

Used to building big houses with big budgets, the Picton brothers earned a platinum rating with their first modest green home—but mastering the learning curve wasn't always a smooth ride

From Luxury to LEED

BY JIM AND MARK PICTON

Like other building contractors, we have enjoyed the challenge of building big, fancy houses, and we are honored by the confidence and trust their owners have placed in us. In the best of those projects, the details were exquisite and demanding. Besides providing a good living, however, the single-minded, spare-no-effort pursuit of quality in big projects should leave us spiritually nourished and enriched.

In recent years, though, we began to feel a numbness as over and over, we saw materials thrown in Dumpsters because of design changes and skilled workers lose their edge as they tore out their own good work to accommodate the whims of busy globe-trotting clients. There also was something troubling when International Energy Conservation Code (IECC) minimum standards were dealt with as stumbling blocks to get around or over rather than as a starting point to improve

A LEED platinum home by the numbers

Lot size: **13 acres**
Footprint: **896 sq. ft.**
Living space: **1732 sq. ft.**

Bedrooms: **2**
Baths: **2**
LEED-H score: **89.5**

HERS rating: **30**
Energy Star rating: **5+ stars**
Construction cost: **\$266/sq. ft.**

energy efficiency. There's something unwholesome, too, about building heating and cooling systems sized to meet the demands of an inefficient envelope, then seeing a fuel truck routinely replenish a 1000-gal. tank and being assured that for this client, fuel costs are "not an issue." Were all costs being considered? And to whom, besides the clients, might those costs matter? Might they include us? Might they include you?

A new project, a new way

In response to these questions, we set out to build a house that made sense in terms of both the natural and built environment.

Fortunately, the U.S. Green Building Council (USGBC) was then field-testing its LEED for Homes program, which defines sensible building. We chose to enroll in the LEED program because it not only codifies, informs, and guides the green-building process, but it also provides tangible recognition for achievements in sustainable building. We thought that by becoming LEED-certified, the home would help to distinguish our achievements from those of builders who do not participate in such rigorous third-party vetting.

Plan early, and focus on efficiency

We would have liked to build a one-room bungalow with a ladder to a loft, but the smallest ground-floor footprint allowed under our town's zoning regulations is 900 sq. ft., or an 840-sq.-ft. main-floor living space. So we chose to build a simple Cape on a 28-ft. by 32-ft. footprint. The opportunity to place the highest values on simplicity, compactness, and practicality over all else was restorative. But the process of building this house didn't always offer such clarity.

We attempted to rely mostly on our own extensive knowledge as builders and realized quickly that going it alone wasn't the wisest decision. Visualizing the finished home, then working back from that vision through all the elaborate assembly details was difficult. We had to think through the details of the construction daily and make critical deci-

sions hours or sometimes minutes before the crew needed direction, and that cost us time and efficiency.

What we should have done (and what we will do next time) was to assemble a team of designers, consultants, managers, employees, suppliers, and subcontractors well before the start of the project to solidify the plan, to refine the integration of technology, and to smooth the construction phase.

For example, we designed and ordered our high-velocity forced-air HVAC system prior to fully comprehending the thermal performance of the superinsulated shell. We were committed to the only local contractor we thought could install such a system and ended up with the smallest conventional high-efficiency modulating boiler available, which still had twice the heating capacity our small house needs. It's not a disaster because a modulating boiler fires at different levels according to demand, and there is excess capacity for a future addition.

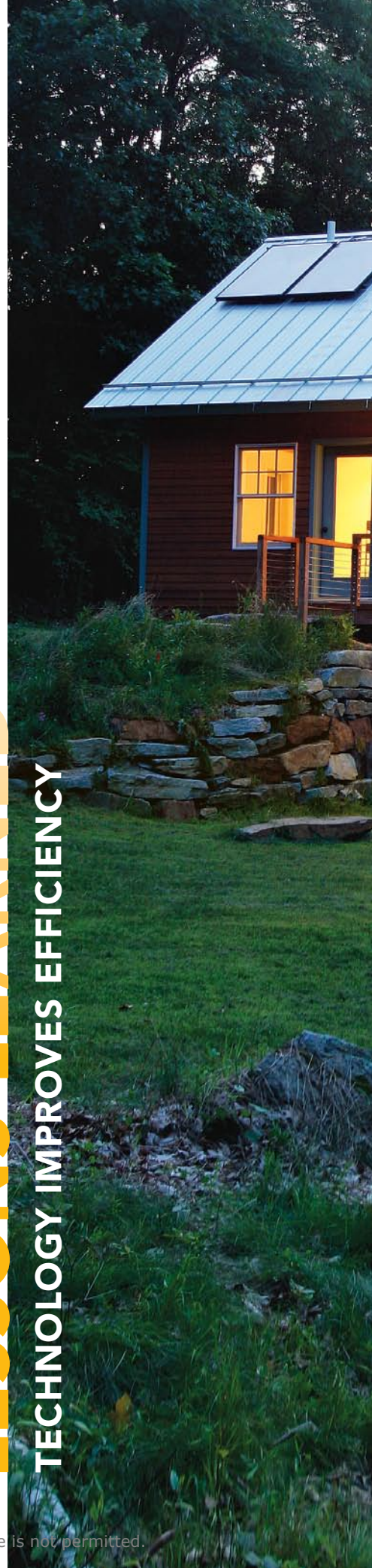
Keep your standards high


We weren't sure if we could count on using our usual subcontractors and suppliers to carry out the construction. However, we brought them into the green-building process wherever we could, and most responded with proficiency and enthusiasm.

It was still a job site, though, and things didn't always work out as we hoped. We had a couple of subs who did it their way regardless of specific instructions to do it differently, or even to do it the way the manufacturer specified. Where it mattered, they had to do it over. Where it didn't matter as much, we corrected it ourselves and moved them down the list of preferred subs to work with in the future.

Hesitation or reluctance to embrace this new way of building isn't always a conscious decision. It was remarkable to see the effect routine and habit have on the construction process. Perhaps nowhere was this more obvious than when it came to our waste trail. We limited our entire waste volume to one 15-yard container, which you can really do

LESSONS LEARNED
TECHNOLOGY IMPROVES EFFICIENCY





Although we created an airtight, superinsulated home that has an R-23 basement, R-40 walls, and an R-60 roof, this is by no means a passive house.

We implemented technology to increase the home's comfort and energy efficiency while still taking advantage of as many of the site's natural offerings as we could. The house was sited and designed with regard to the lot's southern exposure. The home uses low-e, argon-filled windows (SHGC: 0.31; U-factor: 0.33) for energy efficiency. There is more window area on the south wall for solar tempering. In the lowest level of the south facade, the low-e coating was eliminated to increase heat gain in the insulated concrete slab. The entire home is insulated with 4 in. of rigid foil-faced foam board outside the frame, and with cellulose blown in between the studs and the rafters.

- The 2kw, 10-panel Sanyo (www.sanyo.com) **photovoltaic system** on the roof generates net metered electricity and is expandable to 3kw. The panels are mounted to the standing seams of the metal roof. They look good, but next time, we'll consider collectors designed for new-building integration for a more architectural look.

- A balanced whole-house ventilation system uses a **heat-recovery ventilator** to provide fresh air. This system should solve the indoor-moisture problem during the heating season in a superinsulated house and help to conserve energy.

- The **solar hot-water system** is composed of two Schüco (www.schueco.com) flat-panel collectors that measure roughly 4 ft. by 8 ft. There is also an 80-gal. solar storage tank in the basement that feeds into the indirect-fired water heater supplied by the propane boiler. We have high hopes of using mostly solar-heated water in three seasons. In the future, we'll investigate the use of evacuated-tube collectors mounted on a wall for easier installation and maintenance.

- The 80,000-Btu gas-fired boiler heats the air in a **high-velocity forced-air heating system**. Next time, we'll downsize the equipment for the minimal heating demands of the home.

- An **efficient wood-burning stove** by Vermont Castings (www.vermontcastings.com) with a low emissions rating makes use of the site's abundant trees, a renewable fuel supply.

LESSONS LEARNED

USE LOCAL MATERIALS

Even more important than limiting what left the job site was limiting what we introduced to it. As consumers—which builders are to the highest degree—we could see green building as just a new market that satisfies a new purchasing ideology without getting truly positive results. The conscious builder—and the one whose homes will have the least impact on the land and the biggest impact on society—is the one who invests in the most environmentally responsible materials that are produced locally.



- Very **low-flow faucets** and showerheads throughout the house reduce water consumption.

- The 1x8 **white-pine boards** used as wall paneling add a farmhouse feel to the home. These boards, like all the wood in the house, have been finished with products that are GreenSeal certified (www.greenseal.org).

- The **ceilings** are covered with **drywall** that has recycled paper and gypsum. It was difficult to find such a supply within 500 miles. The drywall had to come from one particular U.S. Gypsum plant, and getting the company to guarantee that its product met our standards was tough. It took roughly 40 hours of research to source the drywall.



- The exposed second-floor framing is made from **locally sawn pine** and was milled by Cole Brothers (www.colebroslumber.com).

- The house is outfitted with **energy-efficient appliances** at close to the highest levels available. **Fluorescent lighting** is used throughout.

- Citilog (www.citilogs.com) sources much of its wood from reclaimed city and campus trees. Citilog **cabinets**, which we have in our kitchen and bathroom, are made by Pennsylvania Shaker woodworkers.

- **Fireslate countertops** were reclaimed from a previous remodel. They serve as worksurfaces in the kitchen and bathrooms.

only if you have a fully committed crew. We did, and in fact, our crew acted as monitors to keep most of the subs from tossing all manner of recyclable waste into the container. We also spent a few sessions in the container ourselves sorting out items that didn't belong there. It's amazing how much of a difference in volume this kind of diligence can make.

Buy local; build more than a house

We believe that using local materials is one of the most important green principles, and we found it to be more enjoyable, more economical, and more accessible than we thought it would be. By keeping our money within the local community, we're contributing to our own economic environment, and it gives us a special reason to appreciate the materials that grow or are produced where we live.

The ash heartwood floor in this house, for example, came from trees in Vermont and was milled by Cole Brothers in nearby Woodbury, Conn. We have sold timber to Cole Brothers in the past, and buying their lumber seems like completing the circle.

Over the years, we have found that a lot of people aren't always aware of the social and environmental effects of materials sourced from around the world, and we were careful not to fall into the trap of green consumerism. For example, we should ask what cork, bamboo, or other exotic flooring has to do with environmental and economic sustainability in this country. How do we know that the American demand for a sustainably harvested rain-forest product does not ultimately increase the demand for illegally harvested rain-forest products? What about the energy used to transport those goods?

We think it is well to stop—after a search for locally produced 100% recycled-glass tiles has led to a village in Italy—and ask whether beach stones gathered by a grandchild and placed creatively on a bathroom surface might provide the same level of aesthetic joy while using far less jet-A fuel and diesel.

Sourcing materials with such awareness also made us take a closer look at the materials we had at our disposal. For example, we milled cedar decking from 1½-in.-thick siding salvaged from a house we renovated a couple of years ago. The floor tiles for the entry, hearth, and bathrooms came from another renovation, along with the Fireslate counters for the kitchen and the bathrooms. Preparing these materials took time and

money, but if life-cycle costs are considered, the effort seems well worthwhile.

Change your perspective

Green building should be thought of as only part of an evolving ethic, not just as a specialty trade. Otherwise, as a trade or a simple building method, it might be implemented only during working hours and left on the job site, and that's not enough.

While green building has been criticized for its expense, we came to an important realization. We know the budget went up because of our program, but probably less of the increase was attributable to "green" issues than to the more-or-less expected cost of high-end custom building. If a house is designed properly,



following LEED guidelines should not affect construction costs much.

While our praise for LEED runs deep, it does not come without some criticism. LEED has been faulted for not making energy efficiency more of a priority, and this flaw needs to be corrected. It's also worthwhile to reduce the prevalent interest in exotic methods and materials to achieve a LEED rating, and increase the focus on what helps to make a local community sustainable. We have most of the resources to build better homes right where we live. Maybe, in some way, our small home represents that idea. □

Jim and Mark Picton are principals of Picton Brothers, LLC, in Washington Depot, Conn. Photos by Rob Yagid.