MITSUBISHI ELECTRIC
HEATING & AIR CONDITIONING

Weaverville,
North Carolina

SCHMELTZER RESIDENCE

CHALLENGE

A North Carolina couple decided to build a net-zero home and required an efficient, zoned HVAC system

SOLUTION

Zoned Comfort Solutions® (Variable-Capacity Heat Pump) from Mitsubishi Electric

RESULT

A comfortable, net zero home that received a HERS score of -10

Sally and Jason Schmeltzer moved to Asheville in 2005 and began their careers as chemistry faculty at UNC Asheville. As a couple and in their professional work, they strive to make choices that positively affect their family, students, community and overall global footprint.

After living in a 2,400-square-foot home with a big backyard for more than a decade, the Schmeltzers made the commitment to create a home life that was more deliberate and less dependent on fossil fuels. After much building-science research, they set their sights on building a new, net-zero home.

CHOOSING NET ZERO FOR TODAY AND TOMORROW

"It was our dream to have a net-zero home for two reasons: 1. The energy impact," noted Sally. "If we could balance the resources our family was using and at least come out even, that would be better for the environment. 2. We saw it as a really great financial investment. If we were going to put our funds into a new house, having one that is really energy-efficient made sense to us, particularly when we thought ahead 20 or 30 years and considered how energy costs will go up."

In reaching their goal, the Schmeltzers were determined to find the most efficient mechanical systems, HVAC equipment included. After consulting with their builder and Mitsubishi Electric's Performance Construction Team, Jason and Sally agreed, Zoned Comfort Solutions® were the right fit for their new home.

As a first step, the couple bought a lot in Weaverville, North Carolina with ideal southern exposure and partnered with Sure Foot Builders (Sure Foot). Established in 2007, Sure Foot is a local high-performance builder that shared their vision. "We strive to build green homes with the best overall value for our clients," noted Raymond Thompson, owner, Sure Foot. "Every single home that we build is both ENERGY STAR® and Green Built Certified."

The design of the home was very much a collaboration between Thompson and the Schmeltzers, ensuring Jason and Sally knew their options with every decision.

"Raymond was great at communicating and helping us understand what we wanted in terms of energy efficiency, ensuring we could manage the property and afford it," said Sally.

EFFICIENCY AT EVERY DECISION

After settling on a design for the 1.5-story, 1,750 square-foot-home, the Schmeltzers and their project team were deliberate in selecting the most energy-efficient materials and mechanical systems available for the home. The home is all electric and completely removed from relying on fossil fuels.

"For the structure of the home, we went with ZIP System® R-Sheathing with an inch of continuous insulation across the entire home envelope," explained Thompson. "The windows and doors have double- and triple-paned glass, and open-cell spray foam lines the 2x6 exterior walls to create an air-tight barrier. With these measures taken, the roof deck has an R-Value of 28 and the walls have a value of R-20."

Next steps included selecting an HVAC system. While owners typically think about aesthetic choices when building a new home, mechanical system selection is critical to ensuring a home's performance, comfort and indoor air quality. Like many homeowners, the Schmeltzers were used to a ducted, natural gas furnace. That said, Thompson wanted them to explore more efficient, healthier options and sent them to one of Mitsubishi Electric's Lunch & Learn programs to better understand variable-capacity, split-ductless systems.

"During the program, we were introduced to Rob Howard of Mitsubishi Electric's Performance Construction Team," said Sally. "He was able to explain everything to me. Initially, I was concerned about the wall-hung unit style…it didn't look like what I expected. But when I learned about the technology and how efficient it is, I had to agree: the wall-mounted unit is beautiful. It's 50% more efficient than the next best thing. Why wouldn't I want that? In addition, they're pretty sleek looking. We told Raymond right then we wanted to go with Zoned Comfort Solutions."

HIGH-PERFORMANCE HVAC DESIGN

From there, Thompson brought Howard onto the project team. "Rob significantly contributed to the design and product selection for this project," said Thompson. "He brought additional expertise to the table which is reflected in the HVAC system layout. After receiving the ACCA Manual J® calculations from our Home Energy Rating System (HERS) rater, VandeMusser Design, his combination of units took the home to above 30 SEER."

4 MSZ Wall-Mounted Indoor Units were specified, each connecting to a corresponding outdoor compressor: 2 upstairs and 2 downstairs. To bring in fresh outside air, Howard specified 1

> **"We really invested our money into this house: the walls, insulation, windows and HVAC system. At every point we could make a choice, we always went with the most energy-effcient option. That's why we chose Mitsubishi Electric."**
>
> **— Sally Schmeltzer, homeowner**

third-party energy recovery ventilator (ERV). Sure Foot installed a jumper-duct system, putting inline fans in the closets and bathrooms — ultimately balancing the home's indoor atmosphere.

"Traditionally, high-performance builders install continuously-running bath fans and utilize that suction to bring in unfiltered, fresh air,"

explained Thompson. "That creates negative pressurization on the home. We've always been against that policy as it can be harmful to the occupants or create issues such as mold. Even in our entry-level homes, we always install ERVs or Heat Recovery Ventilators (HRVs)."

To accommodate Weaverville's chilly winters, the units utilize Hyper-Heating INVERTER® (H2i®) technology. Even in temperatures as low as -13˚F H2i units deliver sufficient heat. Hot Start technology blows warm air instantly, providing the Schmeltzers comfort in all rooms of their house when the outside temperature drops.

FEEDING THE GRID

With efficient materials, mechanical systems and an air-tight thermal envelope, one extra step was needed to achieve net-zero: power generation. At the end of construction, the Schmeltzers added a photovoltaic system to their roof and connected to the electric grid.

"We officially moved into the house in October 2018 and started monitoring our energy usage and generation then," said Sally. "For the month of February 2019, we produced about 600 kWh of energy; for the month of April, we produced 940 kWh. When we received our March/April utility bill we nearly broke even — we paid $1.42 for two months of power. Come summer, we expect to overproduce and get a credit with the utility company."

THE BENEFITS OF HIGH-PERFORMANCE

As a board member of the Green Built Alliance, a North Carolina-based nonprofit dedicated to advancing sustainability in the built environment, Thompson submitted the home to the alliance's Green Built Homes program. This voluntary building certification recognizes projects and builders that actively pursue sustainability and green construction efforts. It was no surprise when the home received outstanding results, attaining ENERGY STAR certification, Green Built Homes certification at the platinum level and the lowest HERS score the Green Built Alliance has ever produced: -10. "We've been so pleased," said Sally. "The house is just built really well; the HVAC system is highly efficient, and we've had great solar production."

In making the jump to build a highly-efficient home, the Schmeltzers also reaped rebate benefits. Their utility company, Duke Energy® Progress, provided them with a $3,600 solar rebate, paying a percentage for every kWh generated. They also received a federal tax rebate for building a new construction home with a photovoltaic system.

Truly, the home is a testament to the positive effects of high-performance building but for the Schmeltzers, it's a symbol of their choice to do right for the environment. "Our choices matter and we finally felt like we had the opportunity to make this change," said Sally. "From every perspective, this home helped us simplify our lives, make a smallerimpact on the planet and make a wise financial decision."

EQUIPMENT

- (4) M-Series Hyper-Heating INVERTER® (H2i®) Outdoor Units
- (4) MSZ Wall-Mounted Indoor Units
- (2) Wireless MA Remote Controllers

PROJECT TEAM

Builder:
Sure Foot Builders, Asheville, North Carolina

HVAC Consultant:
Mitsubishi Electric Performance Construction Team

Energy Rater:
VandeMusser Design, PLLC, Asheville, North Carolina