Virginia Builder Reaps Success with Healthy Houses

by Cheryl J. Cease

In the early 1990s, Virginia builder Jay Epstein barely cracked double digits when it came to annual house sales. But in 1999 Epstein, the president of Newport News–based Gabriel Enterprises Incorporated, expects to build and sell well over 100 new homes.

The secret to his success? After a seven-year evolutionary process, Epstein has developed a failproof formula: He builds houses that are energy efficient, provide families with a healthy living environment, and—perhaps most surprising—meet the budget of the entry level home buyer.

Take the gray, two-story house in Gabriel Enterprises' Morgan's Trace development in Newport News, Virginia. On the outside it resembles any of its neighbors. But swing open its blue door, and you'll find features that make the 1,800 ft² house not only economical to heat and cool (400 kWh or $32 per month on average) but equally comfortable upstairs and down during either a summer heat wave or a winter chill.

As a bonus, allergy sufferers and asthmatics will discover that once inside, they breathe easier—off-gassing from carpeting, paints, stains, and adhesives has been virtually eliminated, and air quality is tightly controlled. And at $109,000, even the price is a breath of fresh air for first-time buyers who might otherwise have felt that high-quality, energy-efficient construction was out of their league. This house costs only $1,000 more than similar, standard homes in the same neighborhood, while an appraisal found it was worth $2,050 more than the asking price.

Built in 1998, the house was actually a collaboration among Gabriel Enterprises, the Virginia chapter of the American Lung Association (ALA), Virginia Power, and Doswell, Virginia-based energy conservation consultant Charles B. Bowles. Dubbed the Health-E Community Demonstration Home, the handsome gray house has served as the prototype for two Healthy and Energy Efficient (Health-E for short) communities that Gabriel is constructing in southeastern Virginia. Each of these current projects embraces a whole-house concept, notes Epstein, using a systems approach to improve health and safety, enhance comfort, and increase durability and affordability, while optimizing energy and resource use.

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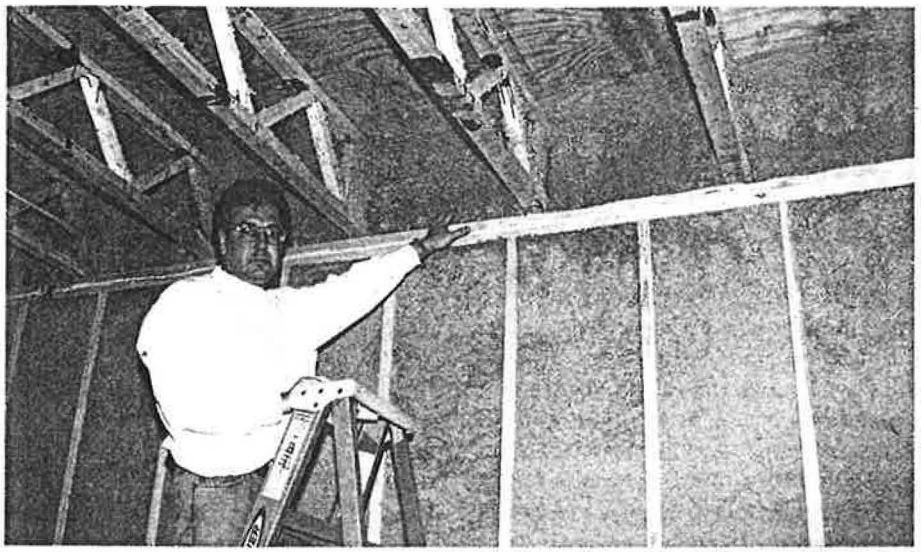
This comfortable, energy-efficient house sells for only $1,000 more than standard homes in the neighborhood. It costs just $32 per month to heat and cool, and features pristine indoor air.

Green Beginnings

Gabriel Enterprises' foray into green building began a little over seven years ago, when Epstein first partnered with Virginia Power to create affordable homes that cost less to heat and cool. Under its Energy Saver Home Plus program, the utility offered to provide the builder with advertising dollars if he, in return, would outfit his homes with new, energy-saving technologies—including 12-SEER heat pumps and a programmable thermostat; increased insulation levels; and a blanketed, high-efficiency water heater. Epstein agreed to retrofit two existing models with a high-efficiency, dual-fuel system—a heat pump with gas backup. The houses, which were priced between $70,000 and $90,000, sold out quickly, notes Epstein. They also earned community honors as "the first dual-fuel, affordable housing project in Virginia."

Liking the results, Epstein employed similar technology in Gabriel Enterprises' next development. He also began exploring new and better building techniques, tightening down his houses to rates of 0.3 ACH instead of the more typical 0.66 ACH. He was so successful that he was able to work out a partnership with Comfort Home of Lancaster, Pennsylvania, in which they guaranteed his homes to be 30% more efficient to heat and cool than a typical home built to the standards of the 1995 Model Energy Code (MEC). To get the guarantee, Gabriel sent Comfort Home his house's plans and specifications for approval. After the home was built, Comfort Home followed up with site inspections, doing a blower door test and a Duct Blaster test, and using infrared technology to check for heat



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Jay Epstein's company, Gabriel Enterprises, uses advanced air sealing and high-density cellulose insulation to minimize a house's indoor/outdoor air exchange. Tests have shown that cellulose insulation reduces air exchange by 38%.

loss. Guaranteed heating and cooling costs varied from home to home, but Comfort Home agreed to pay the difference if they came in above the guaranteed rate at any time over the next two years.

Not only did a prospective home buyer get guaranteed heating and cooling costs, but these homes were also certified by Virgina Power under their Energy Saver Home Plus program. Homes certified under the program received a $10 credit off their monthly electric bill for ten years. This certification was available only to homes that were built from 1995 through the end of 1997 as part of a three-year pilot program. During that time, Virginia Power ended up certifying 486 houses. "The reason Virginia Power piloted this program," says Terry Cole, senior energy consultant of the utility, based in Richmond, Virginia, "was to defray peak energy usages." The pilot program showed, however, that the additional $1,200 cost to construct these homes required a 17-year payback when actual energy savings were taken into account.

Focusing on Breathing

Epstein's success in energy conservation soon led to numerous speaking engagements throughout Virginia. It was during one of these talks, in September 1997, that he linked up with the ALA of Virginia and got involved in the Health-E Community program. The chance meeting couldn't have come at a better time. Epstein, now well versed in energy conservation, was ready to expand his company's boundaries. Energy efficiency and affordability were great, but as an asthmatic and the father of two asthmatic children, and keeping in mind the effects of tighter building on indoor air quality, the builder felt a need to focus on healthy breathing as well.

"After that meeting, we all started talking, and said, 'Wouldn't it be nice if we could build a home that was 50% more efficient than a MEC home, that was still affordable, and that met ALA standards?'" recalls Epstein. So that's what he set out to do.

Epstein took his plan back to veteran partner Virginia Power. The utility paid for Bowles, the energy conservation consultant, to conduct five days of staff and subcontractor trainings on the ins and outs of constructing a house that offers both improved indoor air quality and superior energy efficiency.

Throughout the building process, Epstein's healthy prototype was rigorously inspected by each of the partners to ensure that when the Health-E Community Demonstration Home was completed, Gabriel Enterprises had met the challenge. As a result of this attention to detail, the home earned a five-star energy rating from the National Home Energy & Resources Organization Incorporated (NHERO); was deemed an Energy Star Home by the U.S. Environmental Protection Agency; and met all of the ALA standards for healthy indoor living, meaning that the home qualified in the ALA's national Health House program, a program that works to promote good indoor air quality in new homes. The ALA gets a $100 residual for each Health-E house sold, while Gabriel Enterprises benefits from being listed on the ALA's Web site and getting ALA referrals. In January, the Newport News project also earned the builder an EnergyValue Housing Award from the National Association of Home Builders Research Center.

Key Features

Among the key features that make Gabriel Enterprises homes more healthy are:

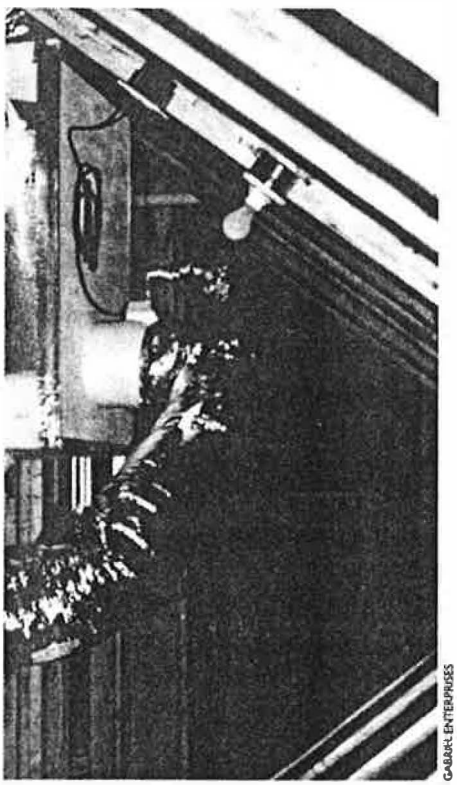
- Three and one-half inches of R-13 damp spray cellulose insulation in the wall cavity and 12 inches of R-38 dense pack cellulose in the ceiling. In a 1989 University of Colorado study, cellulose was shown to reduce air leakage by 38% compared to standard batt insulation. In addition, cellulose muffles sound and, because it is treated with boric acid, acts as both a fire retardant and an insecticide. By deterring roach infestations, the cellulose eliminates the buildup of roach feces, a known asthma trigger.
- A special framing technique, dubbed the California corner or two-stud corner, to ensure that all exterior walls are insulated.
- An HVAC system that forces conditioned air into the sealed, insulated, unvented crawlspace (and incorporates adequate makeup air as well). This pressurization of the crawlspace not only limits moisture infiltration, but essentially converts the crawlspace into a conditioned shallow basement.
- Radon control through use of a passive subslab mitigation system (where slab-on-grade foundations exist) and through the use of sealed, unvented, pressurized crawlspaces (where crawlspaces exist).
- Special paint finishes with little odor and low concentrations of volatile organic compounds (VOCs).
- A mechanical ventilation system that operates continuously as long as the house is occupied to bring fresh air

into the house and mix it with recirculating interior air in a controlled manner. The system can be turned off whenever the house is unoccupied.

"We build a house supertight so it doesn't leak; then we control the ventilation," explains Bowles. Indeed, the bedrooms that do not have return ducts are outfitted with transfer grilles, which are designed to maintain a balanced pressure in the room even when the door is closed. By properly pressurizing the house in this way, Gabriel Enterprises can also impede the spread of pollutants and contaminants throughout the living area.

Numerous other features enhance both energy efficiency and the overall "healthy" factor, from placing the clothes dryer in the garage, where the exhaust pipe doesn't interfere with the home's conditioned air, to sealing ducts with mastic. The ducts are performance-tested so that the leakage is no greater than the 3% system design air flow.

To keep his houses affordable, Epstein looked for trade-offs to cut his labor costs. He did this by installing 2 x 4 studs 24 inches on center instead of 16 inches, using an open-web floor truss, and reducing the number of headers. Epstein also re-engineered the HVAC system, moving the air handler from the attic into a conditioned part of the house, reducing the length of the duct runs, installing a circular instead of a rectangular main duct, and dropping the size of the air-conditioning unit by ½ ton. By dropping down from a 12-SEER heat pump to a 10-SEER, he saves $220, which he applies to the cost of the mechanical system. Because the house is built so tightly, Epstein feels that the loss of energy efficiency from this trade-off is negligible.



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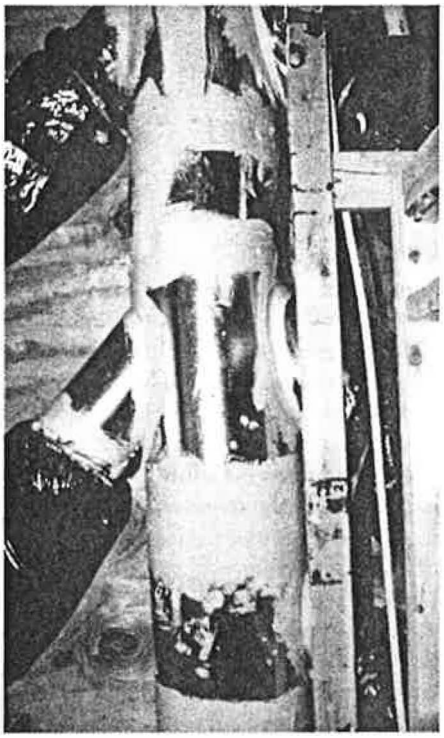
A mechanical ventilation system continuously brings fresh air into the house and mixes it with recirculating interior air in a controlled manner.

Education on All Sides

Over the last year or so, Epstein has perfected his building techniques with a great deal of input from outside experts. That doesn't mean there haven't been a few missteps. "The problems that you run into are in some of the construction techniques," he notes. To mitigate such problems, he advocates Duct Blaster tests before the Sheetrock goes up. He also advises builders to stick with brand names, to select high-quality doors and insist on manufacturer or distributor installation for proper fit, and to make sure customer service representatives are well versed in all phases of the construction process.

Employee education is particularly important in dealing with a first-time homeowner, who is usually unfamiliar with energy-saving and health-and-comfort technologies. Using two walk-throughs and detailed literature, Gabriel Enterprises buyers are educated about the unusual features of their new homes and are alerted as to what they can expect. "They're going to notice that their house doesn't smell like a new car," says Epstein, and that the air temperature in a closed-up bedroom is no different from the air temperature in the rest of the house.

They're also going to notice that when it comes to conserving energy, their house functions as promised. "Out of the 58 homes we have built in Morgan's Trace, we only had one go over energy use expectations," says Epstein. "And the residents of that house never turned the air conditioning off."



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By installing a round main duct and angling peripheral ducts at 45°, Gabriel Enterprises improves the efficiency of its air handler.

Sales at Full Speed

Because its product is unique, Gabriel Enterprises markets heavily. Site signs point out guaranteed heating and cooling costs, sales materials use graphics to walk would-be buyers through the construction process, and company staff stress indoor air quality issues over and over again.

The public has responded enthusiastically. Back in the early '90s, Gabriel Enterprises—with a staff of three—was putting about 16 houses on the market each year. In 1999, the company expects to build 120 houses, all 50% more energy-efficient than MEC standards and all priced in the $120,000s or below. The company staff has also grown; it now totals 14 employees.

"We have a train going down the tracks. The locomotive is in full speed, sales are doing quite well, and cities are embracing us," says Epstein. "What we find is that the caboose has the most power and is actually pushing the train. It's the Health-E Community concept that is opening doors for us."

Cheryl J. Cease is a freelance writer based in Hampton, Virginia. She frequently writes about residential building and remodeling.