

Green + Solar

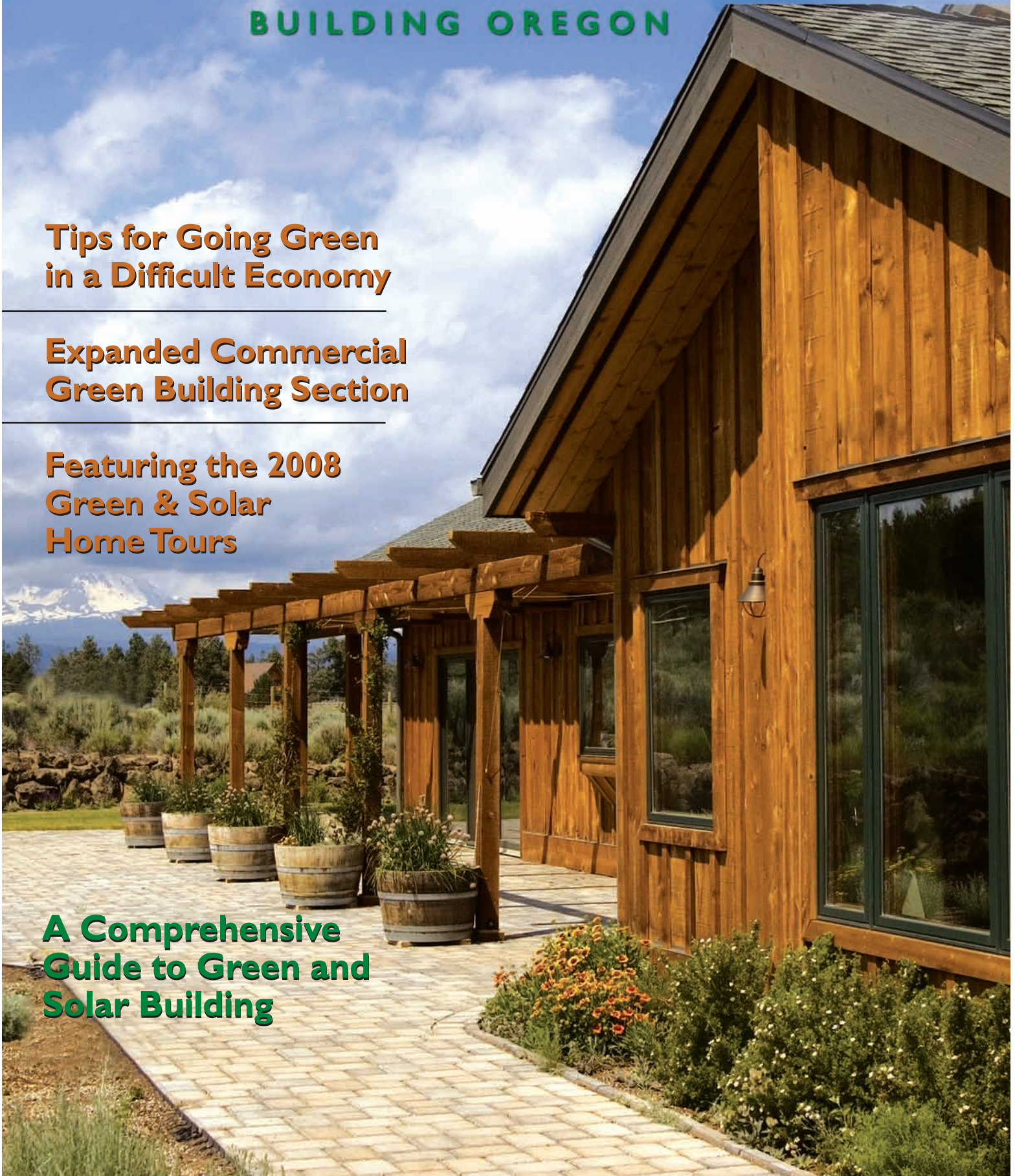
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KERR-LARCH HOME

Tight, Green, Comfortable and Economical

By Karen Chase, *Oregon Department of Energy*

“This is the tightest house I have evaluated,” said Fred Gant, Southern Oregon Earth Advantage Field Representative. Gant was referring to the newly constructed Kerr-Larch home located a few miles outside of Ashland.

In selecting a building site, Andy Kerr was extremely thoughtful about what he and his wife wanted to achieve. They wanted to produce as much energy as they consumed – a net-zero energy building. Finding environmentally prudent building products that are healthful for occupants, minimizing energy losses and use and generating power, was doubly important to Kerr because the building also houses his business, the Larch Company, which is a for-profit conservation organization where all profits are dedicated to conservation.

They chose a site that allowed them to orient the home’s longer axis east-west for solar gain. They bought their solar house plans from Sunplans.com online, and hired Peter L. Cipes Building Design to work with them on incorporation of local codes and additional green building concepts. John Fields of Golden-Fields Construction built the home.

Kerr expects his home and home-office to qualify for state and federal tax credits for its solar energy system, solar hot water system, passive solar design, energy efficient appliances and energy-recovery ventilator. It also qualified for Energy Trust of Oregon funding. And, with the probable continuing rise in retail electricity rates, making his own power is an increasingly logical economic decision.

“You’ve got to be willing to put more money down up-front” for later savings, Kerr said. He expects to have virtually no energy bills. “This house is economically rational,” he added.

“Using Forest Stewardship Council (FSC) wood throughout the house probably added just 1 to 2 percent to the total cost,” Kerr said. The only wood in the house that is not FSC-certified are the interior doors, which contain just 15 percent wood. They are mostly comprised of wheat straw. Even the kitchen countertop is an FSC-certified 100 percent post-consumer waste paper product with a cashew nut hull oil binder.

“Price is mainly a matter of design,” Kerr said. “We spent a lot on the windows and doors and insulating the envelope.”

They spent nothing for air conditioning or central heating. The ceiling, floors and walls are super-insulated. The 2 x 6 stud walls have insulating solid foam between the studs, sprayed-in foam insulation and cement and wood-fiber siding to interrupt heat loss. The triple-pane argon-filled windows and exterior doors all close tightly, with multiple latch points.

Indeed it is “tight.” Air does not readily leak into or out of the building envelope. “Tightness” is measured using a blower door test in which air is pulled out of a closed-up house with a powerful fan secured in an exterior doorway. Fred Gant, who conducted the blower door test, found leakage at a rate less than half of that necessary to meet the Earth Advantage certification. An energy recovery ventilator ensures healthful indoor air,



Southside provides passive solar access. PV and solar hot water on rooftops. No southside roof penetrations to interfere with solar devices. Credit: Karen Chase, Oregon Dept. of Energy



Andy Kerr looking over the house plans at the table; Indirect summer south light bathes the room. Solar thermal mass in floor and in wall to the rear of the eating area. Credit: Karen Chase

introducing adequate amounts of fresh air, while efficiently tempering incoming air with heat recovered from the outgoing air.

Unlike most new homes in the Rogue Valley, the Kerr-Larch home has no air conditioning system. Yet, it stays cool and comfortable on typical summer days that hit 95°F. This is accomplished by having few east or west-facing windows. The west side of the main floor is an enclosed porch, which further insulates the house from the hot west sun. South-facing windows, shaded from the high summer sun by roof overhangs, bathe the interior space in natural, indirect light. Thermal mass in the floor, consisting of six inches of concrete topped with a pleasing neutral tile, also helps to maintain the cool temperature. Warm air, rising through the house, is released through four ventilation windows located near the top of the house. Finally, window casings are fit with insulated window shades.

The house has no central heating source either. In the winter, when the sun is lower in the sky, warmth is delivered through passive solar heating. High solar gain thermal windows on the south side permit sunlight to strike and heat the air and thermal mass inside. Thermal mass is found in the floor as well in a concrete block wall, a normal-

looking wall that provides the backdrop for the dining area. These structural features soak in the sun's warmth during the day and slowly release it during the night. For a just-in-case backup, a handful of small convection electric wall heaters are scattered throughout the house to distribute supplemental heat when needed. On the coldest days of the year, these will use the equivalent energy of running three toasters, according to Kerr's calculations.

The 42-panel, 7.2 kilowatt solar electric system is as big as would fit on the south side of the roof. Bob-O Schultz of Electron Connection installed the system. It is grid-tied through one Fronius and two Outback inverters. Twelve of the panels are wired through Outback inverters and deep-cycle batteries, as a backup system in the event of loss of grid power. Tim Dawson of Solar Collection, Inc. installed the solar hot water system located on the adjoining garage roof.

The Kerr-Larch house was designed to be tight, inexpensive to operate, aggressive in taking advantage of sunlight, progressively green, and aesthetically pleasing. It excels at each of these objectives. While the owners do not yet know if it will be a truly net-zero energy home, it will definitely come very close. ■

FEATURES

- Triple-pane argon filled Thermo-Tech windows, with multiple latch points
- Super insulated ceiling, floors, and walls
- Insulated exterior doors with multiple latch points
- Very low air leakage (via blower door test)
- Insulated window shades
- Energy recovery ventilator
- Whole house fan
- High-place ventilating windows for stack effect
- Premium efficient tax credit-qualified appliances (better than Energy Star)
- CFLs or T-5 lights throughout
- "Variable Frequency" high-efficiency well pump
- Passive solar design
- High-solar gain windows on south side.
- Solar mass in floor and dining room wall
- Rheem solar water tank - 120 gallons
- 7.2 kw PV Grid-tied System:
 - 42 Mitsubishi 161.5 watt panels
 - Fronius and Outback inverters
 - 12-battery backup system
- 50-year recyclable metal roof
- Paperstone FSC-certified paper countertops
- Interior doors consist of 85% wheat straw and 15% exterior wood veneer
- Low and no-toxicity/VOC coatings and finishes
- HardiePlank™ cement and wood-fiber siding

TEAM

Builder

Golden-Fields Construction

Designer

Peter J. Cipes Building Design

"Producer"

Andy Kerr, owner