FPSC Joint IOU Presentation

Smart Meter Workshop
September 20, 2012

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The Evolution of Metering

The electric meter is the most improved upon device in the utility industry and continues to change as new technologies are discovered.

- **< 1880s**: Copper plates were submerged in an electrolytic solution and then weighed.
- **1880s**: Discovery that two out of phase AC fields can make a solid armature rotate. (electro mechanical meter)
- **1930s**: First socket type meters.
- **1940s**: Introduction of magnetic levitating bearings.
- **1970s**: First electronic registers.

Progression of telephone communication over the same time period...
The Evolution of Metering

1970s
• Electromechanical induction disk
• Manual meter reading recorded on paper or computer cards
• Monthly reading only (kWh)

1980s
• Electromechanical induction meter with embedded 1-way 900 MHz radio
• Walk-by meter reading using handheld device
• Monthly reading only (kWh)

1990s
• Electronic digital meter with integrated 1-way 900 MHz radio
• Drive-by meter reading using mobile collector
• Monthly reading only (kWh)
The Evolution of Metering

**2000s**

- Electronic digital meter with integrated 2-way 900 MHz radio
- Meter communication through a fixed communications network
- Daily, time-interval, and on-demand remote meter readings (kWh)
- Outage and restoration notification

*Each day, roughly 500,000 Americans spend at least two hours without electricity in their homes and businesses. Such outages cost our economy at least $150 billion a year.* (via Bob Galvin, galvinpower.org)

- Monitor power quality
  - Identify bad transformers
  - Customer voltage problems
  - Service phase identification

**Advanced Metering Infrastructure (AMI)**

kWh Metering Plus Much More

- kWh
- kW
- Voltage
- KVAR
- TOU
- Current
The Benefits of Advanced Metering Infrastructure

THE CUSTOMER WILL HAVE:

CONTROL

- Save Money
- Conserve Energy

INSIGHT

- Mobile App
- Web Portal
- Detailed Billing

CHOICES

- Time-of-Use
- Demand Side Management
- Pre-paid

Smart Meters
- Convenience of Remote Meter Reading
- Reduced Electric Theft, (a cost borne by all customers)
- Reduced Estimated Bills
- Distributed Energy Rates
- Potential Rate Offerings
- Etc…

Our Customers Say:
- Simple Solutions
- More Information (Energy usage and Conservation)
- One size does not fit all
- Expect technology solutions from us
AMI meters are essential to improving the long-term reliability and efficiency of the electric grid.

- Faster, more accurate outage identification enables faster restoration
- Improved data for engineering and System Planning
- Improved ability to prevent outages through better detection and more predictive maintenance
- Confirmation of restoration without customer intervention
- Greater operational efficiencies, which help utilities control costs
- Improved delivery of energy, enabling transportation cost savings and reduced environmental footprint
- **SMART GRID**

**Advanced Generation**
- Excess Generation Storage
- Distributed Generation

**Distribution Automation**
- Integration of Renewables
- Capacitor Bank Control
- Instantaneous Distribution Power Flows
- Outage Detection

**Advanced Metering Infrastructure**
- Smart Meter
- Communication Network
Public Concerns

Privacy

• In the information age, utilities will have an increasing amount of sensitive information that will need protection.

• Each utility continues to take responsibility to ensure the protection of its customers’ private information just as it has in the past.

RF Emissions

• Radio Frequency (RF) emissions are regulated by the Federal Communications Commission.

• Each utility continues to follow the FCC regulations and other industry standards to protect its customers and employees from RF emissions.
Nothing has changed…except the way the meter is read
• We are still dedicated to protecting customer information
• No customer information is stored at or transmitted from the meter
• Total energy consumption is all that is measured
Customer Web Portal – Daily Use
Customer Web Portal – Hourly Use
RF Exposure

- Smart Meters have been tested & certified to FCC rules
- Smart Meter power is \( \leq 1 \) Watt
- Duty Cycle \( < 10\% \) (typically \( < 1\% \))
- 900MHz Public Exposure Limit is 610uW/cm\(^2\)
  - 10x safety factor for occupational exposure
  - An additional 5x safety factor for general public exposure
  - So, there is a 50x FCC safety barrier for public exposure
- Peak measured levels at 1 foot are below this limit
- Typical indoor peak exposure \( < 1\)uW/cm\(^2\)
Comparison of RF Density in Everyday Environment

- Smart Meter
- Microwave Oven
- Computer
- Cell Phone
- Walkie Talkies

Power Density measured in microwatts per square centimeter (µW/cm²)

*Richard Tell and Associates*
Progression

- Advances in technology have influenced electric metering over the last century and Smart meters are the result of that continuing development.

- Smart meters allow utilities to provide many benefits to their customers.

- Smart meters are fundamental in the foundation for a smart grid.

- Utilities recognize the concerns of their customers and are diligent in making sure their grid enhancements comply with all established federal safety regulations and protect customer data.