



The Role of Energy Infrastructure Modeling and Analysis (EIMA) in Risk Analysis, Grid Integration, and Resiliency

*National Association of State Energy Officials
Annual Meeting*

Alice Lippert

Senior Technical Advisor

Office of Electricity Delivery and Energy Reliability (OE)

US Department of Energy

September 9, 2014



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 Risk Assessment Working Group



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**

Matt
Rosenbaum
Acting Deputy
Assistant
Secretary

OE-30
**Infrastructure
Security and
Energy
Restoration**

Vacant
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 Other Areas of Focus

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?
- 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?



Tropical Storm Karen
 Predicted Track
 October 2013



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 Risk Assessment Working Group

- Group members: OE, NASEO, NARUC, NCSL, and NGA
- Goal: Collaborate to promote greater understanding of risk and how risk assessment can be applied to energy infrastructure and systems at the State level
 - Risk assessments of critical assets can improve understanding of interdependencies
 - Predictive analysis can be used to gain new insight into risk management and reduce uncertainty
 - Information sharing among State/federal governments, private industry, and the public reduces overall risk
- “N-groups” engage their respective constituents and take advantage of synergies created by working group collaboration



Risk Assessment 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 toolbox (All)



Thank You!

Alice Lippert, DOE/OE
Alice.Lippert@hq.doe.gov

