RESILIENCE ROUNDTABLE
Designing and Building 22nd Century Infrastructure

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DISCUSSION POINTS

1. What is resiliency/sustainability?
2. What is the urgency for achieving resiliency and sustainability?
3. What is EPA’s role; What are EPA’s responsibilities?
4. Steps to incorporating resilient into building design and standards
5. How do we reconcile conflicts that ensures public safety, encourages innovation, satisfies owners’ requirements, and protect designers and builders from liabilities?
6. How do we prepare architects, engineers, planners, designers, builders, regulators, and leaders to operate in this kind of environment?
Resilience and Sustainability

- Resilience: ability to **anticipate, prepare for, and adapt** to changing conditions and withstand, respond to, and recover rapidly from disruptions. (PPD-21 and E.O. 13653, March 2013)
- Sustainability: **integration of economic, social and environmental actions** to meet the needs of the present without compromising the ability of future generations to meet their needs.
- Sustainability aims to **improve long term conditions** rather than just sustain or maintaining current conditions.
- Resilience and sustainability are distinct concepts but can be integrated if they support the same community goals for long-term development and recovery from disruption
Resiliency and Sustainability Challenges

• By 2030 approximately 75% of U.S. infrastructure will either need to be renovated or built from scratch. (“Rockefeller Foundation: Build America”)
• Adapt to climate change/sea level rise/increase in extreme droughts and weather events
• Urban population growth/rebuilding and protection of urban infrastructure and reduce human health risks.
• Ensure water security and rebuild aging water infrastructure
• Anticipate and prepare for homeland security threats.

Build America: Forward-thinking approach to infrastructure planning and investment that encourages more up-front thinking for better long-term results.
EPA Roles and Responsibilities
Regulations, Codes, Conducts, Collaborations

- Traditional role of protecting human health and the environment
- Ensure homeland security/protect infrastructure and natural systems
- Develop tools and indicators for building a resilient and sustainable society

**Environmental Resilience:** “minimizing environmental risks associated with disasters, quickly returning critical environmental and ecological services to functionality after a disaster, while applying this learning process to reduce vulnerabilities and risks to future incidents” (EPA 2015)
Promoting Sustainability and Resiliency through the EPA-DOD Net Zero Program

• Under EPA’s Net Zero Program, EPA scientists are working with federal, academic, and industry partners to test and develop innovative, real-world strategies and technologies to help military installations and civilian communities achieve their net zero goals.

• Net Zero means consuming only as much energy as produced, achieving a sustainable balance between water availability and demand, and eliminating solid waste sent to landfills.

• The program started out as a partnership with the U.S. military, the idea being that with military installations serving as research testbeds, technology successes would be transferable to other military installations and civilian communities.
Net Zero Program and Resilient Buildings

There are several Net Zero projects that focus on how water and energy are used in buildings.

Addressing the Social Drivers of Water Demand in Homes - This project assessed the effectiveness of targeted education and outreach on helping people living in Family Housing units on Fort Riley, Kansas reduce their water use in everyday activities at their home, including showering and lawn watering.

Systems-based Modeling for Sustainable Decision Making - EPA scientists developed a systems-based Triple Value Simulation model that identifies different resource management options to lower costs, minimize energy and water use, and protect the environment. A pilot study of this model is underway at Aberdeen Proving Ground, Maryland, looking at hand dryer vs paper towel use in buildings.

Monitoring Graywater and Blackwater Systems - EPA scientists are monitoring mixed wastewater systems in large buildings to improve treatment requirements and monitoring approaches for the onsite non-potable reuse of wastewater.
EPA Activities for Safe and Resilient Communities

• Voluntary codes and standards for green building design
• Create and promote green infrastructure
• Partnership/collaboration with federal agencies and building codes organizations
• Develop decision support tools
• Protect water infrastructure and systems
• Support disaster recovery and resilience planning
Federal Green Infrastructure Collaboration


• Leverage joint efforts to publicize the multiple community benefits of green infrastructure,

• Build and share knowledge around emerging green infrastructure technologies and policy issues, and

• Facilitate shared inquiry into the best ways to encourage adoption of green infrastructure technologies at the community level.
Federal Resilience Guidance & Tools

- Coastal Risk Reduction and Resilience (USACE 2013)
- HUD Exchange for Community Resilience
- Planning for an Emergency Drinking Water Supply (2011)
- An Inventory of EPA’s Tools for Enhancing Community Resilience to Disasters (EPA, Jan 2016)
Resilience in Community Planning and Green Building Standards

• International Code Council's 2012 International Green Construction Code (IgCC)
• ANSI (American National Standards Institute)/Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings
• ICC 700-012: National Green Building Standard
• US Green Building Council's Leadership in Energy and Environmental Design (LEED®)
November 2015: 3 LEED Pilot Credits adopted on assessment and planning for resilience, design for enhanced resilience, and design for passive survivability.
Business Standards (BS 65000) Guidance for Organizational Resilience.

- Adapt/improvise successfully to unforeseen and disruptive changing environments
- Gain a competitive edge by identifying gaps and taking advantage of opportunities
- Be more agile and innovative by learning from trends
- Reduce costs and increase efficiency by avoiding potential pitfalls
- Obtain a better understanding of risks and opportunities
- Preserve and improve their reputation by being seen as vigilant and robust
- Engender trust amongst external clients and internally amongst staff
- Cultivate a culture of shared purpose and values
ISO Standards for Resilience.

• ISO standard for resilient and sustainable cities – ISO 37120 – is based on 100 indicators which steer and measure the performance of city services and quality of life. It is being implemented by the Toronto-based World Council on City Data (WCCD).

• ISO 28002 Standard for Resilience in the Supply Chain provides a basis for an organization to evaluate both its organizational and supply chain risks and to develop a comprehensive strategy to manage the risks that may disrupt its operations.
Resolving Conflicts and Preparing for the 22\textsuperscript{nd} Century

- Educate and inform general public of key challenges
- Anticipate and responding to future trends/threats and land use planning
- Advance green building design/green building standards/codes and green infrastructure
- Apply an integrated systems approach to problem solving
- Coordination and cooperation at community, state and federal levels
- Promote innovative science, technology and decision support tools
- Advance government-business collaboration on strategic capital investment