

## | CASE STUDY |

# Green giant of a home goes all-out for geo

BY DAN VASTYAN

Virginia is for lovers, but it's also for people who like big, green houses. At least that's the impression Scott Broyles, president of Blazer Heating and Air, took away from a meeting with the GC of a 25,000 square-foot starter-castle near Richmond.

The owner's original home was leveled, based on the suggestion from world-famous interior designer, Bunny Williams. "The replacement home, of course, was residential, but the size and scope of it made it a lot more like a commercial project," Broyles said. "It's definitely the biggest house we've worked on."

The owners moved in while the home was still under construction in May 2011. Blazer Heating and Air was established in 2001. "At that time, we employed around 20 people," Broyles explained. "We grew to 50 or 60 employees by 2005, driven by new residential construction. In 2008, the economy took its toll, and at that point we decided to focus more on geothermal as our niche market. Over the past several years it's worked well for us."

"We were called for this job because we have a good relationship with Mako Builders, the GC," Broyles said. "Between the builder, the engineer, the loop contractor, and ourselves, we've been working together for nearly a



Jason Verlander, HVAC technician for Blazer Service, arrives at the 25,000 square-foot custom home jobsite where he's worked for the past several months installing geothermal equipment.

decade. There's no doubt that experience played a big role in making such a formidable project run smoothly."

### Shrinking a footprint

Although the magnificent 4-story house, which was featured in the January 2012 issue of *Architectural Digest*, covers a big slice of real-estate, shrinking the carbon footprint wasn't overlooked in the design process. To heat and cool the home, 38 tons of geothermal capacity was installed, five of which are dedicated to heating and cooling a large outdoor pool. The 22, 6-inch bore holes are connected to 14 ClimateMaster heat pumps, all on one huge supply loop.

"Each bore hole is 300 feet deep,"

said Cliff Bunn, president of Virginia Energy. "All of the boreholes are backfilled with bentonite grout for maximum conductivity."

The exchange field is located to the west of the home. The 25-person company serves Virginia and adjoining states, with loop projects from three tons to nearly 750. According to Bunn, the volume of geothermal capacity being installed has gone up. He attributes the increase to awareness of the technology and tax rebates.

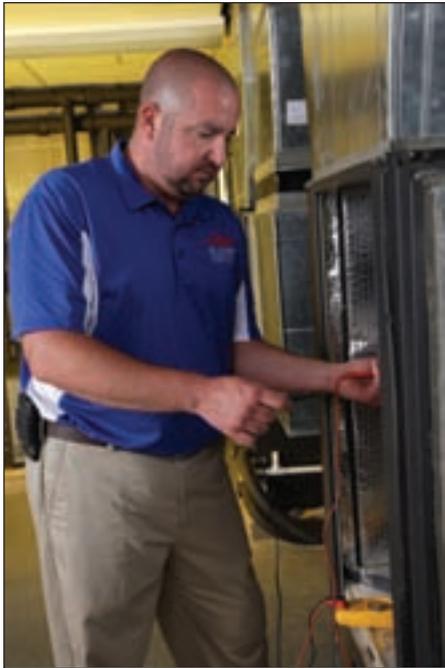
"We've worked with Blazer for about 10 years now and this project went smoothly, as most of them do," Bunn said. "The sheer size was the only challenge. It was more complex than some medium-sized commercial jobs we've done."

Adding to the home's green profile were two York energy recovery ventilators that reduce the energy needed to bring in fresh outside air. These ventilators provided a nice advantage for indoor air quality because one of the residents of the house is prone to allergies. In certain parts of the house, especially where large quantities of valuable hardwood were used, Honeywell steam humidifiers gently provide balanced moisture. Per the engineer's design, the humidifiers are attached to six of the home's geothermal packaged units. "The feature is almost entirely for winter use," Broyles noted.

There's plenty of glass in the home, with wide picture windows throughout. The two-by-six walls



HVAC technician Jason Verlander performs routine maintenance in the larger of the home's two mechanical rooms.



Service manager Matthew Loving checks current to a geothermal heat pump.

100kW photovoltaic array will populate a very steep, southern-facing hillside several hundred yards from the house. Because of the home's perch above a steep drop-off, the array will be invisible from the house, pool and deck areas.

**28 geo zones**

To keep the rooms as comfortable and inviting as they appear, Broyles teamed up with John Dunlap, P.E., to create a high-performance system. The geothermal heat pumps used to supply heating and cooling to 28 zones are a combination of water-to-air split and packaged systems, with an additional water-to-water unit for the swimming pool.

Fourteen geothermal heat pumps are located in two basement mechanical rooms. Nine ClimateMaster model Tranquility27 (TTV) series package systems condition the basement and first floor. Ranging from two-tons to five-tons, four of the packaged units occupy the main mechanical room.

Lined up across another wall of the main mechanical room, five Tranquility Indoor Split (TTZ) systems can also be found. With a smaller cabinet than the package units, these units supply conditioned fluid to air handlers throughout the second, third and fourth floors. A 1,500-square-foot guest suite within the home has its own 3-ton TTS packaged unit and single-well exchange field, separate from the main loop.

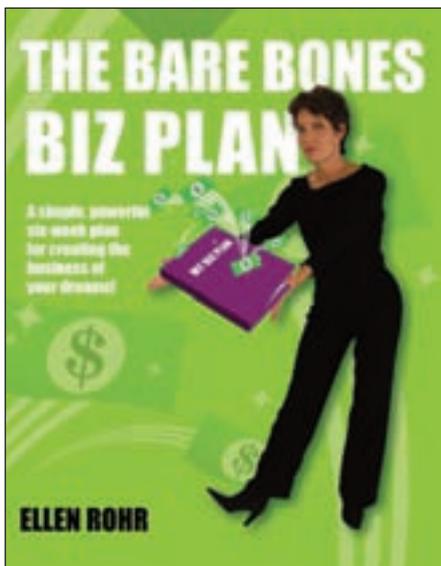
"ClimateMaster was a great fit for the job, due to the support from ClimateMaster and the local distributor," said Jason Verlander, HVAC technician for Blazer. "Chris Baker, president of Virginia Air, was there whenever we needed him."

**Above and beyond**

Two VFDs are used to power pumps for the large, 22-hole geoexchange field. The two, 5-horsepower pumps are redundant, and switch from stand-by and duty each week to increase lifespan and provide the safety of a backup.

are batt-insulated. The underside of the slate roof is all sprayed with closed-cell Icynene foam. This is a great way to top-off the tight building envelope. In 2013, a

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The pump that is on-duty serves as the only pump for the long, 1 ¼-inch diameter ground loop. Since all units rarely, if ever, call at once, they're treated a bit like a terminal unit on a hydronic loop. A Taco solenoid valve on each unit's supply line keeps water from flowing through the scroll compressors when not in use.

"Having two mechanical rooms in the basement level helped with coordination of the job," Broyles said. "But it was a double-edged sword, since installing the ductwork and geo piping with limited ceiling height wasn't much fun."

To keep pace with the high-tech heating and cooling systems, a building automation system was installed to monitor the performance of the home. Alerton BCM-WEB gives Blazer the ability to view real-time data from their office to make operational changes to the equipment. Along with surveillance camera equipment, home entertainment and telecommunication wires, the residence required an entire room to house all of the electrical systems. Across the hallway, the breaker room is larger than some bedrooms.

**Water to water... to water**

The home's rectangular vanishing-edge pool is heated and

cooled by a 5-ton water-to-water ClimateMaster unit, also called an infinity pool. Water flows over one edge of the pool, into an unseen basin several feet below where it's recirculated. The visual effect of the water merging with the horizon is magnified at the large home, since the backyard slopes off several hundred feet to a valley on the property.

The heat pump keeps the pool at 84°F, year-round. The pool has its own dedicated bore hole, identical to the other holes that make up the large exchange field.

**Successful by association**

Verlander, who acted as the foreman on the "big house" job, would attest to how important making and maintaining relationships in the industry can be. Over his seven years with Blazer, knowing how his associates operate has been a key to success. On this project, Matthew Loving often gave a hand when he wasn't occupied elsewhere. Loving has been with Blazer since 2003, and is now service manager.

This year is Virginia Air Distributors' 25th anniversary. During his time there, Baker has learned a thing or two about how important communication between manufacturer, distributor, dealer and homeowner really is, especially

with applications like this one. Broyles and Baker have worked side-by-side in Virginia for 13 years.

"We sell between 300 and 500 systems each year, and Blazer accounts for at least 10 percent of that," Baker said. "For both of us, I'd say that lately it's been half new construction, half retrofit, and mostly air-side."

Much like Broyles values the support he receives from Virginia Air, Baker appreciates the help from Mike Murphy, ClimateMaster Southeast district manager. Murphy covers the Florida Keys up through portions of Pennsylvania and Ohio, serving all 14 branches of Virginia Air Distributors.

The "big house" is the perfect example of how teamwork, good communication and willingness to put forth the extra effort result in an outstanding project. If homeowners would check with wholesalers, reps or district managers before hiring an installer, the world would be a better place. ●

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