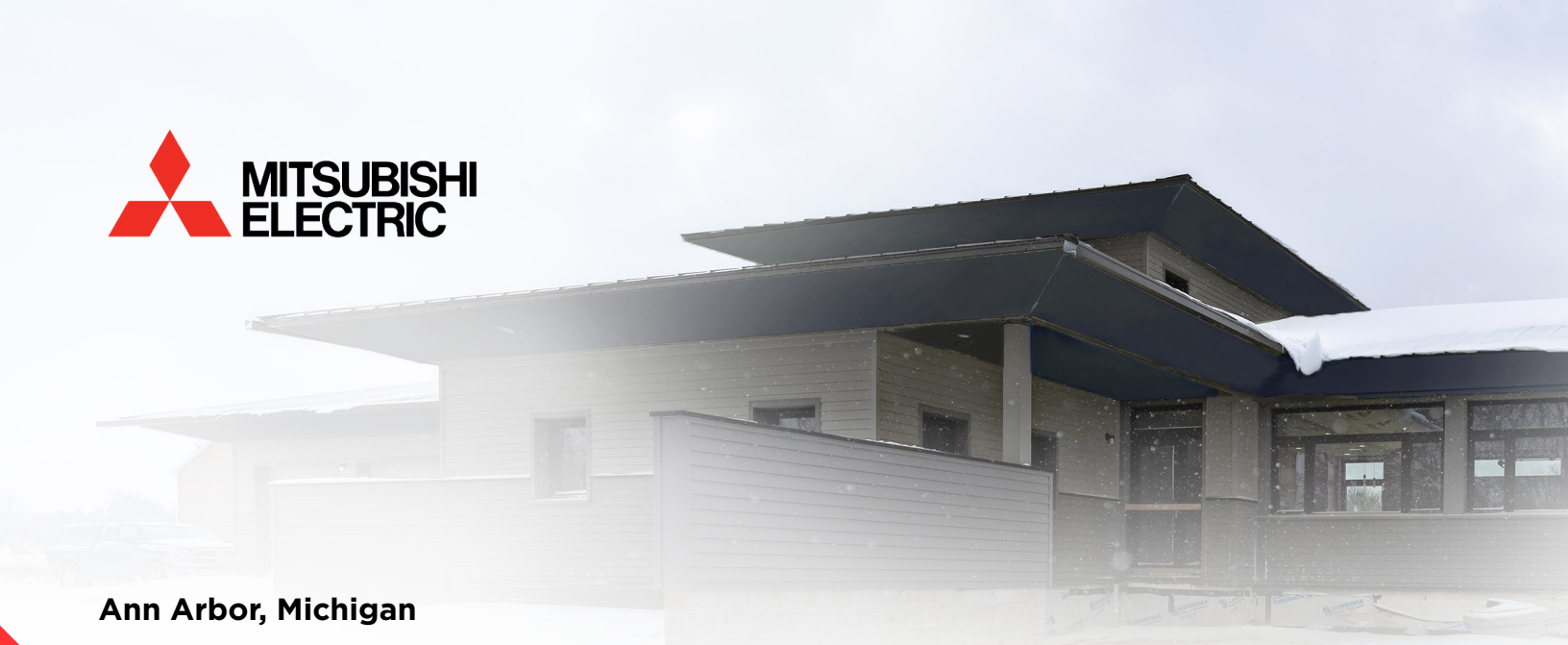


Ann Arbor, Michigan

ANN ARBOR PASSIVE HOUSE

When Eric and Jo Ann decided to build a new home, they set their sights on building a Passive House as a testament to the benefits of high-performing homes.

"My wife and I feel very passionately about the environment; because of this, we had been looking into building an energy-efficient house," said Eric. "As an engineer, the Passive House standard was appealing to me because it results in an analytically-designed home that has proven performance before you even lift a hammer."

CHALLENGE

Selecting a highly-efficient HVAC system for a passive house that could withstand cold winter temperatures.

SOLUTION

Mitsubishi Electric Cooling & Heating Zoned Comfort Solutions®

RESULT

A comfortable, healthy and energy-efficient home that provides optimal conditioning year-round and low utility bills.

After working on a design for the two-story, single-family home with architect Michael Klement, AIA, NCARB, AIBD, CPHC from Architectural Resources, the couple selected Mitsubishi Electric Zoned Comfort Solutions® due to the equipment's small footprint and ability to maximize energy efficiency.

DESIGNING FOR EFFICIENCY

Intent on constructing a comfortable passive house that met rigorous standards for quality assurance, energy efficiency and indoor air quality, Architectural Resources teamed up with builder, Adaptive Building Solutions, LLC. "It was clear the owners wanted to put their best foot forward with a high-performance, energy-efficient home from the beginning," said Mike Mahon, CEO/owner, Adaptive Building Solutions. "Their motive was to design and build the most energy-efficient home that they could."

In developing the home, the team worked together selecting proper insulation, windows and doors that all met high-performance criteria. "Michael Klement was instrumental in turning our ideas into a solid design that met the Passive House standard," said Eric. "Mike Mahon was then able to translate that design into physical reality."

COLD-CLIMATE PERFORMANCE

With the structure of the home set, choosing the right HVAC system was critical, not just for the sake of energy-efficiency, but for keeping up with the cold Ann Arbor winters. To address environmental conditions that include over 50 inches of snowfall per year, on average, and below-freezing temperatures in the winter months, the project team specified a system equipped with Mitsubishi Electric's Hyper-Heating INVERTER® (H2i®) technology.

"Hyper-heating technology allows the unit to extract heat at lower temperatures than most units can go to," said the installing contractor Andy Bobo, owner, CMR Mechanical. "This allows us to put the units as a sole source of heat for the home. H2i units can withstand Michigan winters, which can get quite cold." Ultimately, CMR Mechanical installed a mix of ducted and ductless equipment

with 2 MSZ Wall-Mounted Indoor Units and 2 SEZ Horizontal-Ducted Indoor Units which accommodate each zone.

"The Mitsubishi Electric product is perfect for this house," expressed Mahon. "They work in both summertime and winter. They are even performing fantastically right now in February. As we look out the window and it's snowing, we're standing in a comfortable 68 degrees."

A BRAND TO COUNT ON

Particularly for residences in cold-weather climates, homeowners are always looking for a solution that can help them stay warm without running up the utility bill. The home's HVAC distributor can attest to Mitsubishi Electric's quality. "I was a mechanical contractor for 34 years and I started using Mitsubishi Electric systems as soon as they were available," said Dennis Kurzawa, technical solutions specialist, Comfort Engineering Solutions. "That equipment has helped us solve a lot of issues when there were no solutions in the heating and cooling industry."

Bobo added, noting, "The nice thing about Mitsubishi Electric is that people ask for it by name. They're not just asking for a ductless unit specifically; they're asking for a Mitsubishi Electric ductless unit." By utilizing CMR Mechanical as the installer, Eric was able to secure a top-of-the-line warranty as well: 12 years on parts and 12 years on the compressors.

"They work in both summertime and winter. They are even performing fantastically right now in February. As we look out the window and it's snowing, we're standing in a comfortable 68 degrees."

— Mike Mahon, Adaptive Building Solutions

As a Diamond Contractor®, Bobo and his team of professionals are specially trained to work with Mitsubishi Electric HVAC equipment, ensuring quality installation, start-up and maintenance. As such, CMR Mechanical also offered Eric an additional 5 years warranty on labor.

ACHIEVING OUTSTANDING SAVINGS

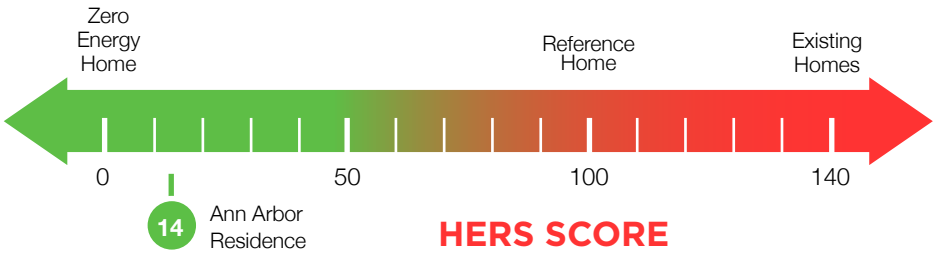
Eric and his family finally moved into the home in February 2019. Officially verified by Building Efficiency Resources (BER), an energy rater, the home has achieved some outstanding accolades. "The home attained a HERS Index® score of 14, is ENERGY STAR® Certified, EPA Indoor airPLUS certified and is projected to meet DOE Zero Energy Ready Home and Passive House Institute US (PHIUS+) status," said Chris McTaggart, co-owner, BER. Compared to the average, new

construction home in the U.S., his efforts will save Eric $8,640 in annual energy savings.

While the house is already highly efficient, the project team plans to take performance to the next level. Adding a solar array is their next plan of action. "We're anticipating the energy load for this house is going to be so low that the solar production will help offset their energy use," explained Mahon. According to McTaggart, it will. With a projected solar generation of 29.8 MBTUs, energy costs are expected to total $1,044 annually, with heating and cooling contributing a mere $573 for the entire year.

While the energy benefits are nice, Eric and Jo Ann are proud to showcase their home as an example of good environmental stewardship.

"We are very, very pleased with how the house turned out," said Eric. "This home is an opportunity to lead by example and it's already exceeding our expectations."



ESTIMATED ENERGY USAGE

	Use [MBTUs]	Annual Cost
Heating	11.3	$515
Cooling	1.3	$58
Hot Water	2.2	$103
Light/Appliances	37.6	$1,710
Service Charges	—	$12
Generation (e.g. Solar)	-29.8	-1,354
TOTAL	**22.6**	**$1,044**

PROJECT TEAM

Architect:
Architectural Resources, Ann Arbor, Michigan

Builder:
Adaptive Building Solutions, LLC, Ann Arbor, Michigan

Mechanical Contractor:
CMR Mechanical, Dexter, Michigan

HVAC Distributor:
Comfort Engineering Solutions, Chesterfield Township, Michigan

Energy Rater:
Building Efficiency Resources (BER), Chicago, Illinois

EQUIPMENT

- 1 MXZ-4C36NAHZ M-Series H2i® Outdoor Heat Pump
- 2 MSZ-FHNA Wall-Mounted Indoor Units
- 2 SEZ-KD12NA Horizontal-Ducted Indoor Units
- 4 MHK-1 Wall-Mounted Wireless Controllers