What’s in the Bulk Electric System?
Stephen G. Kozey
May 6, 2014
What’s In the Bulk Electric System?
Do you want or need it?

Microgrid Interconnections and Energy Storage
Richard G. Lugar Center for Renewable Energy
Points to cover

- Disclaimer
- Introduction to industry structure
- The Microgrid, what and where
- What does the Microgrid want from the bulk electric system and visa versa
Industry Structure

- Local (mostly consumption) individual customers
- Distribution system
- Transmission System
- Generation assets (not so much storage)
- Larger units of reliability performance – local balancing authority, Regional Transmission Organization [these owe duties of performance to one another]
Bulk Electric System – What?

- High voltage transmission wires and facilities (transformers, substations, etc.), usually those above 100kV operating in a network fashion
- Facilities attached to the system (large generation stations) and used to communicate to and about the system
- Not the distribution system
Industry Structure II

- State and Federal Legislation
- Price and service regulation
- Market structure regulation
- Reliability regulation
- Regular access to capital and relative certainty of the risk of capital recovery and who bears the risk
Microgrid What?

- Too many definitions
- But at a minimum – an alternative source of supply for the load from generation not subject to utility or RTO dispatch, and maybe not dependent on the local distribution grid for operation over some time frames
Microgrid Where?

- University campus
- Defense Department installation
- Large property (skyscraper or 4 story?)
- A neighborhood
- A street
- A house
What do microgrids want from the Bulk Electric system and the market?

- Services and a market supported by facilities dependably in operation and subject to reasonable regulation
- A place to sell excess energy to at a fair price
- A place to buy energy from at a fair price
- A place to secure necessary ancillary services [maybe this is from their local utility!]
What does the bulk electric system want?

• Ability to forecast load dependent on the system
• Ability to dispatch generation attached to the system to meet the load both day ahead and in real time
• Ability to deal with the consequences of unscheduled variation of load and generation
• A place to send the bill for providing services
Where do you go to get what you want?

Microgriders
- State legislatures
- State commissions
- FERC
- Standards setting organizations

Bulk Electric System Operators
- FERC
- Local utilities (who go to state legislatures and state commissions)
What are the preconditions for substantial investment in microgrids?

- Sound business model(s)
- Access to capital by some or all of the players
- Confidence of the adopters in durability, reliability, etc.
- Relatively high retail electricity rates?
- Need for special, extra reliable or extra resilient service?
- Cost or technological breakthroughs?