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Contractor builds zero-energy house

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Image courtesy of J. Craig Thorpe [\[enlarge\]](#)

The Zero Energy Idea House will include solar panels and a green roof.

SHIREY CONTRACTING has used energy-efficient systems for 20 years. So when it came time for the company's owners, Donna and Riley Shirey, to build their own house, they decided to make it a paradigm of energy efficiency.

The 1,700-square-foot Zero Energy Idea House aims to be an example of best building practices while teaching clients and members of the construction industry what works and what doesn't. It will concentrate on energy conservation through creation of a tight envelope, but will also produce some of its own energy. The idea behind zero energy is that a house can produce as much as it uses.

Education tool

Donna Shirey, president and CEO of Shirey Contracting, said the project will be "a little laboratory." Shirey is a past president of the

Master Builders Association of King and Snohomish Counties, and a founding member of its Built Green program. She will also chair the National Association of Home Builders Remodelers in 2010.

“The goal is to be an education piece so we can teach and show people what we've been doing for the last 20 years in energy efficiency,” she said. “Buildings can be a win-win for the client and contractor.”

The project is in a high-traffic location at Bass Cove on Lake Sammamish in Bellevue, just off of West Lake Sammamish Boulevard. Pam Worner, top dog at green building consultant Green Dog Enterprises, said the project will use “sexy” and innovative systems that will draw people into the building where they will also see “the meat and potatoes” of energy efficiency like good insulation, windows and efficient lighting.

“The whole goal is to show people that green building doesn't have to be in any way dowdy,” Worner said. “A lot of that is to lure people in and help them understand the basics of energy efficiency, which everybody can do.”

Some of the “sexy” features include two green roofs, a 3-kilowatt photovoltaic solar panel system, and solar hot water. A “living wall,” or vertical retaining wall made of engineered compost, will be used. The team is considering some form of wind energy generation. The building will also use one of the Shirey's signature tools, structural insulated panels or SIPs.

SIPs are polystyrene panels that combine framing, insulation and exterior sheathing in one system. They can be used for roofing, walls or floors over crawl spaces.

To create SIPs, project drawings are sent to a SIP manufacturer, which produces the panels and sends them to the project team.

Shirey said SIPs are a little more expensive than typical framing materials, but they go up in a third of the time and provide an energy

The project team

Builder, owner: Shirey Contracting

Architect: Clinkston Brunner Architects

Structural engineer: Swenson Say Faget

Civil engineer, planner: J3ME

Landscape design: Windrose Landscape Architecture

Green roof design: Triad Associates

Interior design: Autumn Donovan Design

Energy consultant: WSU Extension Energy

Green building consultant, verifier, marketing manager: Green Dog Enterprises

savings of about 60 percent.

Worner said SIPs reduce waste and fit together so closely they increase the tightness of the building envelope.

Getting efficient

Good insulation is the crux of energy-efficient buildings. To maximize that part of the project, the team enlisted the help of Washington State University's Extension Office. The office manages the Northwest Energy Star Program and the U.S. Department of Energy's Building America Program. The project has since been accepted as a Building America Program case study, and receives free matching assistance from the program.

Mike Lubliner, senior building science specialist with the program, said the goal of Building America projects is to create efficient and durable buildings using integrated building systems. To do that, Lubliner's team looks at a project from design to post-occupancy. The whole idea of systems engineering, Lubliner said, is to start with the lowest hanging fruit and work your way up to expensive renewable systems.

Lubliner's team begins by doing energy modeling for the project. Based on those models, the Shirey project should use about \$500 a year in electrical costs. It also examines the architect's design for efficiency. For example, it is examining every window in the Shirey design to make sure it has a purpose. If windows can be reduced, Lubliner said it frees up money to spend on other energy-efficiency improvements.

"I'm kind of the bane of the architect," he said. "The devil's in the details. If you really want to get the homes tighter in a more efficient way, then you need to look at those details."

During construction, the team makes sure the details from the design phase are being followed. It uses building science tools to see how tight the building is, and to identify air leaks. For example, the team uses a large fan, called a blower door, to pull air out of the house and depressurize it. Then the team goes around the project with smoke sticks to identify building leaks.

When the home is done, Lubliner's team does a final commissioning test to see how well the project met its target. In some cases the team installs a monitoring system to track energy use in future years. The Shirey project will receive a monitoring system.

Though the Building America Program focuses on houses, Lubliner said many of the program's processes and tools could be used in commercial and multifamily buildings. Blower doors are already

used in multifamily space and Germany uses large versions of them for commercial projects.

But Lubliner said the most important energy-efficiency measure for a commercial building is to get commissioned after completion, to make sure systems are performing the way they were designed to. This is happening more as LEED and energy-efficiency issues rises.

“The whole process and the integration of systems and quality assurance and looking at building interaction is something you can apply to any type of building,” he said.

New city dwellers

Shirey said she and her husband, who are 60 and 57, are an example of a new niche market of older city-dwellers who want to live in an urban environment but don't want a large house. The Shireys had lived in a large house by Lake Sammamish but decided to downsize to an apartment in downtown Bellevue. They like it, she said, but are ready to have their own house again. As Bellevue sees another 40,000 downtown residents, she said there will be more people who feel like her.

“I think the market is starving for a house like this,” she said. “A smaller, well-designed house that can virtually take care of itself.”

The two-story house will have two bedrooms, two bathrooms and a loft. The project is in design and should be complete by October. Periodic tours will be held during construction, and public and industry tours will be begin in January 2009.

Shirey said the cost estimate is currently at \$500,000.

To learn more about the project, visit www.zeroenergyideahouse.com.

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