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Homes with passive survivability resilient to power outages

Tags: Building Green, Heating & Cooling, Home Plans, Insulation, Windows & Doors
8/11/11 - Teena Hammond

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Last winter, an ice storm took the city of Dallas by surprise, and power lines went down throughout the city. In Gary Gene Olp's neighborhood, power lines were down for nearly a week. All of his neighbors had to vacate their frigid homes, but Olp's family stayed put.

Passive survivability

The Olp family was able to stay in their 3,600-square-foot home, despite the power outage, because the home was built with passive survivability in mind. The home is heavily insulated, so the temperature never dropped below 67 degrees indoors, and as soon as the family was up and a fireplace was lit, the home stayed at a comfortable 71 degrees each day, Olp said.

Passive survivability means that a building can maintain livable conditions in the event of an extended power outage, fuel supply interruption or water shortage. Passive survivability is important in all areas, whether areas are hit with snow, ice or hurricanes. This need is increasing as scientists predict that with global climate change there will be more intense storms and, as a result, more power outages.

Olp, the founder and principal of GGO Architects in Dallas, said, "The way the house is designed, the air moves through it and the house stays warm. It was kind of fun last winter. We brought in Coleman lanterns and candles because we had no light, but we had a gas cooktop and a gas stove and we're campers anyway. But through a passive survivability standpoint, my house was able to weather the situation."

His home is also staying cool this summer while temperatures are topping 110 degrees in Dallas. Air conditioning is only turned on at night, during off-peak rates, to cool the air to 68 degrees, and during the day, when air conditioning is not used, the indoor temperature is never more than 74 or 75 degrees.

"We could weather these extremes simply by the effect of the conscious design decisions I made in the construction of the home. The way many people's homes are designed is that within hours after a power outage in summer, the temperature inside the home is higher than outside," Olp said.



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Due to vulnerabilities of weather, unexpected power outages or even a shortage of fuel supply with oil production capacity declining, the design of passive survivability is becoming increasingly important. A few key elements of passive survivability include storm resilience, natural light, renewable energy, mechanical systems, water storage and passive design.

Summer vs. winter

The Olp home stays cool in the summer, and warm in the winter, due to several components. The home uses passive solar with trees to shade the roof, as well as a roof design Olp created that mitigates 75 to 80 percent of the heat gain away from the home.

It's important to remember that there are passive solar techniques to be used in the summer that differ from the winter. "You know the sun is going to pound the west side roof and side of those structures, so you deliberately design structures to welcome that in the winter and avoid it in the summer," he said.

There is a living wall on the west side of Olp's home and he refers to it as a "super structure" that sits about two feet away from the actual west wall of the house. In the summer, jasmine and climbing roses on the super structure create shade as well as lowering the temperature with moisture as it evaporates from the plants. In the winter, those plants are gone, so the west wall is fully exposed to the sun to warm the home.

Olp has built homes with passive sustainability in colder climates such as Colorado and Maine, too. "It's applicable in any region. We used a dark colored roof to absorb the heat in Colorado, and in Dallas, we do reflective roofs to shed the heat."

Passive survivability not a new concept

Tristan Roberts, editorial director for BuildingGreen.com, said that the concept stems back to homes built a hundred or more years ago, when there was natural ventilation to allow the air to flow through a home. "If you go back to older building designs, you see that designers and builders were using passive elements to make a home livable with minimal or no fuels or electricity."

Many modern buildings feature a wall of windows. "That's a bad idea. It creates a high need for cooling when the sun hits all those windows and a high need for heating because those windows won't insulate very well," he said.

"Passive survivability is about an objective. The objective is to have a home that you can live in, even in a long-term power outage. Is your home going to be a place where you are safe and able to stay in? It's about meeting that objective, but it also meets a lot of green building goals and objectives. A home that is well insulated will stay comfortable longer if the power goes out — or a home with a renewable energy system on site, whether wind turbine or solar panels, to power some or all of the building if power lines are down," Roberts said.

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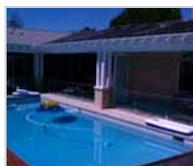
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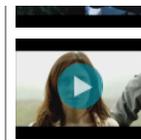
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