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April 30, 2009

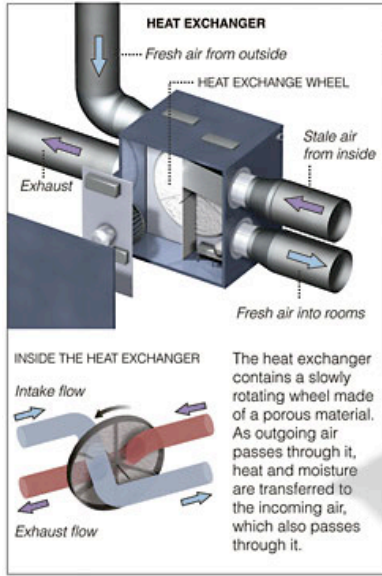
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Snug and Tight

Passive houses are airtight buildings that use heat from appliances and even the occupants' bodies for warmth. They have thick insulation, are oriented to maximize winter sun and use a heat exchanger to warm outside air that circulates throughout. The result is a house that needs little or no extra energy for heating, even in very cold climates. While they are increasingly popular in Germany and Scandinavia, passive houses have yet to make inroads in the United States. Here is one approach.

At the Heart, A Heat Exchanger

The most important element in keeping a passive house warm is the heat exchanger, which uses heat from inside air to warm fresh air from outside. Stale air is constantly being replaced with fresh air; about one-third of the house's air is replaced every hour.

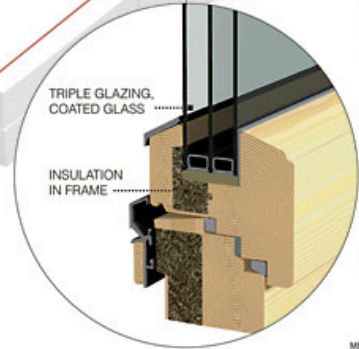
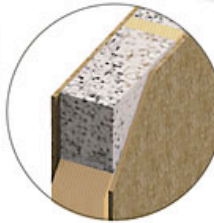
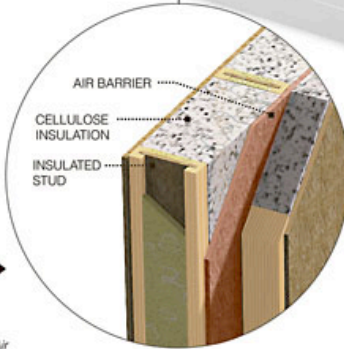


Keeping the Heat In

Exterior walls are two or three times thicker than those in a conventional house and are well insulated, with the amount of insulation varying by climate. A double-wall system is used, with a continuous air barrier between the two walls. Walls and studs are designed to minimize heat conduction.

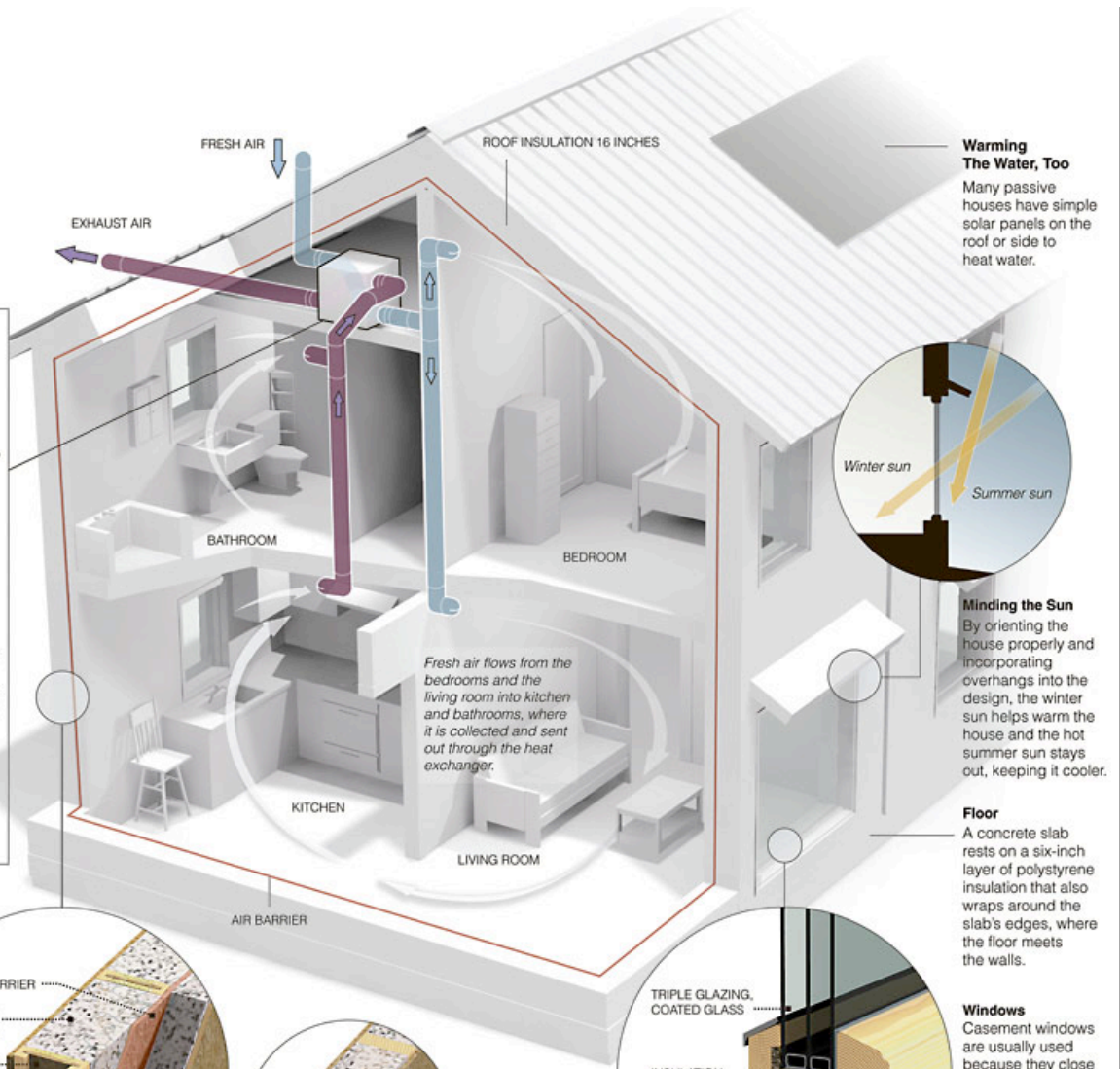
PASSIVE HOUSE WALL, 12-INCH TOTAL INSULATION

Sources: Passive House Institute U.S.; UltimateAir



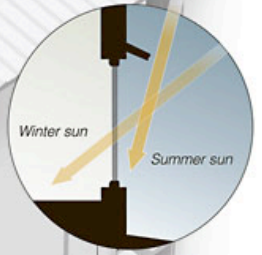
Windows
Casement windows are usually used because they close tighter than other types. Coated glass helps reflect heat back inside the house in winter and keeps some heat out in summer.

MIKA GRÖNDAHL/THE NEW YORK TIMES



Warming The Water, Too

Many passive houses have simple solar panels on the roof or side to heat water.



Minding the Sun

By orienting the house properly and incorporating overhangs into the design, the winter sun helps warm the house and the hot summer sun stays out, keeping it cooler.

Floor

A concrete slab rests on a six-inch layer of polystyrene insulation that also wraps around the slab's edges, where the floor meets the walls.