

Perfect Power @ IIT and Local Area Measurement System

Alex Flueck, Mohammad Shahidehpour, Zuyi Li, Chi Zhou
US Department of Energy (DE-FC26-08NT02875),
Illinois Institute of Technology, S&C Electric,
Intelligent Power Solutions, Commonwealth Edison
and
Korea Electrotechnology Research Institute

What's your problem?

- 2004-2006: 12 outages (partial, total)
 - Annual costs up to \$500k
 - Restoration costs, lost productivity, ruined experiments
- Aging infrastructure
 - Cable failures, switchgear failures, manual (3-5 hr outage)
- Increasing demand and carbon
 - More students, residence halls, faculty, research
 - \$5M substation planned
- http://www.iit.edu/perfect_power

Investment & Benefits

- Investment
 - \$12M DOE, IIT, S&C Electric, Intelligent Power Solutions
- Benefits:
 - Improved reliability and safety (HRDS)
 - Lower peak power, improved energy efficiency
 - Defer \$5M substation (IIT) and \$2M substation upgrade (ComEd)
 - Reduced energy costs and new revenue stream for ancillary services
 - Reduced energy usage and reduced carbon footprint
 - Living laboratory



You can only manage what you measure

- Phasor Measurement Unit
 - GPS time stamped voltage and current samples
 - One phasor sample per cycle (60 samples per sec)
- Detailed load models for individual buildings
- Detailed power measurements for renewable and distributed sources



IIT Campus

High Reliability Distribution System:

DIAGRAM: Drawing not to scale.

