The Role of Energy Infrastructure Modeling and Analysis (EIMA) in Energy Systems Risk and Resilience

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Briefing Topics

• Overview of Office of Electricity Delivery and Energy Reliability
• Energy Infrastructure Modeling and Analysis Division: New Energy Systems Risk and Predictive Capability Program
• State Energy Risk Assessment Initiative
# OE Organization

## 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

- Support catalytic systems-level research and development (R&D) focused on advanced measurement and control
  - **Advanced Modeling Grid Research (AMGR)**
    - Seeks to develop “faster than real time” tools through advanced computational and mathematical methods
  - **Transmission Reliability (TR)**
    - Seeks to advance wide area system awareness and applications
- **Build and maintain an Analytical Energy Systems Risk and Predictive Capability**
Energy Systems Risk and Predictive Capability

• Goal is to assess energy system risks and reliability in response to natural and man-made events
• Analysis products will include
  ▪ Impact and interdependency analyses
  ▪ Vulnerability and choke point analyses
  ▪ Empirical risk assessments
• Customers include – State and local officials, system operators, industry participants, and Federal response officials
• 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
Analytical Focus

- **Pre-event analysis**
  - Assist Federal agencies, States, and regions to plan for and manage risks to energy infrastructure
  - Analyze “at risk” energy assets and systems for reliability and resiliency
  - Produce forecast products to project downstream effects from events
  - Host modeling and analysis workshops to help stakeholders improve decision making for mitigation and response plans

- **Support for response and recovery**
  - Provide near real-time products and analytic support for the Federal emergency response and recovery mission
  - Provide analysis products to State and local officials, and energy owners and operators to improve actions during energy events
  - Assess wide area impacts to energy supplies and infrastructure to estimate damage and facilitate recovery operations

- **Lessons learned and post-event analysis**
  - Produce post-event products which analyze impacts from large scale energy events
  - Assess the performance of risk assessment and forecasting models
  - Quantify lessons learned to improve models and future forecasts
## Seasonal Threats and Areas of Interest

<table>
<thead>
<tr>
<th>Seasonal extreme weather and natural disasters</th>
<th>Long-term risks and security</th>
<th>Events of national significance</th>
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<tbody>
<tr>
<td>Summer – Heat waves, wildfires, drought, and severe storms</td>
<td>Climate change</td>
<td>Political conventions</td>
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<td>Fall – Hurricanes and drought</td>
<td>Cyber security</td>
<td>Presidential Inaugurations</td>
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<tr>
<td>Winter – Cold weather, ice storms, and heavy snow</td>
<td>Physical security</td>
<td>Super Bowls</td>
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<td>Spring – Flooding and tornadoes</td>
<td>Latent and aging infrastructure</td>
<td>International summits</td>
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<td>Earthquakes</td>
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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 the likelihood of customers losing 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?
- What is the scope of impact to NG and Petroleum assets?
- Are there downstream effects or interactions?
Partnerships Are Critical to the Success of EIMA

- Energy system planning and risk management occurs largely at the State level
- Partners
  - Ensure that EIMA’s work is relevant to challenges that system owners, operators, and responders face
  - Provide essential knowledge and insight regarding regional nature of risk and potential mitigating actions
  - Augment DOE’s analytical capabilities
  - Perform key analyses of infrastructure risk, hypothesis testing, model building, and implement actions
State Energy Risk Assessment Initiative

• Working Group members: DOE, NCSL, NASEO, NARUC, and NGA

• Goals:
  ▪ Increase States’ awareness of risk considerations relating to energy systems and infrastructure to better prepare them to make more informed decisions
  ▪ Inform and assist States on available analytical capabilities and resources for identifying and evaluating energy infrastructure risks
  ▪ Provide a suite of scalable, easily-applied analytical tools, methods, and processes to enable States to better assess risks to energy systems and assets.
Key Objectives and Activities

• Determine State energy risk assessment needs
  ▪ Conduct focused, targeted interviews with key State representatives who are involved in evaluation of risk-related activities
  ▪ Identify key stakeholders that are critical to success and identify partnership gaps

• Assess current practices in State-level energy risk analysis
  ▪ Conduct review of Energy Assurance Plans (EAPs) to determine and summarize extent of States’ risk-related activities
  ▪ Summarize and identify current common practices
  ▪ Identify jurisdictional priorities

• Identify tools, methods, and processes to evaluate risk related to energy assets and systems
  ▪ Identify readily available, low or no-cost, best-of-breed risk categorization and visualization tools and assess against State requirements

• Engage with key stakeholders (across entire risk analysis development cycle) to enhance information sharing and collaboration
Working Group Near-term Activities

• Utility Investment and Resiliency Simulation (NARUC)
• Survey members regarding how THIRA guidelines are applied to energy-specific risks (NGA)
• Convene group of State energy experts to determine best practices and available data and co-sponsor the Annual Winter Energy Outlook Conference (NASEO)
• Workshop/webinar for legislators in collaboration with Governors’ offices and Energy/PUC officials (NCSL)
• Development of State energy risk assessment tool kit (All)
• Energy Risk Assessment Workshop, Spring 2015 (All)
Thank You!

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