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

- **SAIFI** – 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