

# POPULAR SCIENCE



## THE GREEN DREAM

ONE MAN'S MISSION TO BUILD AN ECO-FRIENDLY, AFFORDABLE HOME



STAGE #8

## POWER WALLS

Sheetrock that cools or heats a house by changing when the temperature does

**T**HE CONCRETE structural walls and cement floors in my newly built green home function as natural air conditioners, passively absorbing heat and slowly releasing it as the temperature in the house drops each evening. As a result, the bones of my home go a long way toward keeping it cool through the summer. Now I've discovered wall panels that do the same thing, and I'm installing 300 square

**JOHN B. CARNETT,** PopSci's staff photographer, is using the latest green technology to build his dream home. Visit [popsci.com/greendream](http://popsci.com/greendream) for John's blog.

feet of them in rooms with the most sun exposure to reduce air-conditioning costs and energy use.

Drywall covers the structural beams of a house to create a smooth, insulated and fireproof surface. Typically, it consists of gypsum mineral sandwiched between two sheets of paper or fiberglass. Drywall manufacturer National Gypsum is developing a new product, ThermalCore, that looks similar, but embedded

inside are wax-filled capsules, called Micronal. When the surrounding temperature hits 73°F, the wax liquefies and absorbs thermal energy, cooling the room in the same way an ice cube cools water when it melts. As the temperature drops, the wax solidifies again and gradually releases heat back into the room.

The Green Dream is one of several test cases to determine how different amounts of wax

## HOW IT WORKS

### DAY:

Microscopic capsules filled with paraffin wax and embedded inside ThermalCore wallboard change from solid to liquid when the surrounding temperature reaches 73°. As the wax melts, it absorbs heat and cools the room in the same way melting ice cools water.

Wax-filled capsules store heat



ThermalCore wall panel

### NIGHT:

At night, when the temperature drops below 73°, the wax hardens. This reaction releases heat back into the room.

Wax-filled capsules release heat



ThermalCore wall panel

in the gypsum will behave in different climates and seasons. The goal is to be able to tailor the panels to their environment, so homes in Florida, where humidity is more persistent, might have drywall with more wax capsules than homes in colder New York, for example.

For now, there's no guarantee that National Gypsum will ever make ThermalCore commercially available. Much depends on

demand, so my hope is that I'm not the only homeowner who thinks it's a good idea.—JOHN B. CARNETT

### THE SPECS

**HOUSE:** 3,500-square-foot, four-bedroom contemporary

**LOCATION:** Greenwich, N.Y.

**PROJECT:** Installing 300 square feet of phase-change drywall

**TIME TO INSTALL:** One day

**ECO-ADVANTAGE:** Reduces energy needs for heating and cooling

## HOMEWRECKER

BEWARE DRYWALL THAT CAN FILL YOUR HOME WITH SULFURIC ACID

Not all drywall is as environmentally friendly as John's. In fact, some is downright toxic. In May a report from the largest investigation in the history of the U.S. Consumer Product Safety Commission cited 10 Chinese manufacturers as sources of sulfur-laden drywall found in thousands of homes constructed in the U.S. between 2005 and 2009, when a post-Hurricane Katrina building boom created a run on drywall and forced builders to seek out new suppliers. Investigators say hot and humid conditions can cause the tainted building product to release sulfur compounds that smell of rotten eggs and react with moisture in the air to create sulfuric acid, a primary ingredient in acid rain. Released in a home, sulfuric acid can corrode and blacken metal, ruining electrical wiring, air-conditioning coils, fire alarms, TVs and stereos. It can also exacerbate asthma

and cause bloody noses, headaches and wheezing.

In many cases, the damage has been so severe that victims have abandoned their homes or been forced to finance expensive gut renovations. To date, the CPSC has received more than 3,300 complaints nationwide. If you suspect there's tainted drywall in your home, copper test strips that turn black after two weeks can indicate sulfur contamination, but CPSC spokesman Alexander Filip recommends that you enlist professional help to rule out other sources of sulfur, including well water, sewer gas or even jarred pickles. A professional diagnosis can also help homeowners secure mortgage forbearance and relief funds available through state agencies.

For a list of implicated manufacturers and resources, call the CPSC at 800-638-2772 or go to [cpsc.gov/info/drywall](http://cpsc.gov/info/drywall).—NICOLE DYER

### BEFORE EXPOSURE TO SULFUR



### AFTER EXPOSURE TO SULFUR

