Innovation Research Labs, *homeinnovation.com*

New York State Energy Research and Development Authority, *nyserda.ny.gov*

Albany Housing Authority, *albanyhousing.org*

Structural Insulated Panel Assoc., *sips.org*

Building Component: Building envelope component

Application: Retrofit, multifamily

Year Tested: 2015

Climate Zone(s): All

PERFORMANCE DATA

Cost of energy-efficiency measure (including labor): $7.00/ft^2

Projected energy savings: 30% heating

Incremental annual mortgage: $75

Projected energy cost savings: $1,367/yr

Building AMERICA SM U.S. Department of Energy

A single-component product can provide thermal resistance and a nailing base for newly installed siding. In addition, it can serve as an alternative to installing of multiple layers that are typical of energy-efficiency upgrades to the exterior of buildings—e.g., layers of foam, weather-resistive barriers (WRBs), strapping, and cladding.

The product, called a *retrofit insulated* or *nail base* panel, is manufactured by the same companies that brought structural insulated panels (SIPs) to the builder's toolbox. In fact, a nail base panel is similar to a SIP because it includes a sheet of oriented strand board (OSB) on only one face of the foam core. The panels are available in 4 ft × 4 ft and longer, and they are attached to a building's structural frame (from the outside) with long screws fastened through the panel's OSB face and expanded polystyrene (EPS) foam core, through the building's existing sheathing, and into its structural framework.

For this project with the U.S. Department of Energy Building America team Home Innovation Research Labs, the retrofit insulated panels relied on an enhanced EPS for thermal resistance of R-4.5/inch, which is an improvement of 10% over conventional (white-colored) EPS. EPS, measured by its life cycle, is an alternative to commonly used extruded polystyrene and spray polyurethane foam.* It is a closed-cell product made up of 90% air, and it requires about 85% fewer petroleum products for processing than other rigid foams.

This product investigation assessed the ease of installation as well as the compatibility with—and affordability relative to—siding replacements. The use of retrofit insulated panels is part of a planned multistep deep-energy retrofit program demonstration. The seven-unit 2 × 4 frame building had numerous architectural details, a walk-out basement, and split-face block fire walls. Separate central utility meters supply the heat, hot water, and building electricity (for equipment venting and exterior lighting).

*U.S. Environmental Protection Agency. *Transitioning to Low GWP Alternatives in Building/Construction Foam.* *epa.gov/ozone/downloads/EPA_HFC_ConstFoam.pdf*

Retrofit Insulated Panel Installation

1. Panels are installed over the existing OSB/WRB on a smooth, even surface.

2. Panels are fastened with SIP screws, which are 1 in.–1½ in. longer than the panel thickness, following a pre-engineered pattern.

3. Windows are installed and flashed at the outer surface of the retrofit insulated panel, and the WRB is applied as with standard construction.

For more information see the Building America report *Using Retrofit Nail Base Panels to Expand the Market for Wall Upgrades* at *buildingamerica.gov*.

Image credit: All images were created by the Home Innovation Research Labs team.

The retrofit insulated panel installation provided a solid substrate for this completely re-sided multifamily building.

Lessons Learned

- Retrofit insulated panels allowed the opaque R-value of the building's walls to be doubled to R-27 (weighted average).
- The retrofit insulated panels were installed by a vinyl-siding crew with minimal but necessary training, proving the constructability of the method.
- As an individual measure, the panels were not found to contribute significantly to decreased air leakage of this specific building.
- The added cost of the energy-efficiency measure—panels and all installation costs including labor—was about equal to the cost of a standard re-siding project. This cost metric provides a predictable and affordable method for estimating and marketing this measure by trade contractors.
- Cold-weather installations are limited by the availability of sealants that can be used effectively at low temperatures. It is recommended to schedule installation during the season appropriate for the selected sealant products.
- The monitoring of sheathing moisture indicates that the existing sheathing has a reduced average moisture content (to less than 12%) and de-amplified moisture fluctuations.

Looking Ahead

A design and implementation guide is being developed that will enable contractor access to the technology—both for planning purposes and for field reference during construction.

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

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buildingamerica.gov

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