



Photo: Wright Builders, Inc.



# Energy Efficiency Case Study

Brought to you by National Grid

## All-Electric Home Northampton, Massachusetts

### Background

Located in a small development of highly efficient homes, this net-zero ready, single-family home features innovative construction materials and methodology. The home achieved an impressive HERS Index score of 36 without accounting for the 15.4-kW solar array on the roof. This project is a perfect example of what can be done with strategic planning and a dedicated project team with the same goal.

### Challenge

Wright Builders, Inc., has been building high-performance homes in Massachusetts for nearly 50 years and operates with strict standards for energy efficiency. Their goals for this project, and all their projects, are to build homes for the future that are high-performance, sustainable, net zero ready, and built and operated with a low carbon footprint. All their homes attain at least ENERGY STAR® 3.1, Indoor Air Plus, Zero Energy Ready, and WaterSense certifications. With the help of their HERS rating company, Center for Eco Technology, they achieve these goals by utilizing advanced framing, open web trussing, AeroBarrier, and maximizing the use of low-carbon materials. Additionally, air sealing is performed periodically throughout the construction process to ensure the building is as air tight as possible.

### Outcomes

Incredibly, this large 3,777-square-foot home in Northampton is only heated with a 24k British Thermal Unit (Btu) ductless heat pump system. This is due to a well-thought-out and implemented plan for air sealing and insulating the thermal envelope of the home as it was constructed. They used as little high-density foam as possible, due to its high carbon footprint, without sacrificing the efficiency levels of the project. They only used foam under/around the slab, along the finished basement walls, and in a small section along the roofline. Cellulose was used everywhere else, and a CertainTeed Smart Membrane was also installed on the interior side of the exterior walls. This type of membrane adds a continuous air barrier along with advanced moisture management to the home. A Rheem 4.24EF 50-Gallon heat pump adds to the energy efficiency of the mechanical design. A separately ducted energy recovery ventilator (ERV) provides fresh air to the building. Homes like this are a testament to the advancements in both proper planning and modern building techniques.

### Heating fuel

- Electric

### HERS Index without solar PV

- 36

### HERS Index with solar PV

- -25

### Annual electric savings

- 11,851.2 kWh

### Equivalent CO<sub>2</sub> emissions

- 945 gallons of gasoline consumed annually

### CO<sub>2</sub> sequestered

- Equivalent to 139 tree seedlings grown for 10 years

### Development team

- Architect: In-house design by Wright Builders
- Contractor: Wright Builders, Inc.
- HERS Rater: John Saveson, Center for Eco Technology

### Total sponsor incentive

- \$15,000

### About Mass Save:

Together, we make good happen for Massachusetts. Your local electric and natural gas utilities and energy efficiency service provider are taking strides in energy efficiency: Berkshire Gas, Cape Light Compact, Eversource, Liberty Utilities, National Grid, and Until. As one, we form Mass Save®, with the common goal of helping residents and businesses across Massachusetts save money and energy, leading our state to a clean and energy-efficient future.

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## Green features

### Certifications

- U.S. Environmental Protection Agency (EPA) ENERGY STAR® 3.1
- EPA Indoor airPLUS
- U.S. Department of Energy Zero Energy Ready Home
- EPA WaterSense

### Building envelope

- Infiltration: Blower door test achieved an impressive .71 ACH50
- Attic: Air sealed and insulated with cellulose (R-56)
- Roof: Insulated with high-density spray foam (R-60)
- Walls: Double-stud 2x4s with a 3" gap insulated with cellulose (R-37)
- Windows: Triple pane with 0.16 U-factor and 0.35 Solar Heat Gain Coefficient (SHGC)

- Slab: Rigid foam board (R-26)

- Foundation: Continuous high density rigid foam board (R-26) with dense-packed cellulose in 2x4 framed cavity (R-13)

### HVAC

- 2-ton ductless 10.2 Heating Seasonal Performance Factor (HSPF) and 19 Seasonal Energy Efficiency Rating (SEER) heat pump was used for all the heating and cooling needs of the home.
- Broan ERV system supplying fresh, balanced, filtered air to the living space.

### Hot water

- Rheem 50-gallon hybrid heat pump hot water heater (4.24 EF)

### Solar, storage, and EV charging

- 15.4-kW solar array was installed on the roof to satisfy all of the home's electric needs
- Electric vehicle charging stations



**Have a question? We are here to help: 1-866-527-SAVE (7283)**

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