

St. Paul residents go all electric

When Kristin and William bought their 1909 two-story, single-family home in St. Paul, they knew the house needed updating to improve its comfort and efficiency. Motivated by their desire to reduce their home's carbon emissions and take advantage of renewable energy, they decided to pursue an all-electric strategy for retrofitting their home. With the help of general contractor Justin Riddle and Center for Energy and Environment's (CEE) energy audit and consultation, Kristin and William were able to convert their 115-year-old house into a comfortable, efficient, and all-electric home.

Retrofit Process

Before beginning renovations, CEE conducted an energy audit to provide a baseline energy model for the home and guide possible improvements. CEE created multiple projected energy models using Ekotrope's HERS rating software to show how different thermal envelope improvements would impact the home's HERS score and change the estimated annual energy costs. After reviewing the energy models, Riddle and the homeowners decided to move forward with electrifying the home by updating the electrical wiring and electrical box, removing the gas boiler and gas meter, installing a properly sized cold climate air source heat pump (ASHP) with electric resistance backup, and installing a heat pump water heater and all-electric Energy Star appliances throughout the home.

It was also important that the home was weatherized to withstand extreme temperatures. Weatherization measures included air sealing and insulating the attic, walls, and crawlspace, and replacing or repairing some doors and windows.



Home Features

- **Location:** St. Paul, MN
- **Built:** 1909
- **House Type:** Single-family, two-story

Energy Efficient Features

- **Overall energy efficiency:** HERS 57 (Pre-work HERS 126)
- **Air leakage reduction:** 3.75 ACH50 (Pre-work 11.9 ACH50)
- **Weatherization:**
 - Rigid and spray foam insulation used to air seal and insulate the attic, walls, and crawlspace
 - Some new windows and doors, plus restoration of some existing windows and addition of missing storm windows
- **Electric appliances:**
 - Two fully ducted cold climate air source heat pumps with outdoor units and backup resistance heat
 - Energy Recovery Ventilation (ERV)
 - Heat pump water heater
 - Heat pump clothes dryer
 - Induction range oven



Throughout construction, CEE collaborated with Riddle on site assessments and providing technical expertise for the project. Once construction was completed, CEE returned to complete final HERS testing to compare the actual energy use of the home after remodel to the initial modeled use, so the home's upgrades could qualify for utility rebates and tax credits.

Results

The homeowners were able to take their home from a pre-work HERS score model of 126 to a final HERS score model of 57, with a lower score being better. This represents a nearly 75% reduction in energy consumption. They have also reported improved comfort as temperatures now hold more consistently throughout all levels of the house.

Testimonials

“ [CEE’s] breadth of knowledge [was] incredibly valuable when discussing and planning our project. Their insights and recommendations helped us make informed decisions to achieve the best possible outcomes.”

– **Justin Riddle, Paltrin, Project Partner**

“ We knew that going all electric was possible, but didn’t have the expertise to determine HVAC and other systems for the home. We wanted a baseline of energy efficiency so we could understand how effective our upgrades were at project completion. It also helped us to model the system size necessary to heat and cool our renovated home.”

– **Kristin and William, Homeowners**

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