Demystifying the Smart Grid
AMEU 2012
What is the Smart Grid?

Many definitions

A SmartGrid is an electricity network that can intelligently integrate the actions of all users connected to it – generators, consumers and those that do both – in order to efficiently deliver sustainable, economic and secure electricity supplies.

Source: European Technology Platform SmartGrids

A Smart Grid is self-healing, enables active participation of consumers, operate resiliently against attack and natural disasters, accommodate all generation and storage options, enable introduction of new products, services and markets, optimize asset utilization and operate efficiently, provide power quality for the digital economy.

Source: US Department of Energy

Need to look at grid requirements
Today’s energy challenge
The evolving grid

- Electricity is the most versatile and widely used form of energy in the world, developed over the past one hundred years
- More than 5 billion people have access to electrical energy
- It’s evolution is ongoing but we urgently need to speed up the development
- To mitigate global climate change the electrical system needs to change quickly
- Need to match limited supply and increasing demand

- We need a much better power system
Traditional power grid
Relatively simple
The evolving grid
New complexities
The evolving grid
New intelligence

Integration of renewables

Grid interconnections

Control / IT / Cyber Security

Reliability and efficiency

Demand management

E-mobility
The Smart Grid
OT and IT

- Operational Technology
  - Physical devices in the power system
  - Allow monitoring and control
    - SCADA
    - Remote Terminal Units
    - Protection
    - Metering
The Smart Grid
OT and IT

- Information Technology
  - Enterprise software systems
    - Distribution Management Systems
    - Outage Management Systems
    - Asset Management
  - Enable Management of the power system

- Systems Thinking
  - Tying together separate components
  - Achieve synergies supporting investment
  - Power equivalent of “Internet of things”
The Smart Grid
Four Key Areas

- Communications
- Distribution Automation
- Grid Management and Analysis
- Integration of New Technology
The Smart Grid Communications

- Automated Metering
- Field Data Applications
- Outage Management
- PHEV Integration
- Distribution Automation & Control
- Renewables Integration
- Demand Response
- Power Quality and Planning

One Network, Many Applications
The Smart Grid
Communications

- enterprise resource planning (ERP)
- computerized maintenance management system (CMMS)
- risk management system
- geographical information system (GIS)
- customer information system (CIS)
- billing systems
- meter data management

power system network management

- power plant automation
- substation automation

- feeder automation

Generation
Transmission
Distribution
Consumption

- enterprise integration bus
- real/time mission critical communication
- non-critical communication
- real/time operation systems

customer service providers

gateway
The Smart Grid
Distribution Automation

- SCADA
  - What you can see you can manage
  - Monitoring of HV and MV substations
  - Monitoring of secondary distribution
  - Self healing grid
    - Automatic fault detection
    - Automatic restoration
Analysis of the power system
  - Improve performance

Outage Management
  - Fault management
  - Planned outage management
  - System performance measurement

Asset Management
  - Track health of assets
  - Predictive maintenance
The Smart Grid
Integrating New Technology

- Electric vehicles
  - Additional demand
- Source of power
- Renewables
  - Wind
  - PV
- Local Area Storage
The Smart Grid

The Customer

- Customer Enablement
  - Key to achieving goals

- Communication via metering infrastructure
  - Demand management
  - Pricing communication
  - Customer involvement
The Smart Grid Challenges

- Policy and Regulation
  - Tool for implementing policy
- Technology Barriers
  - Development of new technologies
- Security
- Getting the Customer Involved
- Skills for implementation
  - Choose a partner
The Smart Grid
Conclusions

- Is the Smart Grid simple?
- Big Picture thinking
  - Set policy direction
  - Incremental implementation
  - Strategic planning
- Communication
- Customer enablement

- Smart Grid technologies will help your business
Power and productivity
for a better world™