Energy Storage At AEP

Pumped Hydro:
- Difficult to site
- 100s of MW

Substation Scale:
- Easier to site
- 1-10s of MW

Community Energy Storage:
- Easiest to site
- 25-500kW

Costs remain too high for single benefit value streams although they are coming down

AEP is in “learning” mode
Drivers for Energy Storage

- Peak Load Shaving / Leveling
  - T&D infrastructure project deferrals
  - Increased utilization of existing Generation
- Premium Power
  - Islanding of Load Area
  - Power Quality
- Integrating Solar / Wind Generation
  - Smoothing variability
  - Time shifting
- Energy Arbitrage
  - Charge at lower cost / Discharge at higher value
- Ancillary Services
  - Frequency regulation
  - Spinning reserve
Integrating Energy Storage to the Distribution System

- Connection & protection is relatively simple electrically
- Current IEEE 1547 Guidelines conflict with some benefits
- Traditional “cost / benefit” analysis sub-optimizes application
- Should be “visible and controllable” to Distribution operators via SCADA
- Should have “configurable” control algorithms to allow dynamic changes to meet economic / reliability benefit opportunities
- Should be “self discoverable” for automated integration
- Higher penetrations may require “market clearing”
Integrating Energy Storage

1.2 MW, 7.2 MWh Distributed Energy Storage System in Chemical Station, North Charleston

Started Operation on June 26th, 2006

NGK Insulators Ltd
S&C Electric Co.
DOE / SANDIA
**CES – Virtual Station Scale Storage**

**Local Benefits:**
1) Backup power
2) Flicker Mitigation
3) Renewable Integration

**Grid Benefits:**
4) Load Leveling at substation
5) Power Factor Correction
6) Ancillary services

![Diagram of CES Control Hub and Substation with Communication and Control Layout for CES]
American Electric Power
Energy Storage

Questions?

Tom Weaver – AEP – tfweaver@aep.com