

Multi-zone System Selected for First Passive House in Washington, D.C. Area

Bethesda, Maryland

The Bethesda Passive House, Bethesda, Maryland, is the Washington, D.C. area's first certified Passive House. It is a four-level, 4,400-square-foot marvel of design, engineering and construction. It features classic architecture and style that blend in with the surrounding neighborhood. Inside its walls, however, one sees the passive building elements: insulation and right-sized mechanical equipment (with appropriate capacities). Among that equipment is the S-Series multi-zone heat pump system from Mitsubishi Electric US, Inc. Cooling & Heating Division (Mitsubishi Electric).

► Challenge

To install an HVAC system that would offer a Passive House enough cooling for a hot, humid summer.

The Bethesda Passive House started as an idea. Architect David Peabody, president, Peabody Architects, Alexandria, Virginia specializes in energy-efficient design. He arranged a team to build a spec Passive House. "We didn't know who the owner would be, so the house had to look as normal as possible – the Passive House features as invisible as possible. We also knew we needed to build a high-end house to fit into the neighborhood."

For the cooling and heating system, Peabody called in Dan Foley, president, Foley Mechanical, Inc., Lorton, Virginia. Foley suggested a multi-zone heat pump design with a ducted distribution system to help the house meet stringent Passive House criteria. Peabody, a Certified Passive House Consultant, agreed. "[Multi-zone systems] are pretty much the only approach anyone's using for Passive Houses. A [multi-zone system] gives heating and cooling, and you can dial it down to give minimal loads. It's the logical choice."

Choosing a brand was straightforward. Hot days were a concern as Passive House standards are



Bethesda Passive House

Project Location:
Bethesda, Maryland

Completion Date:
June 2011

Project Team

Owner:
Martin Lindholm

Builder:
O'Neill Development Corporation,
Gaithersburg, MD

Architect:
David Peabody, president, Peabody Architects,
Alexandria, Virginia

HVAC Contractor
Dan Foley, president, Foley Mechanical, Inc.,
Lorton, Virginia

Mitsubishi Electric Equipment Installed:

(1) PUMY-P36NHMU Outdoor Unit

(2) PVFY-P18E00A Concealed Vertical
Indoor Units

geared toward climates requiring only heating, but "the Washington, D.C. area is a cooling-dominant climate," said Foley. "Mitsubishi [Electric] is a good fit for Passive Houses because of the INVERTER-driven compressor. It has the ability to ramp down for light loads, then ramp up for colder or hotter days." Foley also noted that good local support was "critical for choosing Mitsubishi [Electric]. It takes price out of the equation when you have that level of support."

Because this was a high-end house, "we had to provide a premium system in terms of comfort, operation cost and reliability," said Foley. The Mitsubishi Electric system, with its impressive energy efficiency and INVERTER technology, was a great fit. Peabody said that "working the equipment into my design didn't present many challenges."

► Solution

A multi-zone system from Mitsubishi Electric helps combat the oppressively humid Washington, D.C. summers.

The finished house sold quickly. "We were looking for a bigger house and were interested in a smaller carbon footprint," said homeowner Martin Lindholm. "We're a single-car household and we use public transportation whenever possible." The Bethesda Passive House, "located close to schools, shops and transportation, combined with the energy-efficient aspects, seemed like a great place to live."

The Lindholms use their HVAC system throughout the year but "the bills don't

fluctuate much." Lindholm said their cooling and heating cost averages \$57/month. The U.S. Energy Information Administration's most recent energy survey shows Maryland residents pay an average of \$193/month for energy, making the Lindholms' expenditure under one-third of their neighbors'. The Lindholms' own energy company says homes in the immediate area average \$280/month, making the Bethesda Passive House's energy costs almost one-fifth of its neighbors'. These numbers are all the more impressive given the indirect comparison; the Bethesda Passive House is considerably larger than the standard single family home.

The comfort level is also high. Lindholm said, "The system does the job without you noticing it too much, which is really nice. It's also quiet outside; we hear our neighbor's system from three houses down more than we hear ours."

Foley also addressed comfort. "We hosted an open house on a 95-degree day, a real scorcher, and there were maybe 45 people in the house. The door was opening and closing constantly, too. The system handled it like a champ. It was comfortable in there." ■

Peter Evans Photography