

Owners hope home's energy efficiency adds up to net zero

By Rachael Rees / *The Bulletin*

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Editor's note: Tom Elliott and Barbara Scott invited The Bulletin to follow their efforts to build the ultimate green home in Bend, to document the project from start to finish. The shell of the home has been built and windows and roofs installed. This installment focuses on the renewable energy requirement outlined in the Living Building Challenge, the standards being followed by Elliott, Scott and the builders.

Many houses are equipped with energy-efficient appliances and in-floor heating, and some have solar panels to generate electricity.

But Desert Rain will have them all, taking energy savings to another level.

From a cutting-edge lighting system and nearly double the insulation found in a standard home to solar electric and solar-thermal heating systems, the Northwest Shasta Place property is designed to produce all the energy it uses in a year — a standard known as net zero — from on-site renewable sources.



Photos by Dean Guernsey / The Bulletin

At Desert Rain, Barbara Scott and Tom Elliott's Bend home, the glass doors and windows and the roof overhang are part of a passive solar system that helps heat the home in the winter and keep it cool in the summer.

“The goal is net zero,” said Al Tozer, of Tozer Design. “It’s the single driving focus from an energy standpoint.”

To help achieve net zero status for Desert Rain, designers and builders used an energy model, a computer software program that estimates annual energy use and costs, said Matt Douglas, a green building consultant at Earth Advantage.

“You can put different features of the home into the energy model to show the estimated energy use of those features,” he said, and compare which will be the most energy efficient.

Tom Elliott and Barbara Scott's home will use electricity from the power grid during the winter and when there's not enough solar energy generated, Tozer said.

In the summer, Desert Rain's solar-electric system is expected to generate more electricity than needed, with the surplus being sent back to the grid. The orientation of the home on the property, along with design features — nearly floor-to-ceiling glass doors and windows in the south side of the home, no glass on the north side, roof overhangs and other elements — are part of the passive solar design. It will help capture sunlight and heat the home in the winter and keep it cooler in the summer by shading it from the sun, Tozer said.

James Fagen, co-owner of Timberline Construction and project manager of Desert Rain, said builders are making Desert Rain as airtight as possible to conserve energy.



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Solar collectors on the roof of Desert Rain, on Northwest

“The airtightness aspect has required us to change our thought process and corresponding installation techniques for all of our wall, floor and roof assemblies,” he said.

Instead of fiberglass, Fagen said Desert Rain will be insulated with spray foam in the walls, ceilings and floors. The R-value, a measurement of insulating effectiveness, of the foam is two to three times what the building code requires, he said. The windows and sliding doors are also triple-pane glazed glass, he said, to insulate the home better than standard windows.

To heat the house and water, a solar thermal system with a supplemental heat pump will be used.

“In-floor heating systems are a common form of heating a home or business today,” said Bob Claridge, president of Bend-based contractor Bobcat & Sun Inc. “Unique to Desert Rain is the source of heat for the water-filled tubing installed throughout the home.”

Seven solar collectors on the roof will use energy from the sun to heat the fluid that runs through the tubes, ultimately heating the floors and domestic water in Desert Rain.

Because of the efforts to make Desert Rain airtight, Claridge said heating the home in the spring and fall won't be as difficult.

On a daily basis, he said, the solar-thermalsystem will be able to outperform the heating and hot water load requirements for the project. When the solar hot-water tank fills, the system will

Shasta Place in Bend, will capture the energy to heat the home and the water it uses.



Scott Lesmeister left and Pat Kemmerer with Bobcat & Sun Inc. of Bend install flexible tubing for radiant floor heating in Barbara Scott and Tom Elliott's Bend home called Desert Rain.

The Living Building Challenge

Like the Leadership in Energy and Environmental Design standards, the Living Building Challenge provides guidelines and requirements for constructing an environmentally friendly building.

The challenge, created by the International Living Future Institute, “defines the most advanced measure of sustainability in the built environment possible today,” according to the institute's website. It rests on seven areas, or petals: site, water, energy, health, materials, equity and beauty.

For more information, visit <https://ilbi.org/>.

shut down and the liquid in the solar panels will drain back into the solar storage tank.

In addition to the solar thermal collectors, a 14.79-kilowatt solar-electric system will generate electricity for the home's appliances and lighting — and power the couple's two electric vehicles.

Instead of incandescent or fluorescent lighting, Desert Rain will use a light-emitting-diode, or LED, system, which will use about half as much energy as a standard system, said Zach Suchara, director of design for Portland-based Luma Lighting Design.

“It's not incredibly common yet,” he said. “Within the last year, we've seen a lot more residential construction using LED lights. Before then, the quality (of LEDs) wasn't equivalent to incandescent lights.”

While every effort has been made to make Desert Rain net zero, Fagen said no one will know if it achieves the standard until the couple has successfully occupied the home for a year, a requirement of the Living Building Challenge.

“Now we must be super diligent in the execution of the plan so we can demonstrate in real life that it will work,” he said.

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