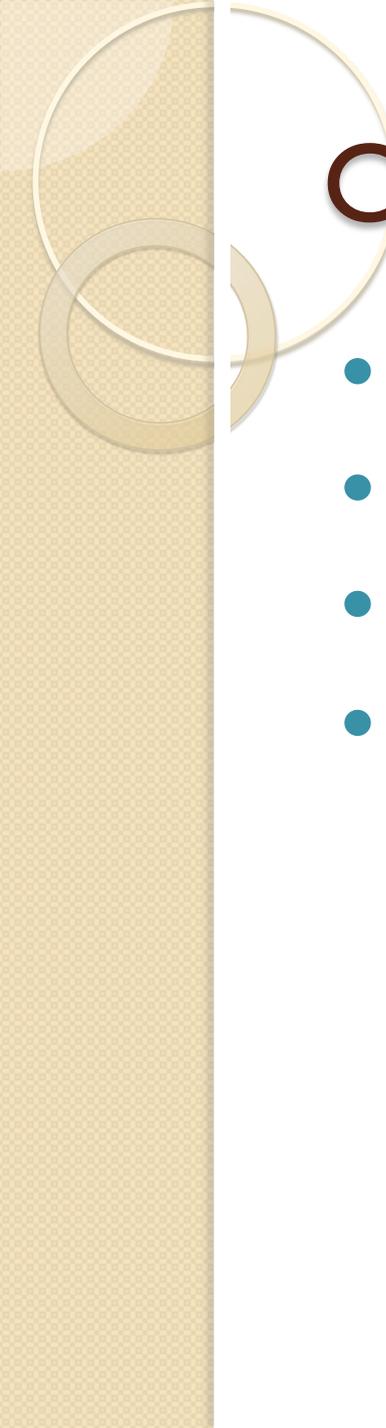


# Energy Security in a Changing Landscape

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# Outline

- Defining Energy Security
- The Grid
- Metrics
- Energy Security

# Energy Security – What is it?

- Term - 256 million hits in 0.42 seconds
- Definition - 34 million hits in 0.19 seconds
- Many definitions offered by many “experts” all with differing viewpoints
- ...means different things to different people in different places with different needs with different political views with different financial or other personal interests...

# Components of Energy Security

- Generation – “make” the energy, power plant
- Delivery – have it arrive somewhere
- Quality – frequency, proper voltage, etc.
- Quantity - volume
- Timeliness – when needed
- Type – green, non-emitting source, dirty, etc.
- Price – how much does it cost, economical

# “The Grid”

- What is The Grid?
- The delivery system
- The system that gets power from the generator to the load
  - Transmission and distribution poles and wires, substation and distribution transformers, etc
- Usually described as being owned and operated by a utility or collectively the utilities
- NOT true



# The Grid

- Customers own parts of the grid and generation sources
- Cities, municipalities, State agencies, industrial sites, colleges and universities, commercial customers, and the federal government
- DoD and other federal agencies own substations, distribution systems and generators

# Why is it Important?

- Everything attached to the Grid is impacted by actions of all parties on the Grid
- The utility is usually the “system operator” for a region and has the ability to “manage” the fluctuations that occur on the Grid
- Utility behavior is heavily regulated by NERC, FERC and PUCs
- Customer behavior generally is not
- Starting/stopping generators, fault currents, voltage, frequency, line loading, balancing, etc.

# Metrics – Reliability Indicators

- SAIIFI – system average interruption frequency index
  - Annual number of interruptions
- SAIDI – system average interruption duration index
  - Annual minutes customer is out
- MAIFI – momentary average interruption frequency index
- Collected up to the customer meter

# Metrics

- Are system averages, say nothing about any individual customer
- Different metrics for transmission vs. distribution served customers
- To understand reliability at a specific location utilities don't use this data
- Customers should collect this data for their system

# Metrics – SCE&G 2012

- Distribution Customers
  - SAIFI - annual interruptions, 1.34
  - SAIDI - annual minutes, 116.16
  - MAIFI – blinks, 4.81
  
- Transmission Customers
  - SAIFI - 0.32, 5-year average 0.34
  - SAIDI – 10.26
  - MAIFI – 0.66, 5-year average 0.67



# Energy Security

- Energy Security includes the reliability of the generation and delivery systems
- Dependent upon the total Grid not just the utility grid
- The quality and integrity of the customer owned system is critical
- Long list of requirements to be able to reliably operate an electric system
- Not a core competency of customers



# Energy Security

- The equipment and systems are complex and require constant maintenance
- Customers generally don't have the expertise and lack funding
- Almost impossible to develop and maintain the expertise
- Funding will always be an issue
- As the systems become more complex these issues overwhelm the owner



# Energy Security

- The basic infrastructure must be addressed first
- Generally find that most customer problems are due to issues on their grid
- Utilities have the expertise and will work with customers to solve these issues
- Areawide contract, privatization and other contracting mechanisms