

READERS' FORUM



HOUSE OF THE MONTH

One of the first super-insulated houses in the West was completed in 1981 at Lake Tahoe. The house sits on a stunning site overlooking Lake Tahoe and demonstrates the elegance and beauty of the simple passive solar super-insulated approach.

Greg True developed the house design. David Bainbridge consulted on passive solar and super-insulation design and detailing. And John Dean, a contractor, financed and built the house.

The Kingsbury Knolls Estate is a beautiful house with almost 3,000 square feet of floor area. The exterior siding of 4 inch wide cedar nicely complements the granite setting and forest below the house. The walls on the north, east, and west are insulated to R-40 using 2"x12" plates and sills with 2"x4" studs opposite each other, further benefit could be gained by offsetting the studs but it was felt the saving in layout time would outweigh the slightly improved performance. The south walls with many double-pane windows for solar gain are R-26 with 2"x6" studs with an inch of foam sheathing on the outside. The roof is also over R-40 with six inches of foam below the roof deck. This is covered with more of the cedar strips.

The windows in the non-solar walls are all provided with insulated shutters that slide into a pocket between the 2"x4" studs. The shutter and shutter pocket are insulated with rigid foam. The shutter-window assembly has an R-value of about 10 and the shutter pocket has an R-value of about 25.

The super-efficient shell is heated by a solar greenhouse and south windows. Slate floors, brick wall facings, concrete, and water tanks provide storage for heat

gained from the 326 square feet of south glass. The thermal mass provides 1 million BTU storage capacity or enough carry-over for more than 3 days without sun. Circulation of heat is by convection through vents to the upstairs and by natural circulation through the open plan house. A pair of vents with small fans returns hot air from the top of the house to the subfloor area which is vented out to the greenhouse.

The combination of super-insulation and simple passive solar design is expected to meet more than 90% of the homes heating demand, if internal gains from people and appliances are included. The total cost for the passive system and super-insulation was about \$12,000, with most of the cost attributed to the snow load engineered greenhouse and as little as \$2,000 for the super-insulation. This cost is offset by the saving in heating equipment (only a small wood stove is provided for backup heating) and savings in utility bills. At current rates the house will save about \$2,000 dollars every year compared to a comparably sized conventional house with electric heating.

Over the lifetime of the house it will save almost \$80,000 if the rates remain what they are today. If energy prices continue to rise at the same rate they did during the 70's (7% yr. over inflation) the house will save more than a quarter of a million dollars.

In addition to the passive space conditioning systems the house includes an active solar water heating system for domestic hot water and a separate system for heating the hot tub/spa. These systems cost much more than the insulation and passive systems and provide a lower return but are probably still a very wise investment as we enter the decade of the energy price increase.

Super-Insulated Buildings

There are two basic choices for super-insulation when designing or retrofitting a building: multiple walls or simple 2"x6" walls with exterior foam insulation. Each has its advantages and disadvantages.

The multiple wall with 2"x12" plate and sill and 2"x4" stud is an appealing choice because layout is fast and simple. The other choice, a 2"x6" wall built from 2"x4" offset studs, gives a better thermal break, but is more costly to build. The multiple walls allow insulated shutters to slide between the walls into insulated pockets, making windows as energy efficient as possible without great inconvenience.

One of the best resources for additional information about super-insulated buildings is Energy Efficient Housing from the Office of Energy Conservation, Sask. Mineral Resources, 1914 Hamilton Street, Regina, Saskatchewan S4P 4V4.

The National Center for Appropriate Technology is selling a nice plan set for a foam insulated house for \$25 from NCAT, PO 3838, Butte, MT 59701, attn Bob Corbett.

★ ★ ★ ★

Solar Consultant, David Bainbridge, submitted the descriptions of January's "Solar Building of the Month." If you would like to contact David Bainbridge please refer to his card in the "Business Directory."