

U.S. DEPARTMENT OF
ENERGY

Office of
**ENERGY EFFICIENCY &
RENEWABLE ENERGY**



Case Study: Cost Savings and Improved Occupant Comfort for Michigan Resident

Margaret Rankin has lived in her home in Metro Detroit for over two decades.

She loves her house, but on hot summer days, the temperature in her bedroom can soar to 90 degrees. Other rooms are uncomfortably cold in winter. This year, she finally decided to do something about it.

Rankin talked to her sister, who pursued an energy retrofit on her home in 2020.

“When I asked if she would do it again, she said, ‘Absolutely—you should see how much lower my bills are,’” says Rankin.

She called Ecotelligent Homes, the contractor that had recently completed energy upgrades on her sister’s home, to learn what steps she could take.

Ecotelligent participates in Home Performance with ENERGY STAR®, a federal program administrated by the U.S. Department of Energy and U.S. Environmental Protection Agency to improve the energy efficiency of existing homes through energy upgrades. The program employs a three-step process, beginning with an evaluation of the most cost-effective energy efficiency measures. A contractor installs the improvements, and later testing verifies the work. More than one million homes have been upgraded since the program launched in 2001. There are Home Performance with ENERGY STAR sponsors in multiple states, with over 1,400 participating contractors that perform energy audits and carry out the work.

Rankin opted to begin with a quote. This way, if she decided not to move forward, there would be no financial commitment.

To start the process, an Ecotelligent Homes energy consultant evaluated Rankin’s three-bedroom dwelling, which was built in 1962. The split-level plan consists of 3,514 square feet of conditioned space, including a 1,171-square-foot basement under the ground floor. An older gas furnace supplies heating, and a whole-home air conditioner provides cooling.

The attics, walls, and basement all had minimal insulation and no air sealing, and many of the comfort issues focused on the home’s split level, where an upper portion cantilevers over a lower level.

Rankin’s master bedroom is located in the upper space; in summer, she often uses a portable air conditioner to supplement the home’s cooling system. Her grandchild’s playroom is located in the lower level and requires a space heater to keep it comfortable in winter.



Homeowner Margaret Rankin (left) with production manager Smith Her and Amanda Godward, owner of Ecotelligent Homes.

“What led me to call Ecotelligent Homes was being uncomfortable through the seasons—too hot during the summer; too cold during the winter.”
Margaret Rankin



The attics, walls, and basement all had minimal insulation and no air sealing.

The energy consultant provided Rankin with three quotes. All three options recommended, at minimum, insulating and air sealing the attic above the split level and insulating and air sealing the basement rim joist. With her budget and comfort goals in mind, she chose the second option, which included insulating and air sealing the upper attic, the basement rim joist, and the overhang where the upper floor cantilevers beyond the perimeter of the lower floor. Each of these areas was insulated and air sealed at or above ENERGY STAR levels (see chart).

The install team used spray foam to seal the top plates and all penetrations in the attic. They fireproofed recessed lighting fixtures, sealed and insulated the attic hatch door, and installed six-foot baffles to promote attic ventilation. Finally, they insulated the attic with an average of 13 inches of blown-in cellulose insulation, bringing the R-value to R-49.

The overhang floor was insulated and air sealed with 4.5 inches of closed cell spray foam, and the basement rim joist treated with 2 inches of closed cell spray foam.



With minimal insulation and no air sealing, Margaret Rankin’s split-level home had some serious comfort issues.

	ENERGY STAR Insulation	Pre Improvement		Post Improvement	
		Insulation	Air Barrier	Insulation	Air Barrier
Attic (R-value)	49	13	No	49	Yes
Knee Walls (R-value)	19	0	No	0	No
Windows (U-value)	0.3	0.4	Some	0.4	Some
Doors (R-value)	5	4	Some	4	Some
Rim Joist (R-value)	13	10	No	13	Yes
Overhang (R-value)	30	10	No	30	Yes



An installer with Ecotelligent Homes installs spray foam around the perimeter of the upper level, which cantilevers over the lower level.



The upper attic was air sealed and insulated to R-49. New six-foot baffles facilitate attic ventilation.

Measurable improvements

In addition to visual inspections, Ecotelligent conducted a blower door test and thermal infrared scanning—diagnostic tools that measure and identify air leakage from the home—in key areas both before and after completing the work. Their Quality Assurance Check report includes before and after photos along with recommended steps to save even more energy in a future phase of improvements.

The Ecotelligent Team also gave Rankin tips on things she could do herself to save energy—for instance, the whole-house fan in the attic was bringing in cold air in winter and hot air in summer, so she covered it with radiant foil and tape when it was not in use.

Rankin is pleased with the results of the upgrade. “I can already tell the difference,” she says. “The furnace is not coming on as often as before.” Unlike a cosmetic remodel, she says, “You may not see what you’re getting, but you’re going to feel it. It’s worth it for your own comfort.”

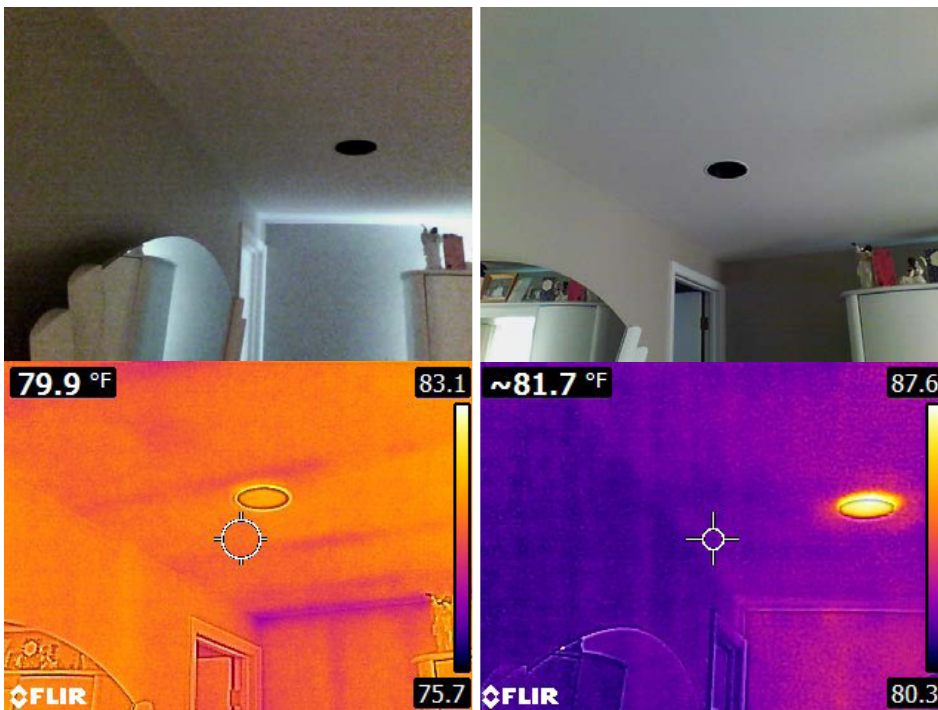
Rankin spent \$7,500 on the improvements and received \$750 in rebates through Consumers Energy, which has been a Home Performance with ENERGY STAR Sponsor since 2010. Amanda Godward, founder and owner of Ecotelligent Homes, says that on average, her clients save around 30 percent on their utility bills after improvements. But while saving money and reducing carbon footprint drives some clients, the majority, like Rankin, are motivated by comfort issues.

“Our phones are ringing after the first big snow,” she adds.

Godward launched the company in 2009, at first focusing exclusively on energy audits. Since then, Ecotelligent has upgraded close to 3,000 homes in the Metro Detroit area. Energy audits remain the linchpin of the business, enabling a science-based approach to energy retrofits that also addresses comfort, health, and safety.

Housing stock in metro Detroit is aging, and some of the homes Ecotelligent works on have lead paint or asbestos siding. To help mitigate this, the company is starting to bring some remediation work in-house. They also are incorporating indoor air quality testing in every project, using Awair IAQ monitors.

Ecotelligent participates in Home Performance with ENERGY STAR in part because of its holistic approach, says Godward.



Thermal scans before (left) and after (right) improvements were installed graphically reveal where air leaks and thermal bridging occur.

About Home Energy Score

Home Energy Score, developed by the DOE and its national laboratories, uses a simple scale to rate a home's overall energy efficiency, with 1 representing the least efficient homes and 10 the most energy efficient. This index allows homeowners and contractors to quickly evaluate a home's status and plan their approach to energy upgrades.

Ecotelligent procured Home Energy Scores for Rankin's home before and after installing the improvements.

“Margaret's project started as a 3 and bumped to a 4 following improvements,” says Godward. “Once we do the second attic and the mechanicals, it will likely go to a 6.”

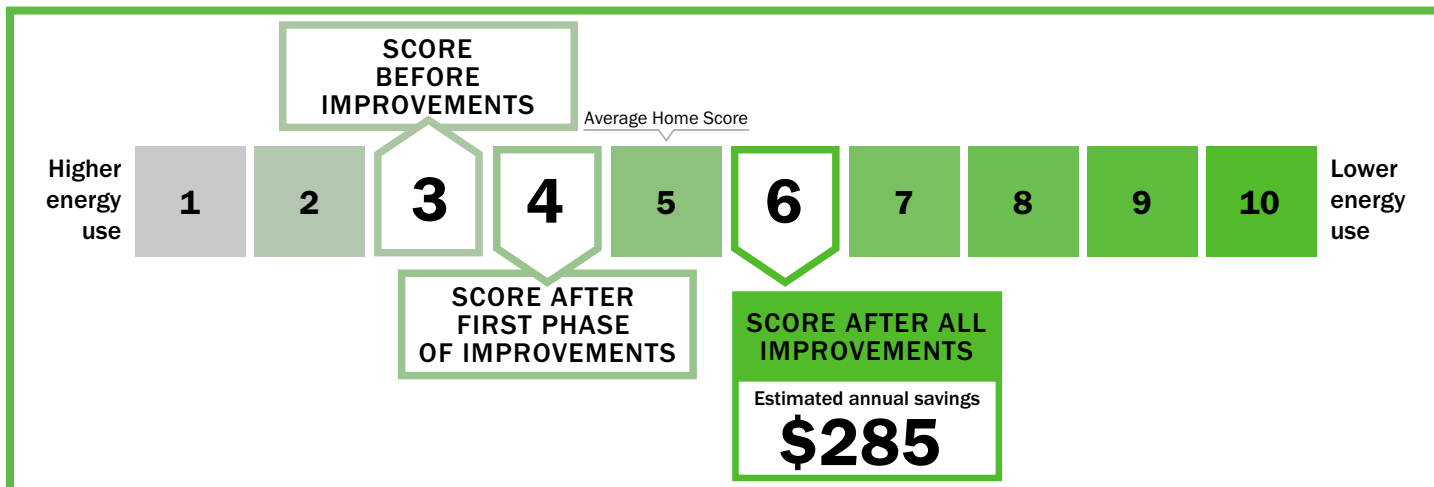
When Rankin is ready for the next phase, Ecotelligent will insulate and air seal the lower attic and knee wall where it meets the upper section. Rankin also hopes to upgrade the furnace and water heater with newer, more efficient ENERGY STAR-certified models.

“Consumers Energy does a good job of raising awareness of the importance of testing before and after,” she says. “I have an engineering background so I like the data.”

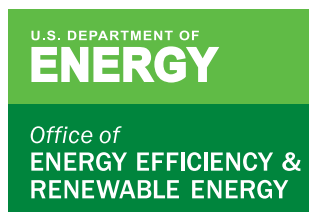
The flexibility to do the work in phases plus the rebates available through the program make it more accessible to people. Godward is gratified that her company’s work makes such an immediate impact on the quality of her clients’ lives.

“It’s really rewarding to hear from clients how comfortable their home is,” says Godward. “We read client reviews at staff meetings. It really motivates us.” ■

Rankin Home Energy Score



Home Energy Score allows Margaret Rankin to track the step-wise progress of her home's energy performance after each round of upgrades.



Photos courtesy of Ecotelligent Homes

For more information, visit:

HPwES ENERGY STAR:
www.energy.gov/eere/buildings/home-performance-energy-star

Home Energy Score:
betterbuildingssolutioncenter.energy.gov/home-energy-score

Ecotelligent Homes:
www.ecotelligenthomes.com/

Consumers Energy HPwES:
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DOE/EE-2585 • April 2022