Helping our members work together to keep the lights on... today and in the future

Southwest Power Pool
Grid 20/20
Transmission Technologies

PJM
Valley Forge, PA
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Independent System Operator (ISO) / Regional Transmission Organization (RTO) Map

Alberta Electric System Operator
MISO
Ontario Independent Electricity System Operator
New Brunswick System Operator
ISO New England
New York ISO
PJM Interconnection
Electric Reliability Council of Texas
Southwest Power Pool
California ISO
This August 2011 storm caused more than a dozen concurrent transmission and generation outages.
SPP kept the lights on, but at what cost? How can we use technology and data to implement better mitigation while maintaining system security.
Synchrophasor Deployment

Major progress due to SGIG and other utility (e.g., OG&E, SDG&E, TVA) projects

- **WECC**: 250 PMUs ($108M): PG&E, BPA, SCE, SRP, IP
- **NY ISO**: 39 PMUs ($74M)
- **PJM**: 90 PMUs ($28M)
- **MISO**: 150 PMUs ($35M)
- **ATC**: 5 PMUs ($28M)
- **Entergy**: 41 PMUs ($10M)
- **ISO New England**: 30 PMUs ($9M)
- **Duke Energy**: 45 PMUs ($8M)
- **Midwest Energy**: 1 sub ($1.5M)

Source: NASPI
Challenge is Creating Understanding from Data

– Data helps understanding that needs to be addressed now and in the near future due to increased grid connectivity and complexity regarding controls and system response

– Manage data to create actionable information to improve grid operations, markets and planning

– Industry needs to pursue RD&D that will create opportunities for development of applications to improve grid efficiency and reliability
Wide Area Monitoring to Wide Area Situation Awareness

Connectedness

Wisdom

Understanding (Why)

Knowledge (How)

Information (w,w,w)

Data (Symbols)

Evaluated

Principles

Patterns

Smart Grids

SCADA

HMI

Russell L. Ackoff

Graphic Illustration: Courtesy of Dr. Lawrence Jones, Alstom Grid Inc. and Dr. Richard Candy, Eskom South Africa
Future Technology and Data Needs

- Enhanced collaboration and cooperation to leverage computing capabilities, development of improved algorithms and standards to enhance interoperability, i.e., DOE’s proposed Electrical Systems Hub and ANL’s proposed National Power Grid Simulator User Facility

- FACTs devices and controls to improve flexibility and resiliency for grid operations, e.g., system optimization / reconfiguration tools, power electronics to manage loadings on critical facilities, etc.

- Improved diagnostics and analytical capabilities using phasor data, using interconnection-wide phasor data for effective baselining and pattern recognition to develop SOL and alarm specifications and operator decision support tools.