Creating better buildings
Timely workshop educates building professionals on vital role of resiliency.

By Concrete Joint Sustainability Initiative staff

Major disasters triggered by natural or man-made hazards impact the lives and livelihoods of millions of people around the world, in developed, developing, and underdeveloped countries. Across the globe, the economic and insured losses from these events are rapidly rising in line with the frequency and severity of major natural disasters. From a business perspective, these natural catastrophes affect all sectors of business, both directly and indirectly. Disasters can cause disruption to energy supplies and transmission, public infrastructure and distribution networks, causing operational and supply chain interruptions to businesses.

Disaster risk reduction is central to a sustainable future, and it is clear that buildings must be constructed with materials that provide superior resistance to damage, reducing the overall loss of life and cost of repair. Additionally, for large scale events, disaster mitigation helps ensure that critical services like roads, hospitals, communications, data transmission, and emergency services can remain in operation.

In mid-October, the private and public sectors of the building and construction industry came together to hold a workshop designed to educate building professionals on the vital role of resilient, high-performance structures in achieving sustainable communities. The Resilient Buildings Workshop, a free event held at the National Building Museum in Washington, D.C., drew approximately 100 architects, engineers, government officials, contractors, and project managers. Sponsored by the Concrete Joint Sustainability Initiative (Concrete JSI), the event was hosted by the Department of Homeland Security Science and Technology Directorate, the National Institute of Building Sciences, and the National Building Museum. Attendees learned about various topics relating to high-performance and resilient buildings from several of the most knowledgeable professionals in the field. Topics included:

- Buildings materials as they relate to high-performance and resilience
- Cutting-edge tools and resources available to help achieve high-performance and resilience
- Resilience as a critical component in sustainable design
- High-performance design and the role of lifecycle assessments
- Assessing a building’s capability to withstand natural and man-made hazard events
- The role of building codes and standards in achieving resilient building enclosures and structures
Henry Green, president and CEO of the National Institute of Buildings Sciences, and Chase Rynd, executive director of the National Building Museum, welcomed attendees to the event by expressing the importance of resilience in sustainable design. John Sullivan, consultant with JJSFIM Consulting, moderated the event, which included speakers Mohammed Ettouney, principal, Weidlinger Associates; Roger Grant, program director, National Institute of Building Sciences; Earle Kennett, chief operation officer, National Institute of Buildings Sciences; and Terry Ryan, program manager, Raytheon UTD.

Mila Kennett, program manager, Department of Homeland Security Science and Technology Directorate, spoke about the tools and resources available to help building industry professionals achieve resilience. Kennett’s “High-Performance Resilience Program Overview” highlighted three concepts that must come together.

First, the concept of high-performance “promotes the use of standards beyond life safety in the public and private sector. This means that after a disaster event, building and infrastructure will continue to provide basic safety functions even under limiting circumstances.” Second, Kennett described the concept of resilience, which “promotes infrastructure resilience, the capacity created in buildings and infrastructure to resist disaster events and continue operating in the aftermath of disruptive events.” Finally, Kennett stressed the importance of an “All Hazard Approach,” which “determines, promotes, and disseminates mitigation and protective measures against all hazards, including explosive blast, CBR, earthquakes, floods, winds, and wild fires.” This approach also takes into consideration energy efficiency, environmental sustainability, and climate change factors.

“Natural and manmade hazards are constant threats to our communities and infrastructure systems in the U.S., and these issues facing our built environment have led the research community to look at the use of alternative materials to increase resilience and durability in our structures,” Kennett said. “We must introduce and help communicate and promote the adoption of new, advanced, high-performance standards, materials, and technologies that have been developed by the building industry and research institutions.”

Keynote speaker Blaine Brownell, professor of Sustainable Design, University of Minnesota, spoke to attendees about the I-35W bridge collapse of 2007 and how a similar disaster could be avoided in the future. Brownell introduced the “Four Factors of Fracture-Critical Design,” which included lack of redundancy, interconnectedness, efficiency, and exponential change.

Additionally, Brownell spoke about the vital role resilient materials play in preventing disasters. He described the need for all building materials to have characteristics of endurance, response, efficacy, and conservation.

Lionel Lemay, senior vice president of Sustainable Development, National Ready Mixed Concrete Association, led a presentation about concrete and the importance of adapting to new and changing environments.

“Disaster is a signal of the failure of society to adapt to its new environment,” Lemay said.

Lemay suggested the solution to communities’ lack of adaptation is a four-step process that includes adopting building codes, encouraging building professionals to voluntarily build above the minimum standards (“Code Plus”), adopting high-performance building standards, and building with more robust materials.

Lemay spoke about concrete as a robust material that can contribute to his four-step process. He explained that concrete can be defined as robust because it is “versatile, strong, water-resistant, non-combustible, energy efficient, durable, and built to last.”

In addition to presentations, workshop attendees had the opportunity to participate in interactive breakout sessions that focused on “Integrating Materials, Resilience, and Sustainability.” Breakout team A met to discuss “EISA and High-Performance,” breakout team B discussed “Resilience and Sustainability,” breakout team C talked about “Economies, Funding, and the Future,” while breakout team D discussed “Professional Issues.” The breakout teams presented their findings to the entire workshop for future consideration by the organizations leading the effort of high-performance, resilient design.

The Concrete Joint Sustainability Initiative, which sponsored the workshop, is currently leading the efforts in the concrete industry to promote the creation and maintenance of more resilient and durable communities. It comprises 28 national and international concrete-related organizations committed to working together with the goal of educating themselves, their members, and their customers about the role and responsibilities of concrete in sustainable development.