THE ROLE OF ENERGY INFRASTRUCTURE MODELING AND ANALYSIS (EIMA) IN ENERGY SYSTEMS RISK AND RESILIENCE

Tribal Energy Systems: Climate Preparedness and Resiliency
Tribal Leader Forum Series

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BRIEFING TOPICS

- Overview of Office of Electricity and Energy Reliability (OE) and EIMA
- Describe EIMA's Energy Systems Risk Predictive Capability subprogram
- Climate Change Analysis: OE Sea-Level Rise Pilot Project

OE ORGANIZATION

OE-1.1
Corporate Business Operations

Terri Lee
Chief Operating Officer

OE-1
Office of the Assistant Secretary

Patricia Hoffman
Assistant Secretary

Vacant
Principal Deputy Assistant Secretary

OE-10
Power Systems Engineering Research and Development

Dan Ton
Acting Deputy Assistant Secretary

OE-20
National Electricity Delivery

Mary Beth Tighe
Acting Deputy Assistant Secretary

OE-30
Infrastructure Security and Energy Restoration

Tom Roston
Acting Deputy Assistant Secretary

OE-40
Energy Infrastructure Modeling and Analysis

David Ortiz
Deputy Assistant Secretary

OE-50
Advanced Grid Integration

Hank Kenchington
Deputy Assistant Secretary

EIMA SEEKS TO ADVANCE OPERATIONS AND PLANNING OF INTEGRATED ENERGY SYSTEMS

- Sponsor catalytic systems-level research and development (R&D) focused on advanced measurement and control of electricity systems
  - Advanced Modeling Grid Research (AMGR)
  - Transmission Reliability (TR)
- Build and maintain an Applied Analytical Capability
  - Energy Systems Risk and Predictive Capability (ESRPC)

ESRPC IMPROVES ENERGY INFRASTRUCTURE DECISIONS THROUGH EMPIRICAL RISK ANALYSIS

- Goal is to assess energy system risks and reliability in response to natural and man-made events
- Analytical products regarding energy systems include:
  - Impact and interdependency analyses
  - Vulnerability and choke-point analyses
  - Empirical risk assessments
- By informing key stakeholders, the benefits of the analysis are:
  - Improved preparedness, response, restoration, and recovery from energy system disruptions
  - Timely and relevant predictions for decision making
  - Energy system investments and operational improvements that appropriately value short - and long-term risks

COMPONENTS OF RISK ASSESSMENT

- **Threat and Hazard Analysis**
  - Identify relevant man-made and natural hazards or conditions
- **Vulnerability Analysis**
  - Determine vulnerability of energy assets, systems, and networks to relevant threats and hazards and supporting supply chains and inputs
- **Consequence Analysis**
  - Categorize and quantify the impact of damage or loss of an energy asset or system
- **Criticality Analysis**
  - Identify specific assets, systems, and networks that are critical for energy continuity goals
  - Identify system dependencies from non-energy sectors

EXTREME WEATHER IS ONLY ONE THREAT

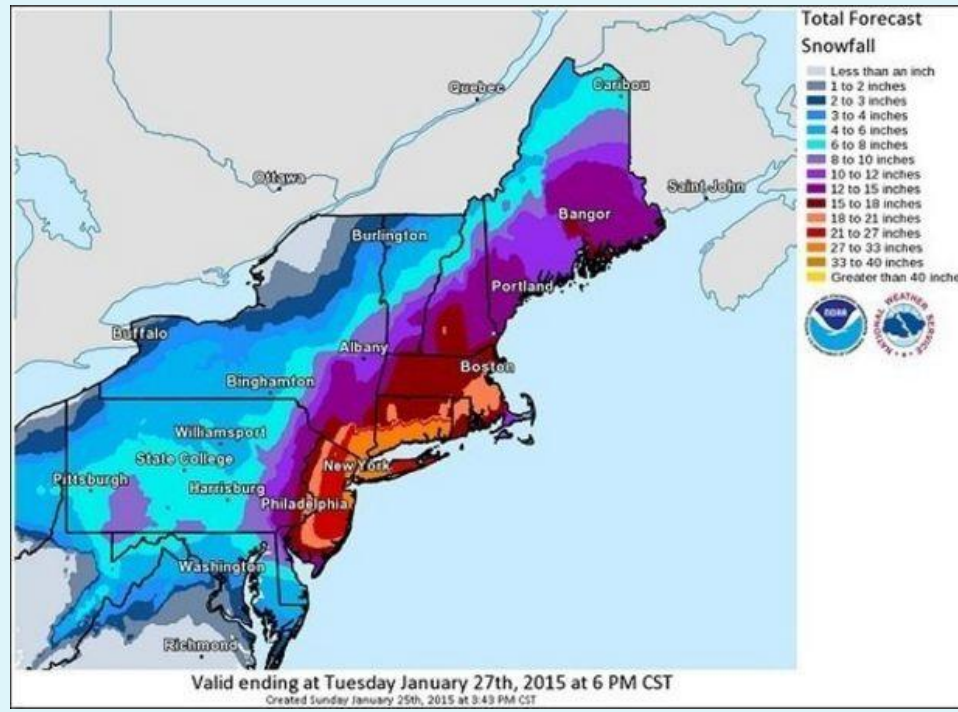
Seasonal extreme weather and natural disasters	Long-term risks and security	Events of national significance
Summer – Heat waves, wildfires, drought, and severe storms	Climate change	Political conventions
Fall – Hurricanes and drought	Cyber security	Presidential Inaugurations
Winter – Cold weather, ice storms, and heavy snow	Physical security	Super Bowls
Spring – Flooding and tornadoes	Latent and aging infrastructure	International summits
Earthquakes		

ENERGY SYSTEM CHALLENGES AND ANALYTIC DRIVERS

- Accommodating renewable and distributed resources
- Complying with environmental regulations
- Providing services reliably in the face of natural disasters and man-made disruptions
- Operating with tighter margins and interdependencies among sectors
- Responding quickly as loads respond to prices and variable generation increases
- Near- and long-term risks associated with global climate change and extreme weather

TECHNICAL, ECONOMIC, AND POLICY QUESTIONS

- What is likelihood of customers losing power?
- How many customers will lose power?
- What would be the likely length of the outage?
- What energy assets could be impacted?
- What is the scope of impact to the electric transmission system? Distribution system? Generators? Customers? Lifeline infrastructure?
- What is the scope of impact to NG and Petroleum assets?
- Are there downstream effects or interactions?



Winter Storm January 2015

OE SEA-LEVEL RISE PILOT STUDY

- Developed a proof of concept approach for identifying energy facilities exposed to sea level rise (SLR) through 2100. Approach is:
  - Flexible to accommodate multiple SLR scenarios
  - Accounts for global *and* local sea level changes
  - Scalable to the entire U.S. coastline
  - Makes use of existing, robust data sources
  - Able to incorporate results from regional studies
- Tested the concept on four metropolitan statistical areas (MSAs) – New York City, Miami, Houston, and Los Angeles
- Published Report entitled: ***Effect of Sea Level Rise on Energy Infrastructure in Four Major Metropolitan Areas,* October, 2014**
- Project is being expanded to four additional MSAs including storm surge assessment

http://www.energy.gov/oe/downloads/effect-sea-level-rise-energy-infrastructure-four-major-metropolitan-areas

THANK YOU!

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