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NEW CONSTRUCTION

Killian/Lee Residence

Los Altos Hills



A SOLAR STRAW BALE HOUSE

In Los Altos, a new home features strategies that reduce the household's reliance on fossil fuel-based energy

On their three-acre property in Los Altos, Earl Killian and Waidy Lee have the best of both worlds: they are immersed in nature yet close enough to zip into town in their electric cars. When they decided to replace the house they'd lived in since 1994, they endeavored to showcase eco-friendly technologies and construction methods, with a particular emphasis on strategies that reduce direct fossil fuel use.

Their new four-bedroom house features passive solar design and straw bale construction to minimize the need for supplemental heating and cooling. In the winter, the primary heat source is solar gain through the south-facing windows. In the summer, the building's high thermal mass helps keep the home comfortable. Two-foot-thick straw bale walls, with plaster finishes inside and out, provide excellent insulation as well as some thermal mass to supplement the mass of the concrete and limestone floors.

The 14-kW photovoltaic system was sized to meet the household's entire electricity needs and charge their two electric cars while still being a net supplier of power to the utility grid. On the roof of the house, the PV system consists of a thin-film, vapor deposited amorphous silicon alloy made by Uni-Solar. On the barn roof, a high efficiency crystalline silicon system consists of 63 Sharp 175W modules with Xantrex SW5548 inverters and eight Concorde PVX-2580L batteries for backup.

Above the family room wing, the metal roof will one day be planted with vegetation to help insulate the home, slow rainwater runoff, and absorb carbon dioxide.

“Our goal is to eliminate direct fossil fuel use from our day-to-day lives.” —Earl Killian, homeowner

HOME STATISTICS

YEAR BUILT: 2006

SIZE: 5,000 SF

ARCHITECT:
Dan Smith & Associates
Architects

CONTRACTOR:
Vickerman Construction

GREEN at a GLANCE

ENERGY EFFICIENCY & RENEWABLE ENERGY

- 14-kW photovoltaic system (Uni-Solar & Sharp panels, Xantrex inverter, Sun Light and Power installer)
- Straw bale construction
- Passive solar design
- Thermal mass floors: concrete, limestone tile
- Natural cooling utilizes basement and crawl space; no AC
- Hydronic radiant-floor heating
- Heat pump water heater (York E4TS060 Stealth)
- Whole house fan
- ENERGY STAR® dishwasher (Bosch)

RESOURCE CONSERVATION

- Deconstructed existing buildings (Whole House Building Supply)
- Framing lumber: 50% FSC-certified (Hayward Lumber)
- Reused existing roof rafters to build new roof trusses
- Engineered lumber: LVL, PSL, LSL, and glulam beams; I-joists; OSB
- Metal roof
- Lime-stucco exterior siding (TransMineral USA)
- Green roof planned (Tremco)
- Permeable gravel driveway
- Planned permaculture landscaping

INDOOR ENVIRONMENTAL QUALITY

- Plaster interior walls
- Central vacuum system (Aerus Centralux)