The Building Industry Is Working to Reduce Long-term Costs and Limit Disruptions of Extreme Events

JULY 27, 2016 BY JARED O. BLUM LEAVE A COMMENT

"Resilience is the ability to prepare for and adapt to changing conditions and to withstand and recover rapidly from deliberate attacks, accidents, or naturally occurring threats or incidents." — White House Presidential Policy Directive on Critical Infrastructure Security and Resilience

In August 2005, Hurricane Katrina made landfall in the Gulf Coast as a category 3 storm. Insured losses topped $41 billion, the costliest U.S. catastrophe in the history of the industry. Studies following the storm indicated that lax enforcement of building codes had significantly increased the number and severity of claims and structural losses. Researchers at Louisiana State University, Baton Rouge, found that if stronger building codes had been in place, wind damages from Hurricane Katrina would have been reduced by a staggering 80 percent. With one storm, resiliency went from a post-event adjective to a global movement calling for better preparation, response and recovery—not if but when the next major disaster strikes.

CHALLENGES OF AN AGING INFRASTRUCTURE

We can all agree that the U.S. building stock and infrastructure are old and woefully unprepared for climatic events, which will occur in the years ahead. Moving forward, engineering has to be more focused on risk management; historical weather patterns don't matter because the past is no longer a reliable map for future building-code requirements. On community-wide and building-specific levels, conscientious groups are creating plans to deal with robust weather, climatic events and national security threats through changing codes and standards to improve their capacity to withstand, absorb and recover from stress.

Improvements to infrastructure resiliency, whether they are called risk-management strategies, extreme-weather preparedness or climate-change adaptation, can help a region bounce back quickly from the next storm at considerably less cost. Two years ago, leading groups in America's design and construction industry issued an Industry Statement on Resiliency, which stated: "We recognize that natural and manmade hazards pose an increasing threat to the safety of the public and the vitality of our nation. Aging infrastructure and disasters result in unacceptable losses of life and property, straining our nation's ability to respond in a timely and efficient manner. We further recognize that contemporary planning, building materials, and design, construction and operational techniques can make our communities more resilient to these threats."

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With these principles in mind, there has been a coordinated effort to revolutionize building standards to respond to higher demands.

STRENGTHENING BUILDING STANDARDS

Resiliency begins with ensuring that buildings are constructed and renovated in accordance with modern building codes and designed to evolve with change in the built and natural environment. In addition to protecting the lives of occupants, buildings that are designed for resilience can rapidly re-cover from a disruptive event, allowing continuity of operations that can liter- ally save lives.

Disasters are expensive to respond to, but much of the destruction can be prevented with cost-effective mitigation features and advanced planning. A 2005 study funded by the Washington, D.C.-based Federal Emergency Management Agency and conducted by the Washington-based National Institute of Building Sciences' Multi-hazard Mitigation Council found that every dollar spent on mitigation would save $4 in losses. Improved building-code requirements during the past decade have been the single, unifying force in driving high-performing and more resilient building envelopes, especially in states that have taken the initiative to extend these requirements to existing buildings.

MITIGATION IS COST-EFFECTIVE IN THE LONG TERM

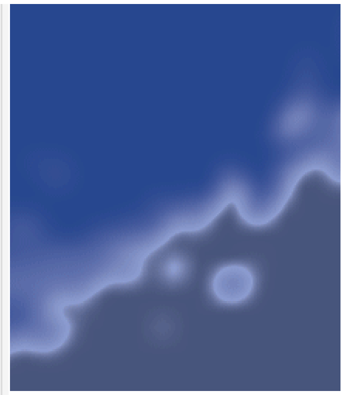
In California, there is an oft-repeated saying that "earthquakes don't kill people, buildings do." Second only to Alaska in frequency of earthquakes and with a much higher population density, California has made seismic-code upgrades a priority, even in the face of financial constraints. Last year, Los Angeles passed an ambitious bill requiring 15,000 buildings and homes to be retrofitted to meet modern codes. Without the changes, a major earth- quake could seriously damage the city's economic viability: Large swaths of housing could be destroyed, commercial areas could become uninhabitable and the city would face an uphill battle to regain its economic footing. As L.A. City Councilman Gil Cedillo said, "Why are we waiting for an earthquake and then committed to spending billions of dollars, when we can spend millions of dollars before the earthquake, avoid the trauma, avoid the loss of afford- able housing and do so in a preemptive manner that costs us less?"

This preemptive strategy has been adopted in response to other threats, as well. In the aftermath of Hurricane Sandy, Princeton University, Princeton, N.J., emerged as a national example of electrical resilience with its microgrid, an efficient on-campus power-generation and -delivery network that draws electricity from a gas-turbine generator and solar-panel field. When the New Jersey utility grid went down in the storm, police, firefighters, paramedics and other emergency-services workers used Princeton University as a staging ground and charging station for phones and equipment. It also served as a haven for local residents whose homes lost power. Even absent a major storm, the system provides cost efficiency, reduced environmental impact and the opportunity to use renewable energy, making the initial investment a smart one.

ROOFING STANDARDS ADAPT TO MEET DEMANDS

Many of today's sustainable roofing standards were developed in response to severe weather events. Wind-design standards across the U.S. were bolstered after Hurricane Andrew in 1992 with minimum design wind speeds rising by 30-plus mph. Coastal jurisdictions, such as Miami-Dade County, went even further with the development of wind- borne debris standards and enhanced uplift design testing. Severe heat waves and brown-outs, such as the Chicago Heat Wave of 1995, prompted that city to require cool roofs on the city's buildings.

Hurricane Sandy fostered innovation by demonstrating that when buildings are isolated from the supply of fresh water and electricity, roofs could serve an important role in keeping building occupants safe and secure. Locating power and water sources on rooftops would have maintained emergency lighting and water supplies when storm surges threatened systems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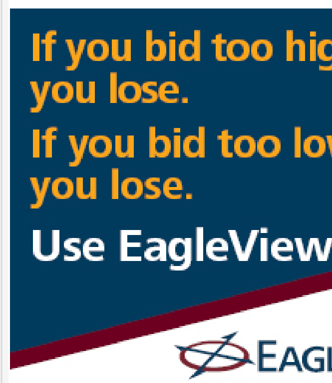

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located in basement utility areas. Thermally efficient roofs could have helped keep buildings more habitable until heating and cooling plants were put back into service.

In response to these changes, there are many opportunities for industry growth and adaptation. Roof designs must continue to evolve to accommodate the increasing presence of solar panels, small wind turbines and electrical equipment moved from basements, in addition to increasing snow and water loads on top of buildings. Potential energy disruptions demand greater insulation and window performance to create a habitable interior environment in the critical early hours and days after a climate event. Roofing product manufacturers will work more closely with the contractor community to ensure that roofing installation practices maximize product performance and that products are tested appropriately for in-situ behavior.

AVERTING FUTURE DISASTERS THROUGH PROACTIVE DESIGN

Rather than trying to do the minimum possible to meet requirements, building practitioners are "thinking beyond the code" to design structures built not just to withstand but to thrive in extreme circumstances. The Tampa, Fla.-based Insurance Institute for Business & Home Safety has developed an enhanced set of engineering and building standards called FORTIFIED Home, which are designed to help strengthen new and existing homes through system-specific building upgrades to reduce damage from specific natural hazards. Research on roofing materials is ongoing to find systems rigorous enough to withstand hail, UV radiation, temperature fluctuations and wind uplift. New techniques to improve roof installation quality and performance will require more training for roofing contractors and more engagement by manufacturers on the installation of their products to optimize value.

Confronted with growing exposure to disruptive events, the building industry is working cooperatively to meet the challenge of designing solutions that provide superior performance in changing circumstances to reduce long-term costs and limit disruptions. Achieving such integration requires active collaboration among building team members to improve the design process and incorporate new materials and technologies, resulting in high-performing structures that are durable, cost- and resource-efficient, and resilient so when the next disruptive event hits, our buildings and occupants will be ready.

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