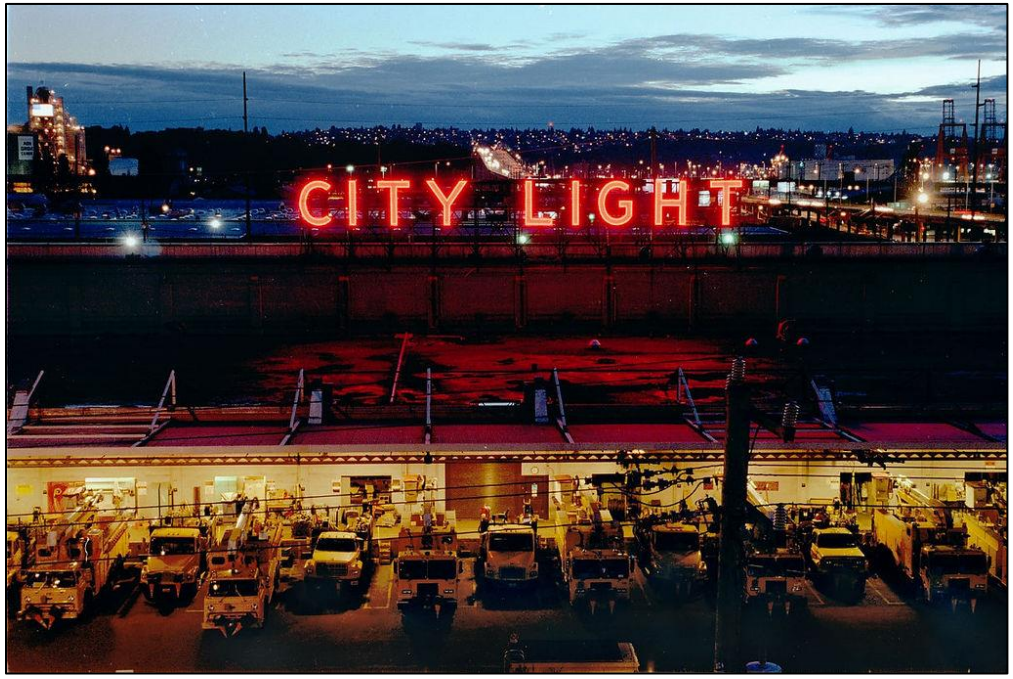
Seattle City Light

Advanced Metering Program

Seattle City Light Review Panel
October 17, 2014

INTRODUCTION



Agenda

- About Advanced Meters
  - Functionality
  - Data Management
- Technology
- Privacy
- Meter Safety
- Savings
- Opt-Out Policy
- Workforce Impacts
- Health

WHAT ARE ADVANCED METERS?

Provides two-way communication between the meter and the utility

Advanced Meters

- Collect customer kilowatt-hour usage information
- Transmit consumption data through wireless and automated communication

Functionality of Residential Meters

Electromechanical Meters

- KWH

AMI Meters

- Integrated board for measurement display and communication
- Internal and display resolution of one watt-hour
- Power outage and restore notification
- Customer selectable Voltage Alarm reporting
  - Surge and Sags
  - Neutral
- Temperature Sensor(s)
- kWh, kVARh and kVAh energy measurements
- Full net metering
- Demand reading options include block, sliding, peak, and cumulative demand
- TOU
- Up to four channels of load profile
- Up to eight seasons of time-of-use in up to seven tiers of data
- Remote disconnect with enhanced Load Limiting functionality
- Over-The-Air (OTA) remote radio and meter metrology firmware download functionality
- ZigBee w/Public Key Infrastructure - PKI authentication
- IP addressable
- Temperature Detection

Functionality of C&I Meters

C&I Electromechanical Meters

- KW
- KWH
- KVAR
- KVARH

AMI Meters

- KVA, KVAR Demand Meter
- TOU Meter
- Interruptible Rate Meter
- 20-Channel Recorder
- Current Recorder
- Power Quality Meter
- Sag and Swell Monitor
- Real-Time Multifunction Instrument
- Loss and Accuracy Compensation
- Q-Hour Meter (Z, PF, Capacitance)
- Real Time Pricing Meter
- Voltage Recorder
- Totalizing Meter
- Bidirectional Meter
- 200-Event Power Quality Log
- Phasor Meter

Power Quality

Alerts and Counters

- Distortion alert with counter
- High demand alert
- DC detection alert
- Over voltage alert with counter
- Date & time of last outage (TOU or recording)
- High neutral current
- Power factor alert
- Under voltage alert with counter
- Outage counter

Instantaneous Measures

- Per Phase Voltage
- V&I Phase Angles
- Reactive power
- Distortion power
- Distortion power factor (D/U)
- Per Phase Current
- Active power
- Power factor

Cumulative Measures

- Distortion kVAh (with k switch)
- Cumulative power outage duration

Advance Power Quality

- Voltage, Current, Frequency, THD, TDD, DPF Recorded as Min, Max, Avg (v2h or I2h) or end-of-interval (4 or 20 channels) Distortion - Real Time and Cumulative Measures
- Distortion kVA and kVAh
- Total Demand Distortion (TDD) = Total Harmonic Current/Rated Maximum Current per Phase
- Distortion Power Factor (DPF) = Distortion Power per phase and total
- Total Harmonic Distortion (THD) - Current and Voltage per phase Instrumentation - Real Time Measures
- Frequency
- Fundamental per phase voltage, current, and phase angles
- RMS Voltage (L-N) or (L-L) primary or secondary Voltage Monitor

Delivery of Data/Information

Today

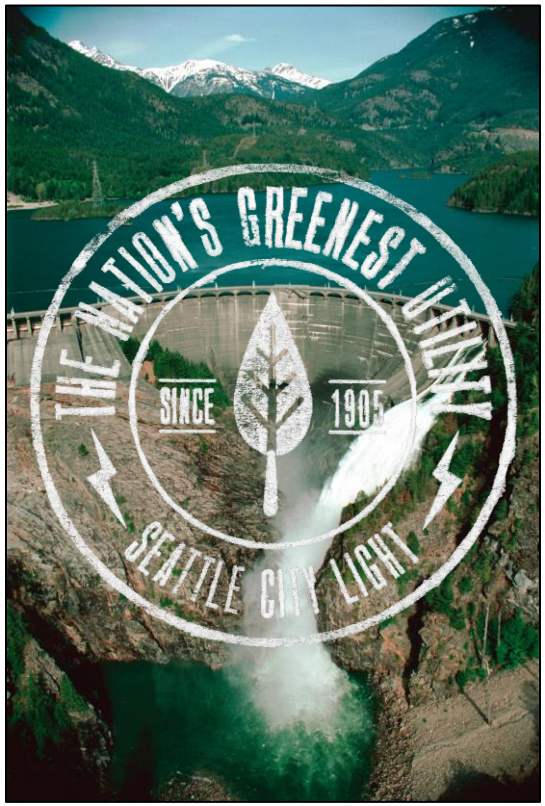
We collect/receive and manage approximately 18 million data points per year

AMI Deployed

Upon completing the AMI deployment, we will start receiving wirelessly 30 million data points per day

WHY ADVANCED METERS?

Advanced meters offer many benefits to both the customer and the utility

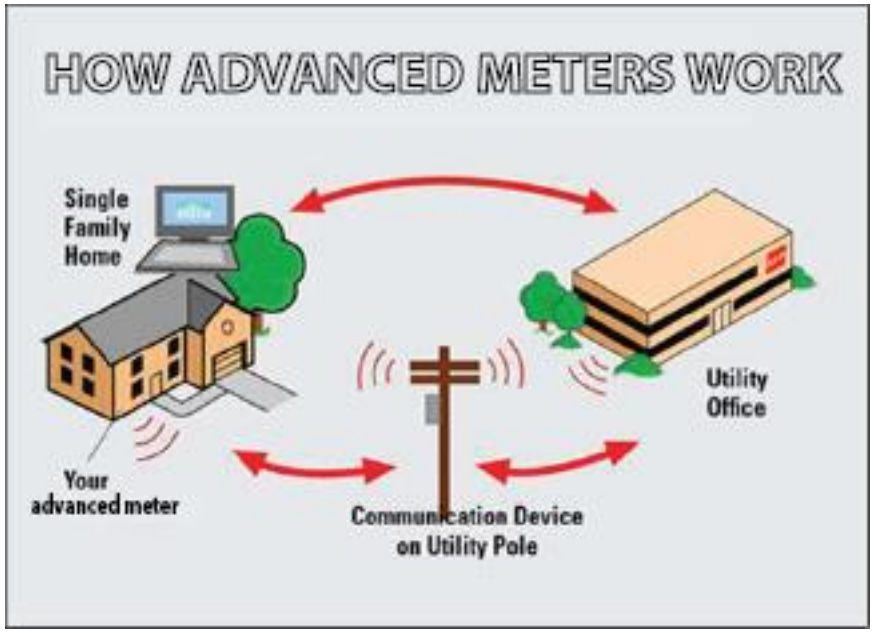


Benefits

- Increase Customer Service
- Improved Safety
- Environmental Impact & Conservation
- Improved Load Forecasting
- Operational Efficiencies

HOW DO ADVANCED METERS WORK?

Sends energy consumption data through automated wireless communication



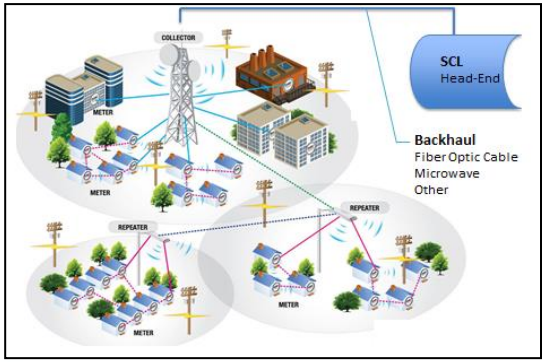
Advanced Meters

- Continuously record the amount of electricity consumed
- Programmed to transmit recorded data as often as needed
  - Industry Std. – Every 4 hours
- Sends information via a secure wireless communication system using radio frequency (RF), much like cellphones

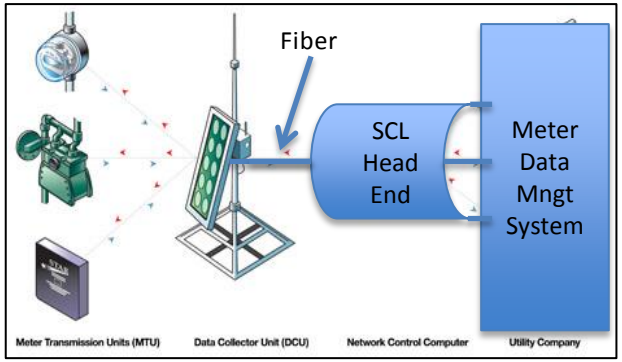
TECHNOLOGY

Seattle City Light is considering 3 secure wireless communication networks

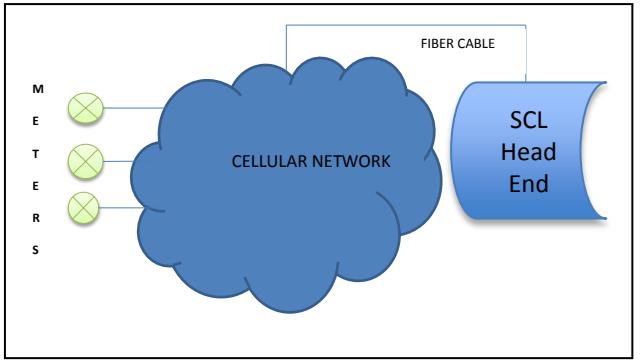
AMI MESH Network



STAR Network AMI System

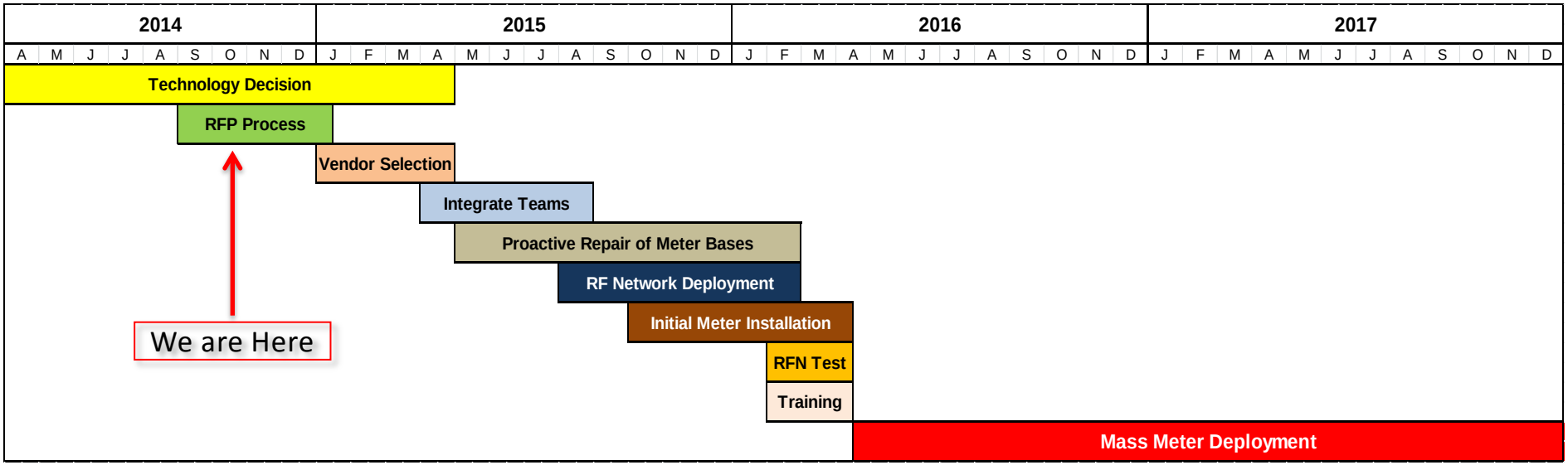


4G/LTE



TECHNOLOGY (CONTINUED)

Project Timeline



PRIVACY & SECURITY

Data Privacy

- City Light will not release personal information as defined in RCW 42.56.335

Security

- Data is encrypted and transmitted to the utility with multiple layers of security throughout the system

METER SAFETY

At Seattle City Light, everything starts with safety

Hot Meter Bases

- Hot meter bases are not a new concern and can occur in both analog and advanced meters
- There are no reports linking fires with meters directly

Safety Features

- City Light's advanced meters will include safety features such as temperature sensors and disconnect switches

SAVINGS

Advanced meters will enable customers to save on energy costs

Cost-Saving Measures

- Energy consumption data via Customer Portal will enable customers to make informed conservation decisions
- The long-term operating cost-savings expected by the utility will help to keep rates low

OPT-OUT POLICY

City Light is developing a customer opt-out policy

- There will be an Opt-Out Policy
- The policy will entail a fee, which will require City Council approval
- More information about this policy will be provided in 2015

WORKFORCE IMPACT

Meter readers will be trained on other jobs and positions

More Information

- City Light is committed to preserving its workforce and does not anticipate any layoffs as a result of advanced meter installation
- Meter readers will be trained in positions either within City Light or in other city departments

HEALTH

RADIO FREQUENCY EXPOSURE STANDARDS & GUIDELINES

Seattle City Light stays current on the science

- **Who sets the standards?**
  - U.S. and international standards bodies: IEEE/ICNIRP
  - Federal telecommunications rules in the US: FCC
- **Why set the standards?**
  - To protect workers and the public from injury or disease from RF energy
- **What is the scientific basis?**
  - Underlying science conducted over 60 years
  - Animal behavior (sensitive, reliable) set benchmark SAR = 4 W/kg
  - Same SAR basis for IEEE standards, ICNIRP guidelines and FCC rules
  - Epidemiologic studies of human beings
  - Laboratory studies of animals, tissues, cells, biophysical theory