

Changing the Perception of Green Building

Many people expect that building a “green” or energy efficient home is more expensive than a home built to the minimum standards allowed by code. It does cost more initially to build a high performance home, but like many other purchases a higher initial cost can be less expensive in the long term.

Total Cost of Ownership

The goal for this project was to minimize the Total Cost of Ownership (mortgage cost + energy costs + maintenance costs) for this house over the next 30 years.

In many cases energy costs can exceed the mortgage cost for existing homes. Complex mechanical systems or problems caused by moisture can leave a homeowner with significant unexpected repair bills.

A Different Approach

This house has no basement and no traditional foundation. The first floor walls contain no wood, and are concrete panels with an integral stucco siding system. The roof and 2nd floor are Structural Insulated Panels. There is no central heating/cooling system. A single ductless mini – split system provides heating/cooling for the entire house.

Energy Requirements

The energy requirements for this house were calculated at \$317 annually for heating **prior to using solar power**. The cooling costs were estimated at \$50 per year. All LED lighting uses about 10% of the energy required for standard incandescent light fixtures.

Solar Provides All the Energy

The house received a Home Energy Rating Score of -12 which means it produces more energy than it requires. A 7.6 KW photovoltaic system is sized to meet 100% of the annual energy requirements for the house with some reserve capacity to charge a plug in electric vehicle. No energy bills for the next 30 years!

Durability

The house is designed to be extremely durable. It has been pressure tested for air leaks, which can cause mold and decay in ordinary homes. It uses no fossil fuels, so there is no annual cleaning of a boiler or furnace. It has concrete walls on the first floor that resist insects, decay, impact damage, and never require painting. The exterior trim is solid PVC and which can never decay.

Comfort

The house has been tested for air leakage with a blower door and found to leakage rate of .7 ACH @ 50 Pascals. That means no drafts on the coldest days. There is mechanical ventilation to be sure there is always the proper amount of fresh air.

The temperature between rooms was carefully measured and found to be very consistent. With no drafts and super insulation the house doesn't fluctuate in temperature when outdoor conditions change. In fact we found the house remained relatively comfortably in the 51-52 degree range even with the heating system turned off for several weeks during the winter. Even in the event of a power failure or heating system failure, the house is in very little danger of ever freezing.

In the summer the house remains cool even without using the Air Conditioning. Super insulation and high levels of thermal mass combine to protect the house from temperature swings. Low solar gain on the East and West side of the house protect from low angle sun overheating the space. High Solar Gain glazing on the South wall allows for maximum gain during the winter.