

Deep Energy Retrofit, Arlington, Mass.

KEY DRIVER

In the spring of 2008, Alex Cheimets decided to re-side his Arlington home, an 80-year-old, 3,200-square-foot two-family house. He recognized that the project offered an opportunity to improve his home's efficiency by adding exterior insulation under the new siding. He contacted the Mass. Department of Energy Resources (DOER) for guidance on how much insulation to add and how to mitigate moisture problems. DOER staff provided him with technical assistance and in doing so, recognized that his project could provide important research into the costs and long-term savings of super-insulation.

By that fall, an innovative public/private collaboration among Cheimets, the second homeowner Cindy Page, DOER, NSTAR Electric, and product sponsors enabled the project to move forward. Through technical assistance, energy modeling, incentives, and donations, Cheimets and Page were able to expand the project to retrofit the entire building envelope, including new roofing, windows, and doors.

THE "ARLINGTON HOUSE" PROJECT HAD THREE STAGES:

1) Analysis of Energy Efficiency Upgrades

[Building Sciences Corporation](#) developed an energy simulation model for the duplex; it estimated costs and savings for insulation upgrades that would reduce heating costs up to 60 percent.

2) Selection and Installation of Efficiency Upgrades

Using a \$40,000 energy-efficiency grant from NSTAR Electric and materials from product sponsors, [Anderson Insulation contractors](#) installed foam insulation underneath the roof deck, and [Synergy Companies Construction](#) contractors installed rigid board insulation to the top of the roof deck and to the walls, foam insulation to the basement ceiling, as well as ENERGY STAR windows and two heat recovery ventilators, which exhaust stale air and warm incoming fresh air.

3) Analysis of Post-Installation Energy Use

[Onset](#) provided data loggers to record inside and outside temperature and humidity, and [Visitank](#) provided monitoring instruments for oil consumption. DOER and NSTAR will use these tools to monitor building performance for a few years, as a pilot project.



Photo by Alex Cheimets

IMPACT

The original plan to replace the siding and roof would have cost approximately \$50,000. The total cost of the comprehensive retrofit was approximately \$138,000. The additional \$88,000 investment to super-insulate and replace all the windows was made possible by NSTAR's \$40,000 grant and sponsors' product donations.

The retrofit is expected to reduce energy use by up to 60 percent and save an estimated \$1,500-\$2,500 in annual energy costs, an estimate dependent upon fuel prices. Actual energy data recorded in 2009 from mid-January to mid-April showed an oil use reduction of 53 percent, with estimated savings of approximately \$1,700, using a cost index of \$2.50/gallon.

ENERGY-EFFICIENCY SPECIFICATIONS

WALLS: R-40 rigid board insulation — 4" outside

ATTIC: R-58 rigid board insulation — 6" outside and open cell foam insulation under roof deck

BASEMENT CEILING: 6" of spray foam insulation

WINDOWS: Pella double-pane fiberglass, Low-E

HEATING & COOLING: Original — two oil-steam systems

HOT WATER: Gas demand hot water heater (for one household)

VENTILATION: Fan Tech Air-to-Air Heat Exchanger

Learn more details about the project on [Cheimets' blog](#).