



Building America Case Study

Insulated Siding Retrofit in a Cold Climate

New Paltz, New York

PROJECT INFORMATION

Project Name: Insulated Siding Retrofit
in a Cold Climate

Location: New Paltz, NY

Partners:

Builder: Kinsley Construction Company,
rkinsley.com

Building America Partnership for
Improved Residential Construction,
ba-pirc.org

Building Component: Building
envelope—exterior cladding and water-
resistive barrier

Application: Retrofit, single-family

Year Tested: 2012–2013

Climate Zones: Cold/very cold (4, 5, 6)

PERFORMANCE DATA

(measure only)

Incremental cost of energy-efficiency
measure: \$1,618 or \$1.43/ft² of wall area

Projected energy savings:
7% space/water heating savings/year

Projected energy cost savings:
\$170/year

Insulated siding has been available in the marketplace since 1997; both ASHRAE 90.1 and the International Energy Conservation Code qualify it as a continuous insulation when properly installed. Although estimates have been made regarding its advantages over standard siding products with respect to air infiltration and insulating value, little field analysis has been done on existing homes to determine and quantify pre- and post-energy performance.

In this study, the U.S. Department of Energy's team Building America Partnership for Improved Residential Construction (BA-PIRC) worked with Kinsley Construction Company to evaluate the real-world performance of insulated siding when applied to an existing home. A 1960s home was selected for analysis. It is located in a cold climate (zone 6) where the addition of insulated siding and a carefully detailed water-resistive barrier have the potential to offer significant benefits. In particular, the team quantified building airtightness and heating energy use as a function of outdoor temperatures before and after the installation of the insulated siding.

Insulated siding is an integrated vinyl siding material in which contoured expanded polystyrene insulation is permanently adhered to the vinyl siding panel. Installation is similar to that for standard vinyl siding, but care must be taken to ensure that the insulation panels fit tightly together. Like standard vinyl siding, manufacturers recommend installation on a flat surface over a water-resistive barrier with seams taped to help prevent water intrusion. In addition to its thermal benefits and air-infiltration reduction, insulated siding is impact resistant and durable. It is also manufactured with recycled materials and is available in a variety of colors, profiles, and trims.

DESCRIPTION



Pre-Retrofit: Southeast Side of Home

The home was constructed in 1969 with aluminum siding and no water-resistive barrier. It included R-11 fiberglass batts in wall cavity, minimal R-22 attic insulation, uninsulated below-grade walls, and single-pane wood windows with storms.



Post-Retrofit: Southeast Side of Home

R-2.7 insulated siding was installed over a water-resistive barrier with seams taped. Air sealing was performed around windows, doors, and penetrations through above-grade walls. No other energy upgrades were made to isolate the impacts of the siding retrofit.

RESULTS

Airtightness improvement: 9.5%

Heating energy savings: 8% (normalized for outdoor temperature variation—therms/heating degree days).

Image credit: All images, except as otherwise noted, were created by the BA-PIRC team.

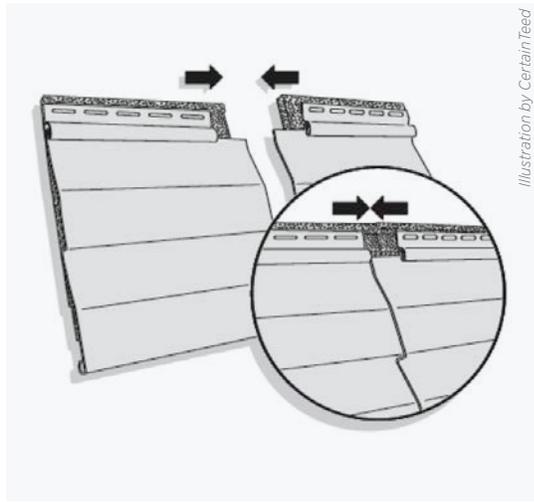


Illustration by CertainTeed

Installation Guide

Although installation procedures may vary slightly, manufacturers typically recommend the following steps:

1. Install over flat surface and water-resistive barrier.
2. Nail loosely with 2-in. corrosion-resistant nails 16 in. on center.
3. Allow ¼-in. gap between siding and trim pieces above 40°F, slightly more in colder temperatures.
4. To overlap, slip vinyl edge of one panel beneath foam and vinyl of adjoining panel. Then slide together until foam ends touch.

Based on building tests in the study home, the team found that the insulated siding provided more than half the total improvement in airtightness, with the remainder attributable to the water-resistive barrier. This indicates that the additional layers of insulation and vinyl siding reduce air leakage and improve thermal capacity, even though the siding is loosely attached.

Lessons Learned

- Insulated siding improved measured airtightness by more than 9.5%.
- Normalized utility bill data showed an 8% reduction in Btu per heating degree day consumed during one post-retrofit heating season.
- Insulated siding increased comfort and reduced draftiness.
- Other options to achieve equivalent R-value (e.g., rigid insulation) would cost more in labor and materials.
- Material costs are \$1,618 higher than those for standard vinyl siding.
- Labor costs are equivalent to standard siding.

Looking Ahead

New generations of integrated insulated siding with higher R-values will offer greater opportunity to improve energy efficiency in existing homes. Future field evaluations would benefit from more discrete pre- and post-retrofit monitoring.