

# Chicago Tribune

## The winds of change

Hurricanes and tornadoes spur efforts to building more storm-resistant houses

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The signs are ominous: a greenish black sky, fast-moving clouds in a rotating pattern, a sudden quiet after a thunderstorm, then a roar like a train or a jet.

Tornado season is here. Twisters hit the Midwest more frequently in April and May than any other time. It was just a year ago that a deadly tornado devastated Utica, in central Illinois.

Hurricane season arrives June 1, and conjures up images of last year's disastrous storms -- and which fueled a new urgency for making housing safer.

What, if anything, can be done to build houses that better weather powerful storms?

The housing industry thinks it has an answer in systems-built houses.

Systems-built means that houses are all or partly built in factories. The manufacturers say these dwellings offer greater resistance to tornadoes and hurricanes than traditionally built houses, constructed on-site with wood framing.

The four types of systems-built homes are concrete, log, modular and panelized.

"Houses built in a controlled factory setting are sturdier because human error is eliminated and they are inspected before being transported to the home site. That makes them tighter and better able to withstand high winds," said Eric Fulton, communications manager for the Building Systems Councils of the National Association of Home Builders.

Fulton added that systems-built houses often are stronger because they exceed local codes. "They have to be strong enough to be trucked long distances and then lifted up by a crane onto the foundation," he said.

"Modular homes, log homes and concrete homes have withstood tornadoes and hurricanes," Fulton added.

A 2,000-square-foot model home loaded with the latest in storm-resistant technology was showcased in Orlando. Called the NextGen 2005 Demonstration Home, it was designed with a "Safe and Sound" theme and assembled from two factory-built modules.

Among its disaster-resistant features: windows with laminated glass and steel-reinforced frames to withstand flying debris up to 134 miles per hour; hurricane shutters; metal strapping that ties the roof, walls and foundations together so the roof won't blow off; and stone-covered metal shingles that are warranted to stay in place in 120-m.p.h. winds.

A safe room was built in the house. The DuPont Storm Room with Kevlar-reinforced wall panels is rated to withstand winds of 250 m.p.h. It is marketed as a refuge from tornadoes and the wind-borne missiles they generate.

"It's made of the same material as bullet-proof vests and bolted to the concrete floor," said Steven Kerr, president of All American Homes, the Decatur, Ind.-based builder of the NextGen Home. "After the hurricanes in Florida last season, safety is on people's minds."

Safe rooms are being built in the Chicago area in some custom homes. "Since 9/11, it has become a trend," said Charles Page, a Winnetka-based custom builder.

Page said he has just completed a 500-square-foot safe room for a house in Winnetka. "It's made of reinforced concrete and is part of the foundation. It will be stocked with freeze-dried food, water and communication equipment. This is like the atom bomb shelters that were built in some homes in the early '60s. But this time they are to guard against bad weather and terrorism," he said.

Page added that safe rooms can cost from \$2,000 to \$25,000 and are usually in the basement.

"A tornado shelter will stay put even if the house goes," said Dennis Graber, director of technical publications for the National Concrete Masonry Association.

Each year, about 1,000 tornadoes touch down in the U.S. Illinois ranks sixth in the number of killer tornadoes, according to the Federal Emergency Management Agency.

In Oklahoma, listed second in killer tornadoes after Texas, safe rooms are a popular option in production housing.

"About 15 percent to 20 percent of the buyers of our entry-level and move-up homes want a built-in safe room," said Russ Gammill, director of purchasing for Ideal Homes in Norman, Okla.

Below-ground shelters, usually in the garage, are priced from \$2,400, he said. Or, buyers can select an in-house shelter, usually in a closet in the master bedroom. Built of 6-inch reinforced concrete with a steel door, these are priced from \$5,500.

But, safe rooms are just part of the movement toward safer dwellings.

"The trend to safer houses is starting to happen everywhere, because insurance companies are looking at what they're insuring," said Glen Salas, a senior engineer at D&R International, a firm in Silver Springs, Md., that is a contractor for the Partnership for Advancing Technology in Housing.

Salas noted, however, that changes may be slow in coming. "There's no impetus for builders to change if they are able to sell everything they build. They need a compelling reason to change, like a hurricane."

Charles Bevier, editor of Building Systems magazine, agrees that major weather events can affect how houses are built. "When hurricanes and tornadoes go through a town, governments start changing the codes," Bevier said. "Building codes are becoming stricter, so houses are performing better."

"The whole building systems concept evolved because of weather and the short building season. You can build year-around in the controlled environment of a factory," Bevier said.

"One of the largest underwriters in Florida is showing some interest in premium reductions for hurricane-hardened houses," said Bill Zoeller, senior architect at Stephen Winter & Associates in Norwalk, Conn.

Zoeller said studies have shown most hurricane damage is caused by water intrusion. "A prototype house built to protect against both water and wind is being built by Mercedes Homes in Melbourne, Fla.," Zoeller said.

Alternatives to traditional housing construction are catching on, said Fulton of the Building Systems Councils. He added that the systems-built housing industry has been gaining popularity and market share across the country.

"About 30 percent of new houses today are systems-built, and 80 percent use factory-built roof trusses and wall or floor panels," Fulton said.

The Partnership for Advanced Technology in Housing (PATH) maintains that new technology can help make homes safer from major disaster risks.

PATH notes, though, that advances in housing technology are slow to be adopted not only because builders hesitate to take risks, but also because of regulatory barriers and the consumers' limited access to information about new products.

"If a house is built right to begin with, it doesn't cost much extra money to make it safer," said Graber of the National Concrete Masonry Association.

He noted that houses built in South Florida now must be designed to withstand winds of 150 m.p.h., but only 100 m.p.h. in North Florida. "In the Midwest and the rest of the country, the codes are 90 miles an hour," he said.

"No house is ever tornado-proof," said Jim Niehoff, residential promotion manager at the Portland Cement Association, a trade and lobbying group in Skokie. "But concrete houses have fared well in hurricanes in Florida."

Niehoff estimates that concrete will rise to 17.5 percent of the new-house market this year.

Concrete block will account for 9 percent of construction, he said, and the rest will be insulated concrete forms. This type of wall is a sandwich created by pouring concrete between two foam forms.

"The foam stays in place and acts as insulation. Siding is added, making it look like any other house," Niehoff said.

He added that insulated concrete forms are 3 to 5 percent more costly than standard construction, but that is paid back in five to seven years because of its increased energy efficiency.

"Concrete is slow to take off in the Midwest, but is very prevalent in Florida, the Carolina coast and Texas," Niehoff said.

Debris driven by high winds presents the greatest hazard to homeowners during tornadoes and hurricanes. Concrete homes are less likely to suffer major damage from debris than conventionally framed houses, according to the cement association.

A combination of steel framing and insulating concrete forms can produce a house that can withstand a Category 4 hurricane," said Ted Hartner, manager of residential development at Dietrich Metal Framing in Pittsburgh. Category 5 is the highest rating for hurricanes.

"Steel-framed residences have been left standing when wood-framed houses in the same neighborhood have been demolished by a storm," Hartner said.

He estimates that this type of construction is 5 to 10 percent more expensive than conventionally built homes, depending on the cost of wood and other materials.

Hartner noted concrete panels are popular in the Upper Midwest. "Minneapolis is one of our best markets," he said.

Though mobile homes are prone to heavy damage in major wind storms, Kerr of All American Homes emphasized that modular houses are different.

The two types of housing are built to different codes, Kerr said. Modular homes conform to local codes. Each module is 12 to 15 feet wide and 50 to 66 feet long. Any size house can be built, depending on the number of modules. It takes one day to combine them and make the house weather tight, Kerr said.

Though log cabins suggest pioneer days rather than cutting-edge technology, they have stood the test of time and have survived severe storms because of their strength and weight.

A log house in Santa Rosa Beach, Fla., suffered no damage when Hurricane Ivan swept through with winds of more than 100 m.p.h. Besides the strength of the solid log walls, it was had hurricane straps connecting the timber roof to the log walls.

Bevier noted that log houses used to be just for vacations. "Now 90 percent are primary residences," he said.

Illinois, the home of a famous president born in a log cabin, is not in the top 10 of log-house construction. But Wisconsin and Michigan rank 4th and 5th nationally.

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*The Partnership for Advancing Technology in Housing (PATH, [www.pathnet.org](http://www.pathnet.org)) is administered by the U.S. Department of Housing and Urban Development.*

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