

Plenary Session Chapter 7 – Energy Systems

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Chapter 7 – Energy Systems

Energy and Power Sector elements at the forefront of the Resilience discussion

Aligning Resilience efforts with current Sector activities

- Reliability
- Energy Assurance

Current performance levels of the Sector

- Electric Power
- Liquid Fuels
- Natural Gas
- Emergency and Standby power

Performance goals

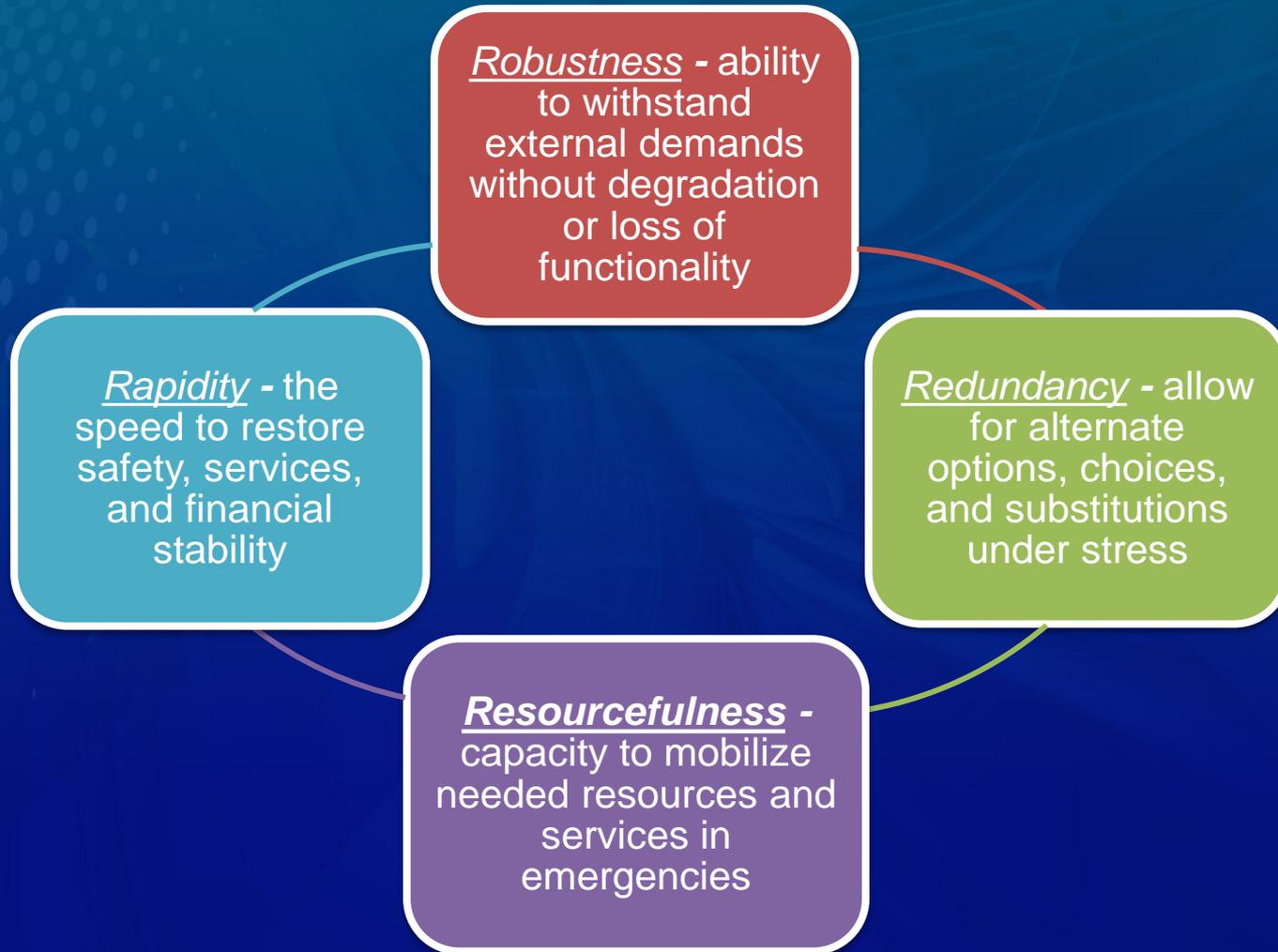
Regulatory environment and codes/standards

Strategies for implementing community resilience plans



Resilience and Energy Systems

Presidential Policy Directive 21 Four R's of Resilience



Current State: Electric Power Example

- Key Sector Elements
 - Generation
 - Transmission
 - Distribution
- All elements are subject to multiple different hazards
- Disparate performance based on hazard or sector element and geographic location of the elements/assets
- Challenges with understanding hazards and impacts
 - No consistent definition of hazards (one stakeholder's extreme hazard is another stakeholder's routine event)
 - Performance expectations between suppliers and users are not uniform or consistent



Performance Goals Scoring Example

Functional Category: Cluster	(4) Support Needed	(5) Target Goal	Overall Recovery Time for Hazard and Level Listed								
			Expected Hazard Level								
			Phase 1 – Short-Term			Phase 2 -- Intermediate			Phase 3 – Long-Term		
			Days			Wks			Mos		
			0	1	1-3	1-4	4-8	8-12	4	4-24	24+
Power - Electric Utilities											
Generation		1									
Critical Facilities and Infrastructure Systems	R/C		90%	X							
Emergency Housing and Support Systems	R/C		90%	X							
Housing and Neighborhood infrastructure	R/C		90%		X						
Community Recovery Infrastructure	R/C		90%		X						
Transmission (including Substations)		1									
Critical Response Facilities and Support Systems											
Hospitals, Police and Fire Stations / Emergency Operations Centers			90%	X							
Disaster debris / recycling centers/ Related lifeline systems			60%	90%	X						

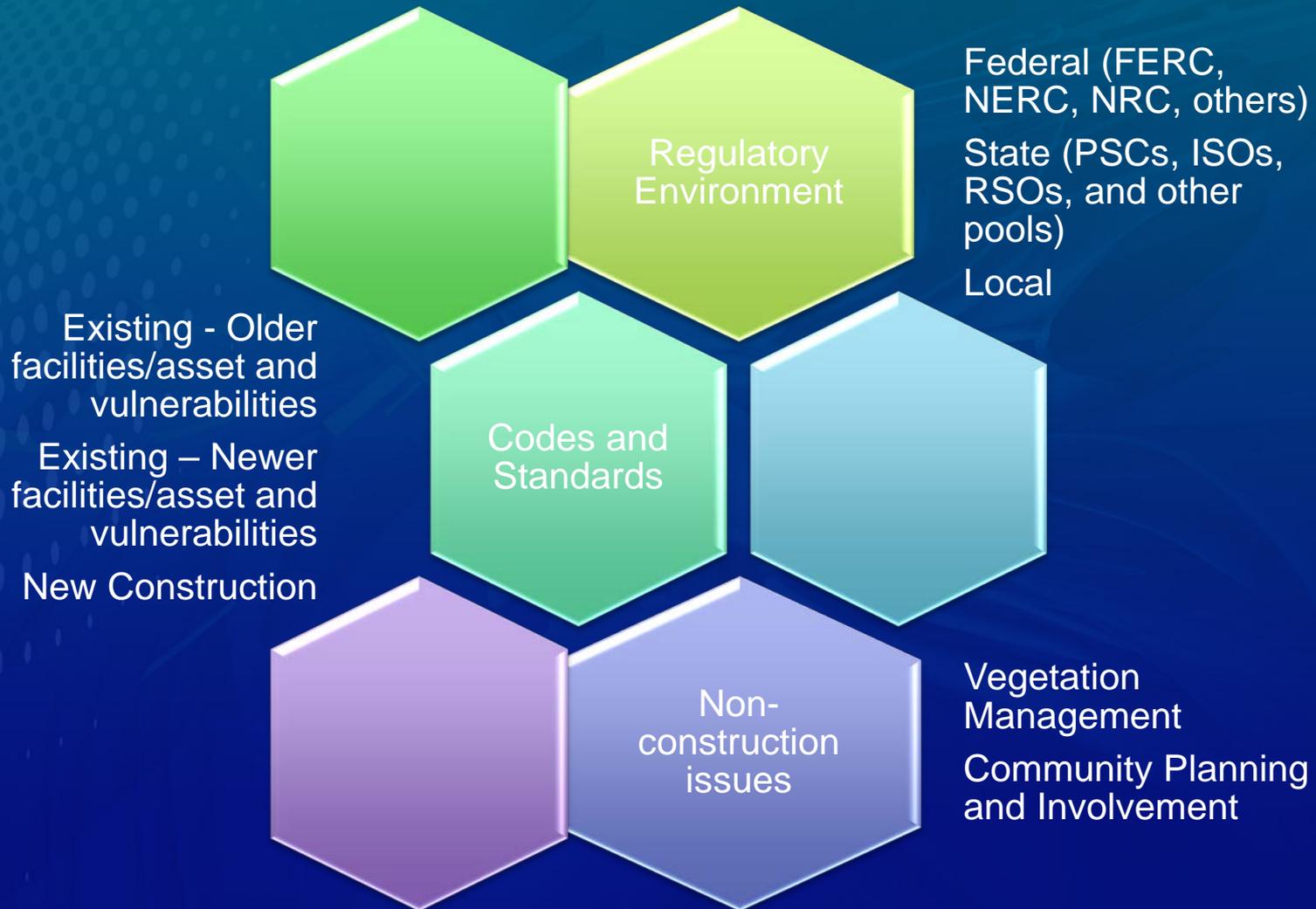
Restoration times		
(2)	30%	Restored
	60%	Restored
	90%	Restored
(3)	X	Current

Example Matrix

- Power Generation - 4 Subcategories
- Transmission – 9 Subcategories
- Distribution – 9 Subcategories



External Considerations



Impacts from Emerging Technologies

Smart Grid Technologies

- Ubiquitous communications enables situational awareness and command and control
- Distribution Automation
- Substation Automation
- Demand Side Management
- Renewable Energy Integration
- Internet of Things (IoT)

Energy Storage

- Renewable Energy + Storage = Energy Resiliency Killer App

Microgrids

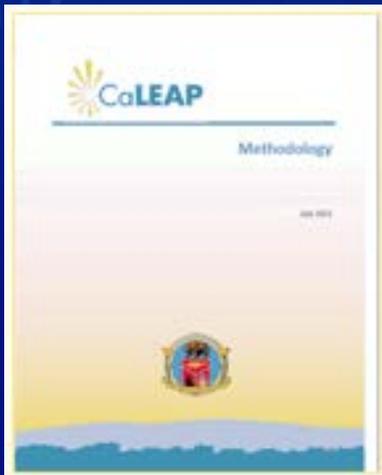
- Well-defined boundaries
- Grid-connected or islanded



Implementation Strategies

CALeap – California
Local Energy
Assurance Planning

Common
methodology for
developing plan for
resiliency, energy
management, and
restoration



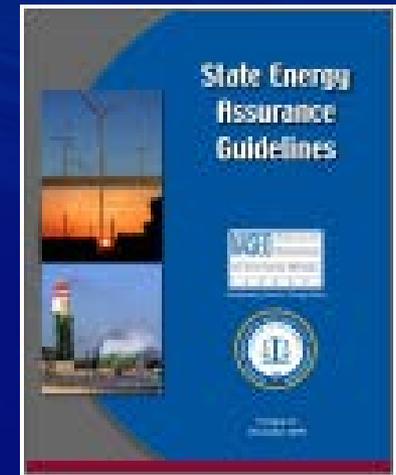
DOE Energy
Assurance Program

Guidelines for
managing energy
resilience



National Association of
State Energy Officials
(NASEO) State Energy
Assurance Guidelines

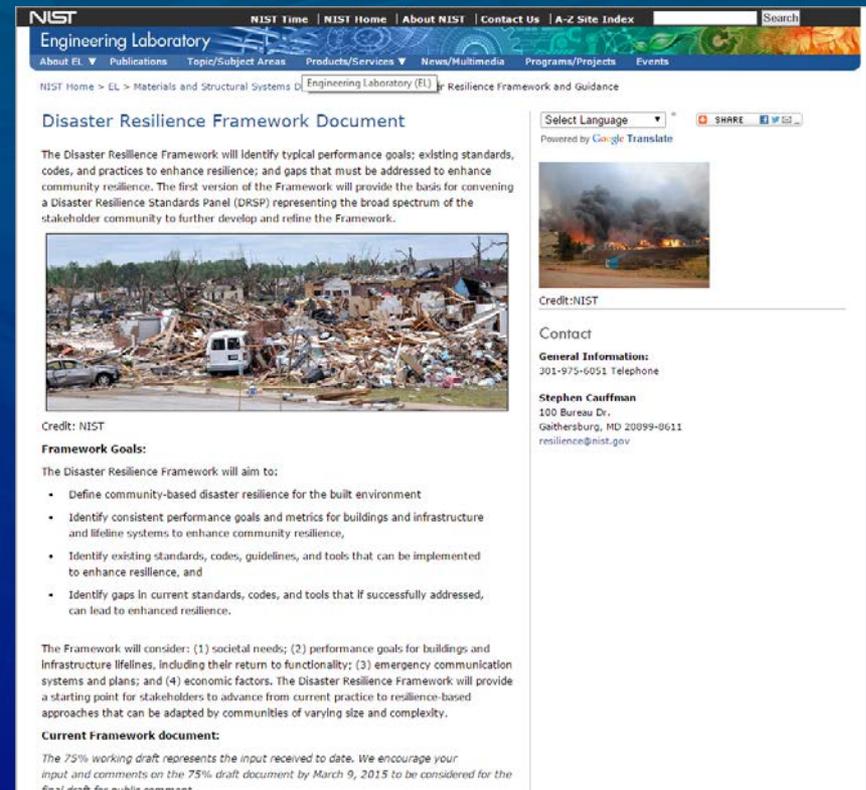
More guidelines for
managing energy
resilience



Implementation Strategies

- NIST Disaster Resilience Framework

- Community resiliency focus
- Variety of domains
 - Energy
 - Buildings and transportation
 - Communications
 - Water and waste water
- Tools, metrics, etc



The screenshot shows the NIST Engineering Laboratory website page for the "Disaster Resilience Framework Document". The page features a navigation bar with links to "About EL", "Publications", "Topic/Subject Areas", "Products/Services", "News/Multimedia", "Programs/Projects", and "Events". The main content area includes a "Disaster Resilience Framework Document" section with a brief description of the framework's purpose. Below the text is a photograph of a destroyed residential area with a white van and a car amidst the rubble. To the right of the main content is a sidebar with a "Select Language" dropdown, a "SHARE" button, a "Powered by Google Translate" notice, and a "Contact" section. The contact section lists "Stephen Cauffman" at the address "100 Bureau Dr., Gaithersburg, MD 20899-0611" with the email "resilience@nist.gov".

Disaster Resilience Framework Document

The Disaster Resilience Framework will identify typical performance goals; existing standards, codes, and practices to enhance resilience; and gaps that must be addressed to enhance community resilience. The first version of the Framework will provide the basis for convening a Disaster Resilience Standards Panel (DRSP) representing the broad spectrum of the stakeholder community to further develop and refine the Framework.

Framework Goals:

The Disaster Resilience Framework will aim to:

- Define community-based disaster resilience for the built environment
- Identify consistent performance goals and metrics for buildings and infrastructure and lifeline systems to enhance community resilience,
- Identify existing standards, codes, guidelines, and tools that can be implemented to enhance resilience, and
- Identify gaps in current standards, codes, and tools that if successfully addressed, can lead to enhanced resilience.

The Framework will consider: (1) societal needs; (2) performance goals for buildings and Infrastructure lifelines, including their return to functionality; (3) emergency communication systems and plans; and (4) economic factors. The Disaster Resilience Framework will provide a starting point for stakeholders to advance from current practice to resilience-based approaches that can be adapted by communities of varying size and complexity.

Current Framework document:

The 75% working draft represents the input received to date. We encourage your input and comments on the 75% draft document by March 9, 2015 to be considered for the final draft for public comment.

Contact

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Needs from this Workshop

- Is the approach on point?
- Is it helpful to communities dealing with resilience issues in the Energy Sector?
- What gaps/perceived gaps exist in our approach?
- Will these performance metrics, if implemented, create resiliency in the Sector?
- Will the plan laid out here impact your day-to-day business?