

September 03, 2014

**Analyzing the Costs and Benefits of Electric Utility Hardening Efforts in Response to Severe Weather**

One-day Workshop

Agenda Outline

Organized by the Center for Energy, Economic and Environmental Policy (CEEPP)  
Edward J. Bloustein School of Planning and Public Policy,  
Rutgers, The State University of New Jersey

On Behalf of the New Jersey Board of Public Utilities

**Logistics**

Dates: Tuesday, Oct. 21, 2014  
Location: Bloustein School of Planning and Public Policy, Rutgers University  
33 Livingston Ave., New Brunswick, NJ  
Time: 8:30 am, Registration and Coffee  
9 am to 4:45 pm, Workshop  
12-1:30 pm (Lunch – not provided; numerous eating establishments are located within a short walking distance of the Bloustein School)  
Cost: Free (registration is restricted to 100, with a set aside for New Jersey State and Municipal Employees)

**Contact**

Frank Felder, Center for Energy, Economic and Environmental Policy, [ffelder@rci.rutgers.edu](mailto:ffelder@rci.rutgers.edu)

**Learning Objectives**

- I. Understand the key terms, assumptions and outcomes of cost-benefit analysis as applied to utility hardening in response to severe weather
- II. Appreciate how the electric industry defines, measures and evaluates reliability and resiliency
- III. Learn about various options to harden the electric power grid in response to severe weather, their implications, and costs and benefits
- IV. Enable the NJ BPU to raise and discuss issues related to utility hardening in response to severe weather

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## Agenda

- I. Welcome and Introduction (Felder, 9-9:15)
- II. Fundamentals of Reliability and Resiliency Analysis (Coit, 9:15 to 10:30)
  - A. Definitions of reliability and resiliency
  - B. Failure modes
  - C. Reliability modeling
  - D. Strategies for improving reliability and resiliency

*BREAK: 10:30-10:45*
- III. Reliability, Resiliency and the Electric Power Grid (Felder, 10:45 to noon)
  - A. Definitions and concepts regarding reliability and resiliency in the context of electric distribution systems
  - B. Electric power system reliability approaches and metrics
  - C. Value of Loss of Load (VOLL) and its role in cost-benefit analyses

*LUNCH: 12-1:00*
- IV. Engineering Economics (Coit, 1:00 to 2:00)
  - A. Time value of money
  - B. Discount rate
  - C. Net present value
  - D. Considerations of uncertainty
- V. Economic efficiency and CBA (Felder - 2:00 to 3:00)
  - A. Equity, risk preferences and other policy objectives
  - B. Integration of CBA with reliability and resiliency analysis
  - C. Probability of outage with and without hardened grid (benefit)
  - D. Cost estimates of various options for utility hardening
  - E. Uses and misuses of CBA: informative not dispositive

*BREAK: 3:00-3:15*
- VI. Utility Hardening in Response to Severe Weather (Felder, 3:15 to 4:15)
  - A. Literature review: academic literature, other states, NJ specific efforts
  - B. Hardening options, characteristics and costs: types of options and their interactions
  - C. Examples of CBA of hardening options

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D. Data collection, evaluation and evolving technologies: importance of data collection, resolution of uncertainty, measurement of costs

VII. Discussion and Wrap-up (Coit and Felder, 4:15 to 4:45)

### **Workshop Presenters**

**David Coit, PhD, Professor, Department of Industrial and Systems Engineering, Rutgers University.** David W. Coit's research interests are in the areas of system reliability modeling and optimization, power systems reliability, and multiple-objective optimization. He has been funded for his research from the NSF, U.S. Navy, U.S. Army, power utilities and industry. Supported by NSF grants, he developed system reliability models and algorithms to determine optimal system design configurations considering degradation and reliability estimation uncertainty. Working under a grant from a power utility, Prof. Coit and his students developed reliability importance metrics and optimal transformer replacement policies. He also previously worked for more than ten years at IIT Research Institute (IITRI), Rome, NY (now called Alion Science and Technology) where he designed and implemented reliability programs, developed reliability prediction models and conducted reliability analyses. Prof. Coit holds a doctorate from the University of Pittsburgh.

**Frank Felder, PhD, Associate Research Professor and Director of the Center for Energy, Economic and Environmental Policy (CEEEP), Bloustein School of Planning and Public Policy, Rutgers University.** Frank Felder directs energy and environmental policy and planning research. Ongoing and recent projects include energy efficiency evaluation studies, economic impacts of renewable resources, and power system modeling of state energy plans. He is an expert on restructured electricity markets and has published widely in professional and academic journals on market power and mitigation, wholesale market design, reliability, transmission planning, and rate design issues. He was a nuclear engineer and submarine officer in the U.S. Navy. Prof. Felder holds a doctorate from the Massachusetts Institute of Technology.