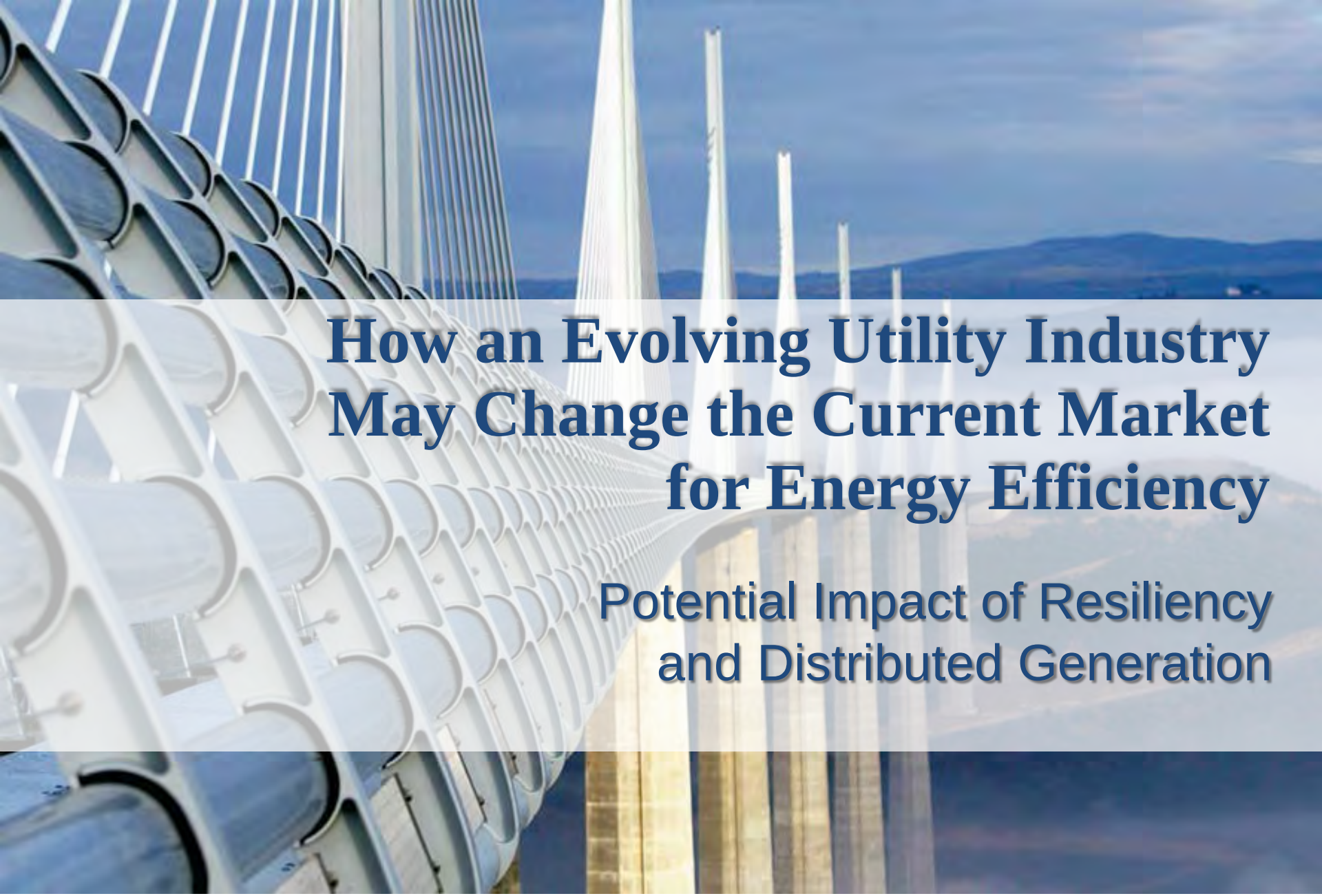


How an Evolving Utility Industry May Change the Current Market for Energy Efficiency

Potential Impact of Resiliency and Distributed Generation

ARCADIS

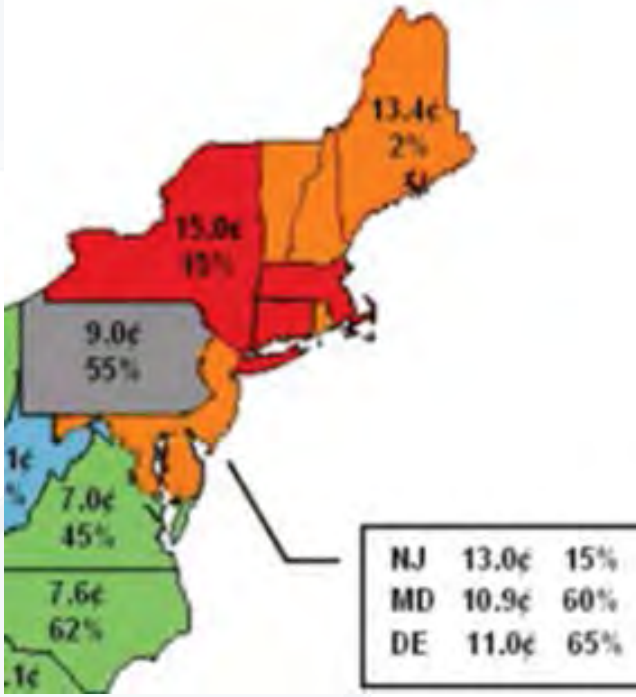
Infrastructure · Water · Environment · Buildings

Organization of Presentation

- Goals of Distributed Generation in the Northeast
- Overview of Effects of Superstorm Sandy
- Concept of Grid Resiliency
- Challenges to Distributed Generation
- Potential Effects of Distributed Generation on Energy Efficiency Initiatives

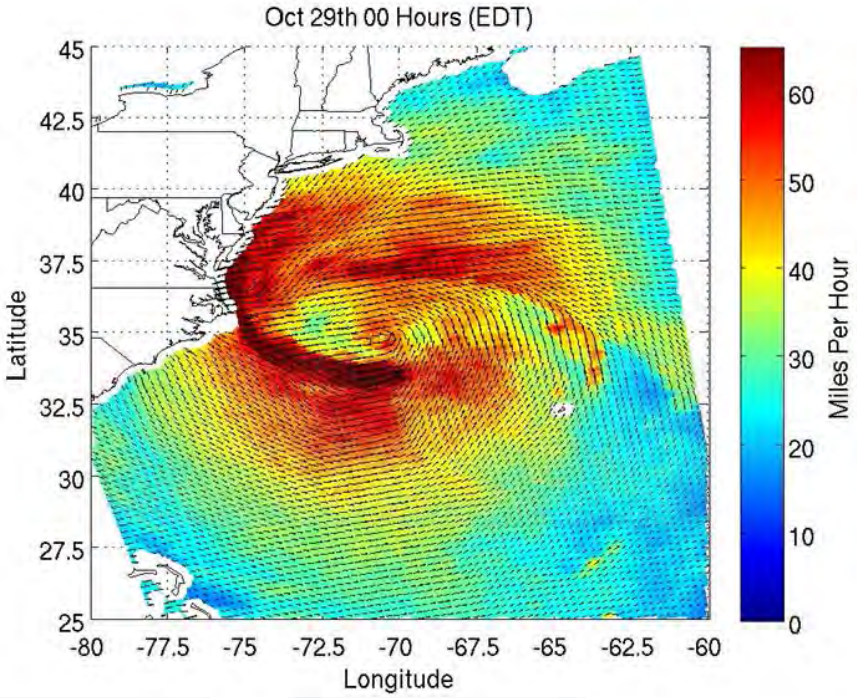
Goals of Distributed Generation in the Northeast

- Grid capacity mitigation
  - Avoided capital investment for transmission and generation
- Economic benefit for user(s)
- Achievement of Renewable Portfolio Standards
- **Improved resiliency**



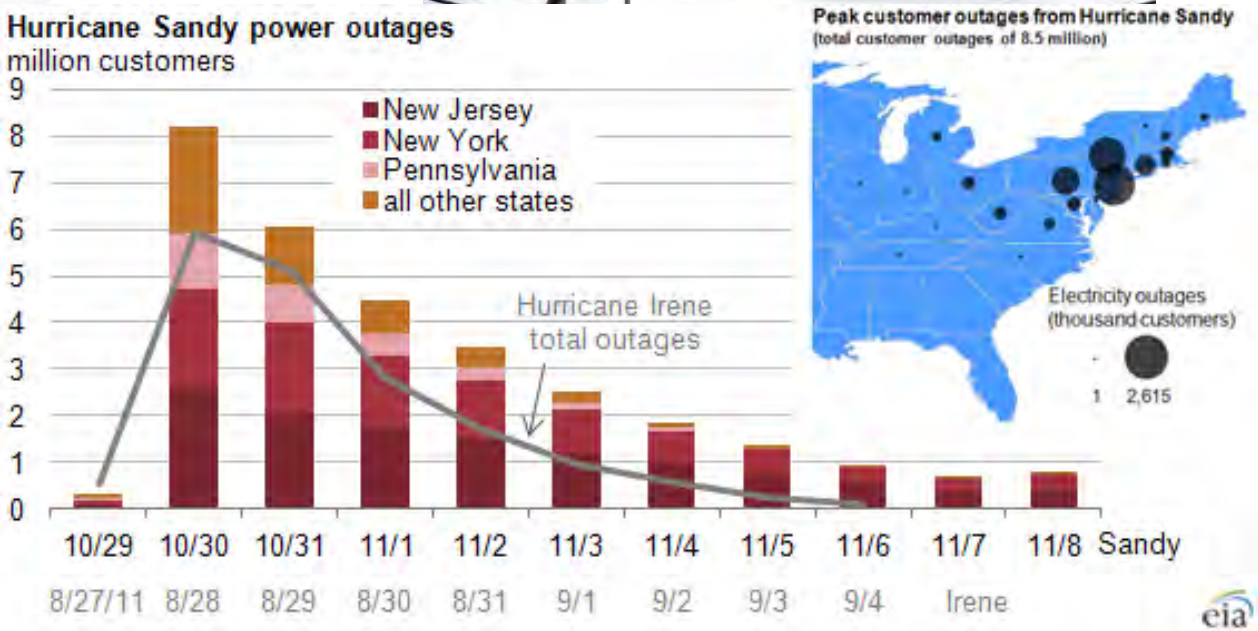
Superstorm Sandy

- Tropical storm force winds extending 500 miles from center
- Peak winds approaching 100 mph
- Sustained winds of 80 mph
- Rainfall amounts up to 8.5” (VA)
- Snowfall amounts up to 45” (WV)
- Storm surge at the Battery in NYC Harbor exceeded 1821 record by over 2.5 feet



Superstorm Sandy

- Over 100 deaths in 8
- U.S. Damage and lo $65B-$75B
- Gas Stations in NY a because of power ou depleted fuel
- Power outages for more than 8 million accounts in 15 States
- Nearly 1 million accounts without power for more than a week



“Stories from Sandy”

- It’s estimated that as many as ½ of backup generators did not start
- For those backup generators that ran, fuel supply quickly became an issue
- A number of PV facilities, although intact and functional, were not able to provide power to facilities because of interconnection/safety issues
- But….several campus and co-op level CHP microgrids successfully maintained power

Grid Resiliency

- ***Prevention:*** protection of distribution system
- ***Recovery:*** rapid assessment, resource deployment and availability of replacement components
- ***Survivability:*** ability to maintain basic functionality under a crisis – this is a new function for most distribution utilities

EPRI, 2012-2013.

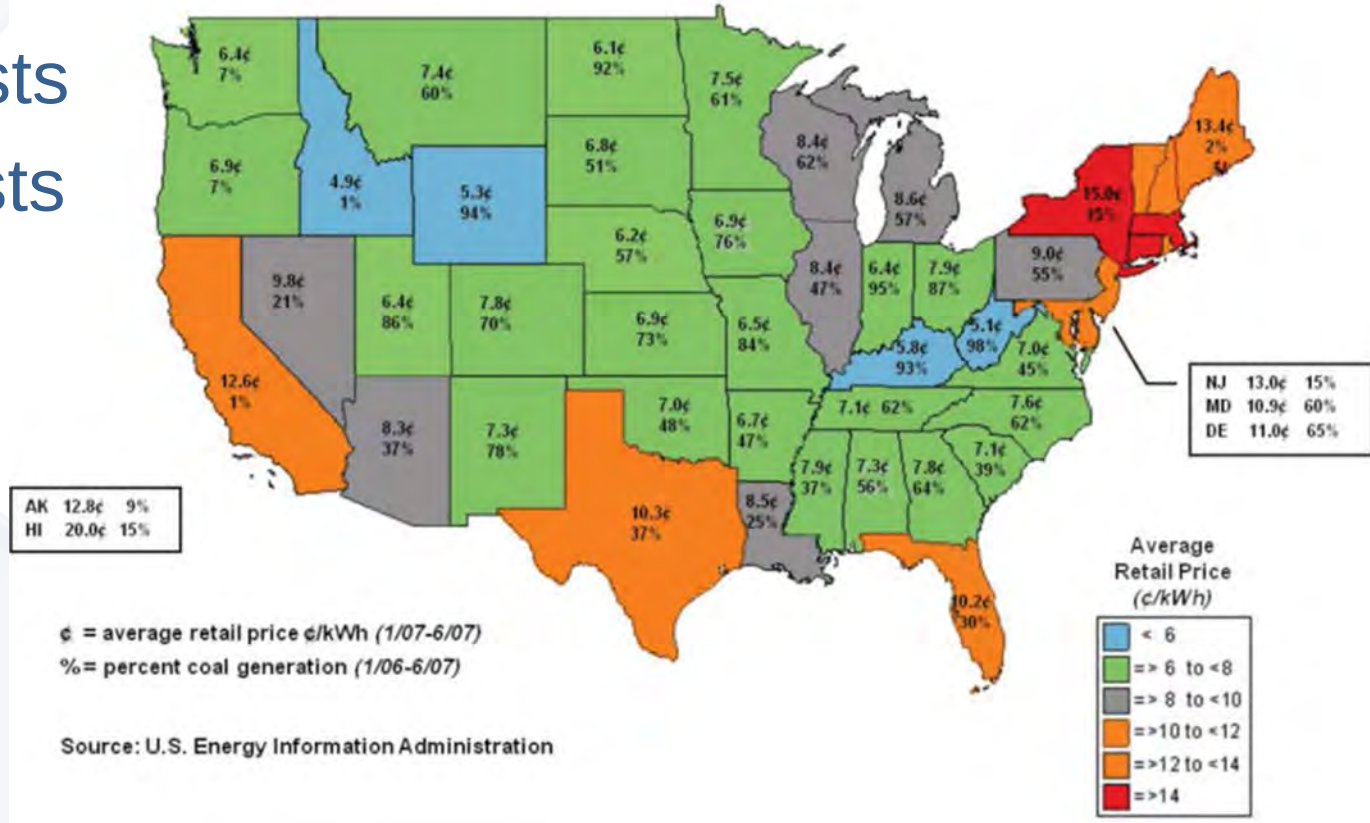
Diverse, distributed generating resources are part of the answer.
The ability to prioritize and control distribution is critical.

Challenges to Distributed Generation as a Resiliency Solution

- Economic Constraints
- Physical Constraints
- Regulatory/Institutional Constraints

Economic Constraints

- Energy costs
- Capital costs
- O&M costs



Are today's costs the right criteria?

Physical Constraints

- Space
- Fuel availability for non-renewable generation (particularly for large scale or during crisis)
- Safety/grid integrity
- Prioritization and controlled deployment of resources during outages

Regulatory/Institutional Constraints

- Environmental
  - Emissions, siting, noise
- Interconnection
- Decoupling of Generation from Transmission

Potential Effect of Resiliency and Distributed Generation on EE Programs

- Limited direct effect
  - EE reduces the size of DG that is required
  - EE reduces the operating cost of DG
  - DG does not satisfy energy reduction goals
- Greatest effect is likely indirect
  - Re-prioritization of legislation
  - Re-prioritization of funding

Conclusions

- Events like Superstorm Sandy remind us of the vulnerability of our electrical infrastructure
- Distributed generation (and energy efficiency) can play an important role in deferring investment in additional generation or transmission capacity
- Diverse, distributed generation resources significantly increase resiliency – but need control
- Policy and technical challenges hinder widespread use of DG and limit overall resiliency benefits at this time
- EEPS, RPS and resiliency are interrelated and each plays an important role in achieving overall energy goals

Imagine the result

Matthew Yonkin, PE, BCEE, CEM
T: 518.250.7356 | M: 518.415.2155
Matthew.Yonkin@Arcadis-us.com

MALCOLM PIRNIE ARCADIS