Energy-efficient house a wish come true for Santa

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Christmas costs can make us all a bit less jolly, but there are a number of ways even Ole St. Nick can save money throughout the year and help offset the high cost of the holiday.
For openers, the Clauses could live in a Department of Energy near-zero-energy house. If the savings are typical of those in Tennessee, this would cut their hypothetical monthly North Pole electric bill from about $400 to $200, said Jeff Christian, director of the Buildings Technology Center at Oak Ridge National Laboratory. ORNL has an important role in DOE's Building America **Near-Zero-Energy House program**.

While energy-efficient houses save the homeowner money throughout the year, the biggest savings come during the heating months, Christian said. At the North Pole, where the mean monthly temperature is 32 in July and minus-22 degrees in December, the heat bills – and the savings -- never end. Closer to home, the savings vary according to the climate, but in Knoxville, where the average low temperature in December is 32, a homeowner can save $100 or more per month with a near-zero-energy home.

Following are average December low temperatures as provided by Weatherbase for select cities around the country dating back some 40 years: Anchorage, 10; Atlanta, 36; Boston, 27; Chicago, 20; Cincinnati, 27; Denver, 18; Detroit, 22; Kansas City, 26; Knoxville, 32; Memphis, 35; Minneapolis, 11; New York, 31; Nashville, 31; Salt Lake City, 22; Seattle, 38; Tahoe City, Calif., 21; Washington, D.C., 32.

While true near-zero-energy houses are designed from the ground up, owners of existing homes can realize a number of benefits by doing some simple things around the house.

"For example, a fireplace is an enormous source of lost heat if it is not sealed correctly," Christian said. "A lot of people have glass across the front of the fireplace opening, but the damper is left open when no fire is burning, and that can cause a huge air leak into and out of the house. Of course, you'll want to leave the damper open on Christmas eve."

An open damper in a fireplace is the equivalent of having a 30-by-6-inch hole in the roof, or about 180 square inches. And a conventional house has additional air leakage that can be the equivalent of a hole that's even bigger. Meanwhile, a near-zero-energy house has air leakage that equals an area of about 13.5 square inches, Christian said.

Where total energy savings are concerned, the largest gains are possible during the heating months. While buildings consume 36 percent of our country's total energy resources, 33 percent of that is used for heating while 10 percent is used for cooling, 15 percent for heating water and 42 percent for everything else. In a near-zero-energy house, the percentage used for heating drops from 33 percent to 14 percent.

Near-zero-energy houses feature airtight envelope construction, advanced structural insulated panel systems, insulated precast concrete walls, a heat pump water heater, geothermal systems, grid-connected solar photovoltaics, adaptive mechanical ventilation, cool roof and wall coatings with infrared reflective pigments, and solar integrated raised metal seam roofs.

In the future, Christian said geothermal systems have significant energy-saving potential. These systems take advantage of heat that has been stored in the earth all summer. ORNL and a major heating, ventilation

and cooling system manufacturer recently signed a cooperative research and development agreement aimed at bringing lower cost geothermal systems to market.

"While today's near-zero energy houses on average are using 50 percent less energy than the national average, our goal is zero energy," Christian said. "And a true zero-energy home would make the Clauses and everyone's Christmas a little better."

ORNL, which is managed by UT-Battelle, employs 1,500 scientists and engineers and is the Department of Energy's largest multipurpose science and energy laboratory.

Source: DOE/Oak Ridge National Laboratory