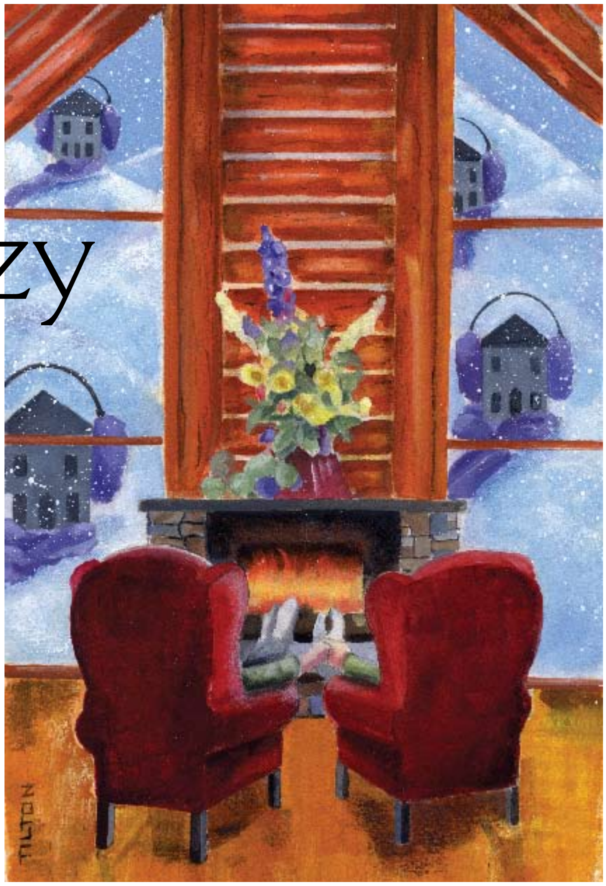
Comfy Cozy

LOG HOMES ARE NATURALLY ENERGY EFFICIENT



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For nearly 30 years, the log-home industry has invested heavily in the concept of thermal mass to explain the warmth and comfort experienced by log-home owners. Thermal mass (the ability of a material to absorb, store and later release heat) has blended into the energy codes, and those codes continue to change in a political environment.

Log-home owners have proclaimed the warmth and comfort of their homes for as long as anyone can remember. An Internet search revealed a report comparing 17th-century life in Colonial America that indicated Swedish settlers in Delaware had a healthy, snug lifestyle in their log buildings, while the Dutch and English suffered illnesses in their framed dwellings. Granted, these log homes were smaller in size and had fewer windows and doors than today's log homes, but warmth and comfort have also been noted in the larger lodges and outbuildings of national parks built in the 1900s.

Environmental awareness in the 1960s, coupled with the Oil Embargo of the 1970s, changed building codes and enforcement of those codes forever. Evolving energy-conservation standards were a factor in the formation of the Log Homes Council, now a member of the Building Systems Councils of the National Association of Home Builders. These standards focused on limiting heat loss from buildings by prescribing minimum insulation levels, an approach that continues today. The standards emerged as the Model Energy Code (MEC) in 1983. That's the same year that the National Bureau of Standards (NBS) tests documented the effect of thermal mass by comparing the performance of six buildings whose only difference was the wall assembly (wood-frame with and without insulation in the cavity; masonry without any insulation, insulated on the interior and insulated on the exterior; and a log wall).

The tests demonstrated that thermal mass does have a tempering effect on the enclosed air space, moderating change in the interior as outside temperatures change. The report shows that the 7-inch-thick log wall outperformed the 2-by-4, R-11 insulated wall. It also demonstrated that when insulation was added to the mass wall assembly, it was most beneficial when added to the exterior.

Based on the testing, it became evident that solid-wood walls could be analyzed in terms of both their static R-value and thermal mass. The interesting thing is that a wood species that has a good R-value is one that has less density (lower weight, less wood fiber and more trapped air); hence, it takes a thicker wall to establish thermal mass. And the inverse is true, that a dense wood species will demonstrate thermal mass with a thinner wall, but its R-value is not as high. With R-value controlling the energy code requirements, a new "dynamic R" measure was needed to represent log-wall performance.

The NBS work was documented and presented worldwide in an effort to persuade those in code development to recognize that energy conservation is based on more than R-value alone. This effort resulted in the thermal-mass provision that was added to the 1989 MEC, which defined a log wall as having thermal mass when its weight is greater than or equal to 20 pounds per square foot. For qualifying log walls, a designer would refer to a table that provided a benefit for walls with integral thermal mass over the minimum requirements for wood-frame construction. This provision has been carried through the conversion of the MEC to the ICC International Energy Conservation Code (IECC) to the 2004 Supplement.

Following the edicts set by government policies, the U.S. Department of Energy has provided significant work to help builders and code officials while modifying their energy-conservation targets. The EnergyStar Program (www.energystar.gov) and RESNET (www.natresnet.org) have also contributed by establishing a performance-based path to energy conservation. Using the Home Energy Rating System (HERS), certified raters use several criteria, including a blower-door test, to verify that a building meets or exceeds the applicable requirements. Their contributions are integrated into the 2006 IECC.

With the 2006 ICC International Energy Conservation Code, thermal mass has been simplified. All log walls are now accepted as having thermal mass. Also, the reference table used by designers to evaluate the performance of log walls compared to the code requirements has been totally redone. This table is not as favorable as the thermal-mass tables of the past, partly because it encompasses more wall types. The table offers a subtle advantage in that it will correlate directly to the new data being generated by Oak Ridge National Labs for Log Homes Council members who are participating in the labs' test program. In the near future, this table can be adjusted to more accurately represent the effects of "dynamic R-value" produced by a mass wall with integrated insulation.

A LOG WALL HAS THERMAL MASS WHEN ITS WEIGHT IS GREATER THAN OR EQUAL TO 20 POUNDS PER SQUARE FOOT.

This new code offers a prescriptive "UA" path (resistance to heat loss), including tradeoffs or a performance path. If the performance path is used, a HERS rater will measure air infiltration by using a blower-door test. If the test results indicate a very low air-exchange rate (good for energy conservation), the building may require an air-to-air heat exchanger to supply fresh, outside air to the conditioned air (good for indoor air quality).

The energy-code changes seem to be getting closer to what log-home owners have been saying. All log homes have warmth from natural resistance to heat loss, radiant comfort from thermal mass and further reduction of energy consumption by low air-infiltration rates. **LHI**

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