



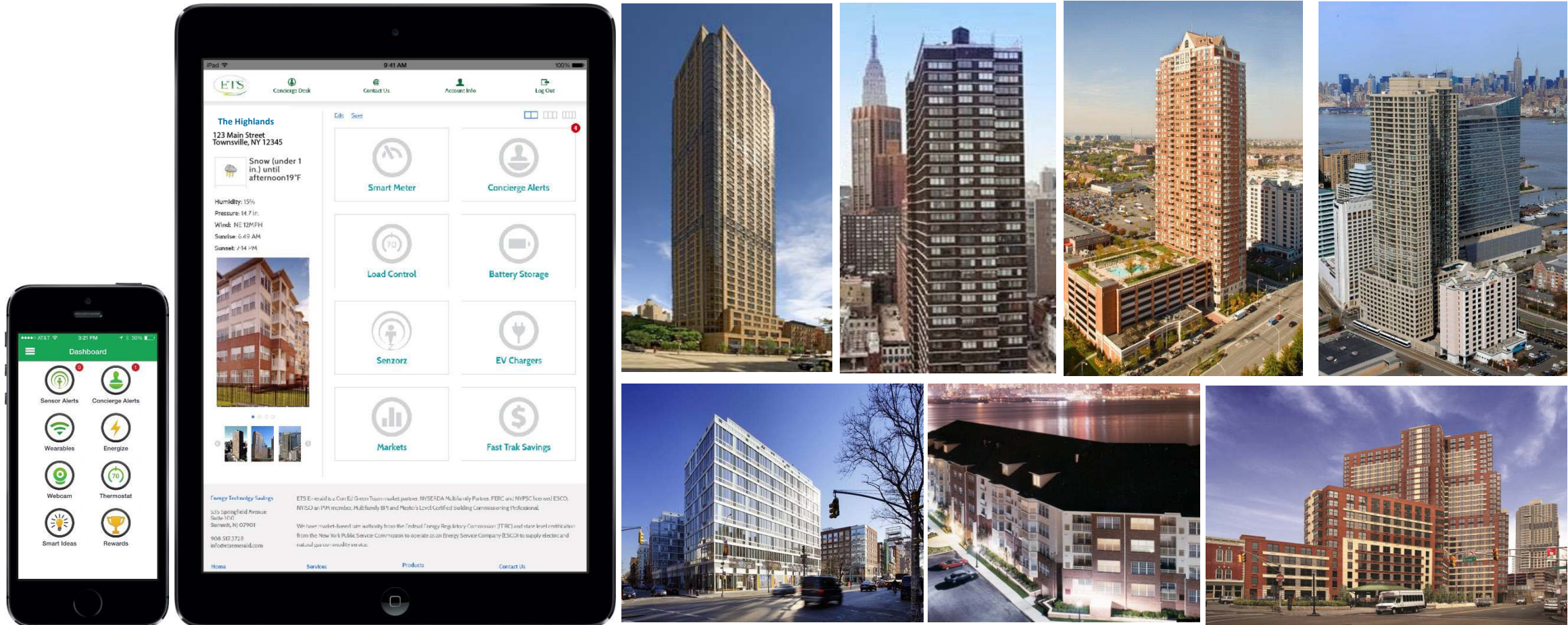
Applying ICT and IoT to Multifamily Buildings

U.S. Department of Energy
Buildings Interoperability Vision Meeting
March 12, 2015
Jeff Hendler, ETS

ETS is an Energy Technology, Behavior Management, and Smart Building Services Provider.

We materially reduce energy expenditures and increase operations productivity of large multifamily properties.

We create value streams rethinking mixed-use space deploying IoT and microgrid technologies with engaging ICT platforms.



The Problem: Existing Technological Barriers to ICT Platforms

- Twelve Monthly Meter Data Points per Year
 - No calibration of energy usage/peak demand events
 - Cannot match real usage to actual costs
 - No fault detection data alert thresholds
- Manual HVAC Load Control
 - Difficult to monitor and adjust controls
 - Cannot respond to real time weather, occupancy, and price events
 - Closed proprietary and dated building management systems, if any.
- Lack of Building Diagnostics
 - No proactive communication interface
 - Only react to system failure/complaints
 - Lack intelligent sensor calibration
- Lack of Continuous Engagement Program
 - Energy auditors issue report and leave
 - Technology providers limited to their proprietary device
 - Energy suppliers incentivized to increase load



The Solution: Open Source, Open Platform, Multiple Protocols, Mobile App Provisioning, Real Time Data Transparency and Response Tools to Empower Management

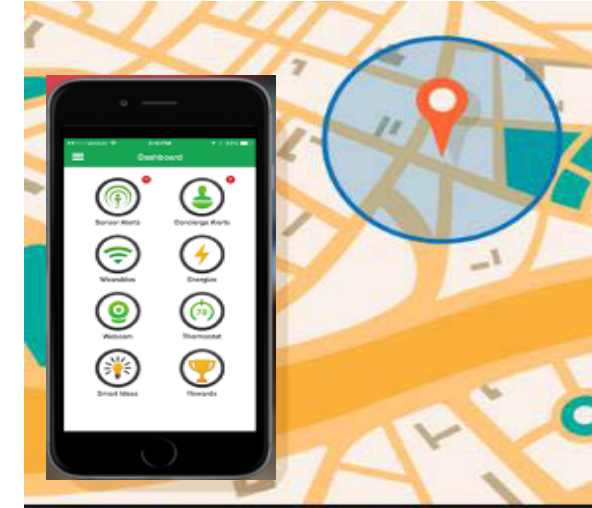
- Upgrade Meter to Digital Age
 - 35,000 interval data points provide calibration
 - Measure and minimize peak demand costs
 - Utility Approved Revenue Grade Web Accessible Data
- Install Wireless HVAC Load Control
 - Empower management with 24/7 control
 - Mobile alerts engage staff to take action based on market events
 - Management guided Protocol Threshold Alerts
- Deploy Smart Building Sensor Diagnostics
 - Increase HVAC dispatch efficiency
 - Mechanical surveillance to enhance operations
 - Real Time Fault Detection Diagnostics
- Provide Continuous Engagement with Apps/Alerts
 - Interactive energy management medium
 - Reward management utilization
 - Top floor to Shop floor engagement
 - Open Protocol Web Enabled System



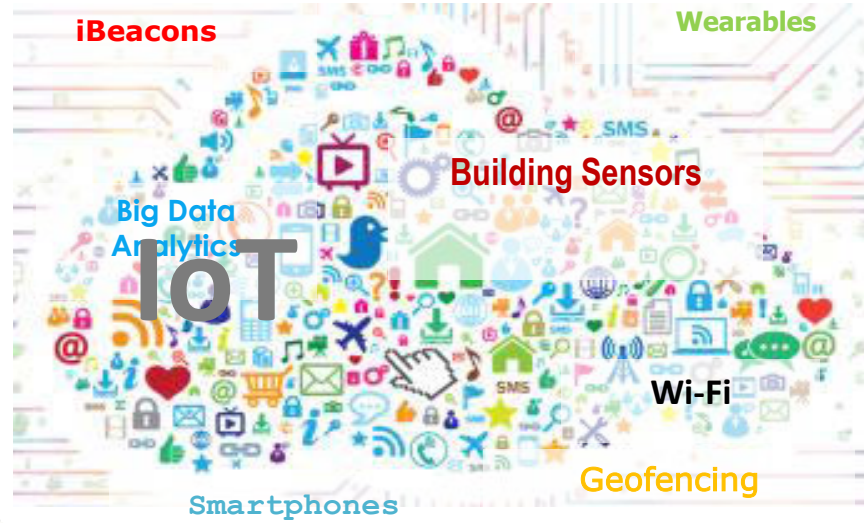
IoT for Residential Units



Smart Mobile Applications and ICT Protocols



Smart Building Services



Wearable Devices to Enhance Work Flow Management

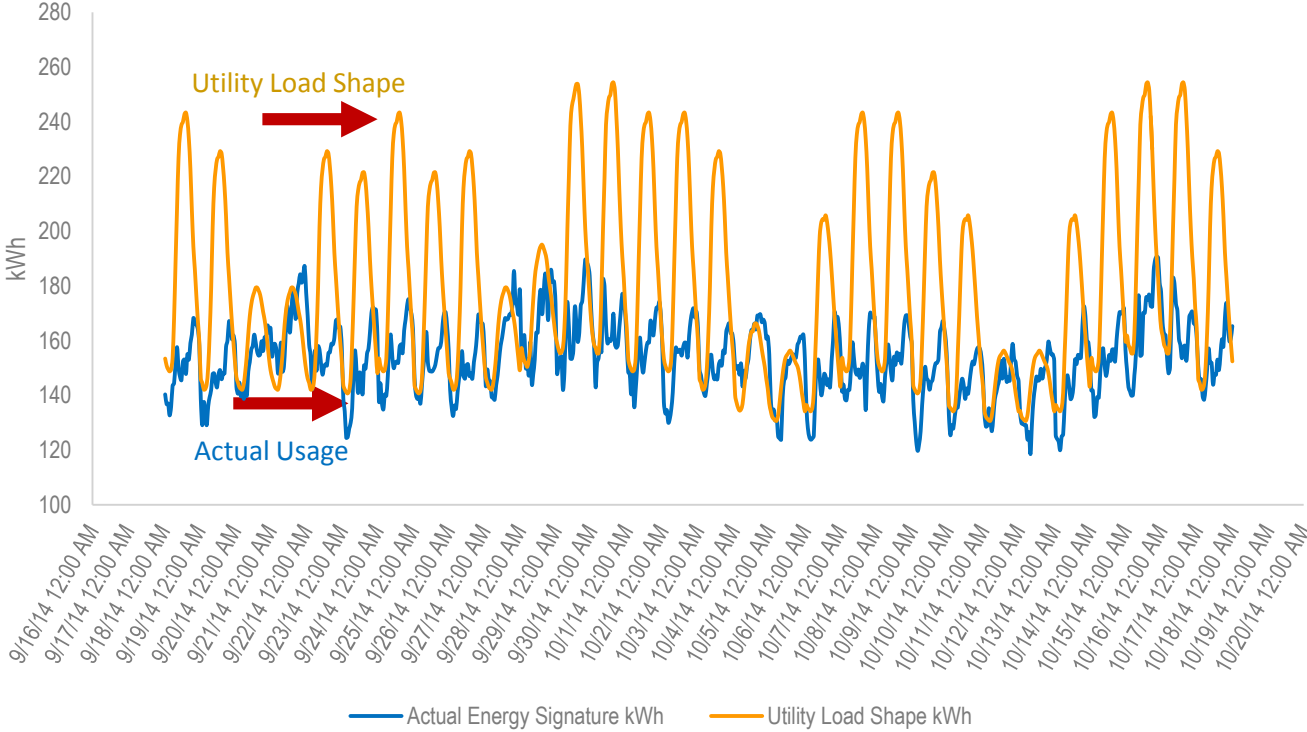


IoT and DER for Common Area

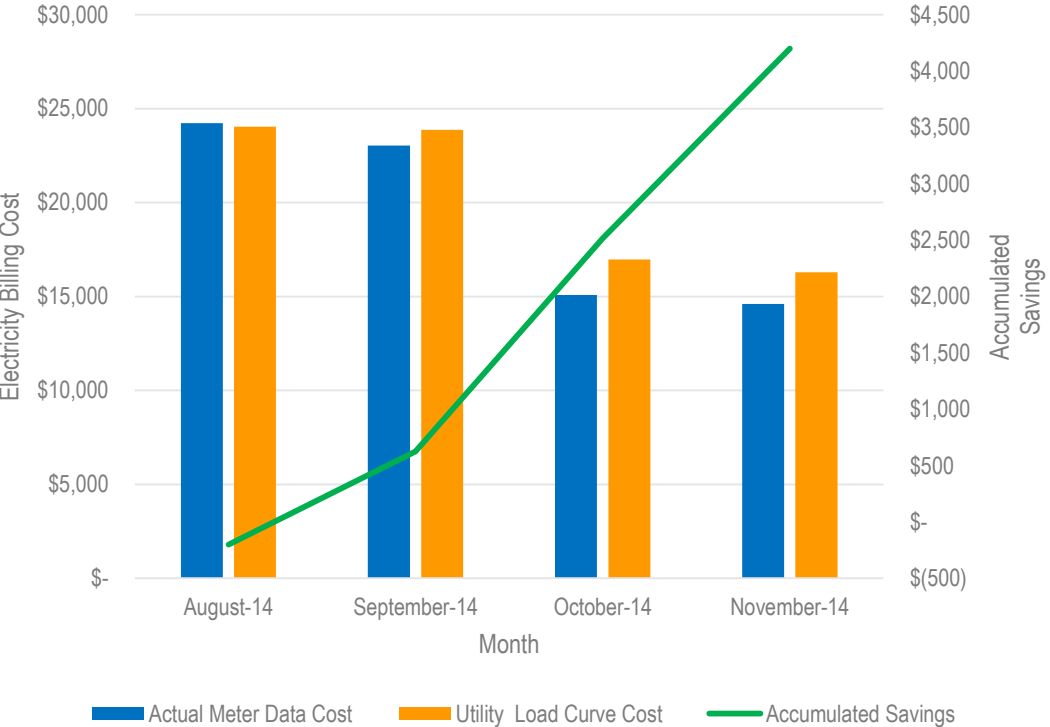


Smart Meter Case Study – NYC Multifamily Building

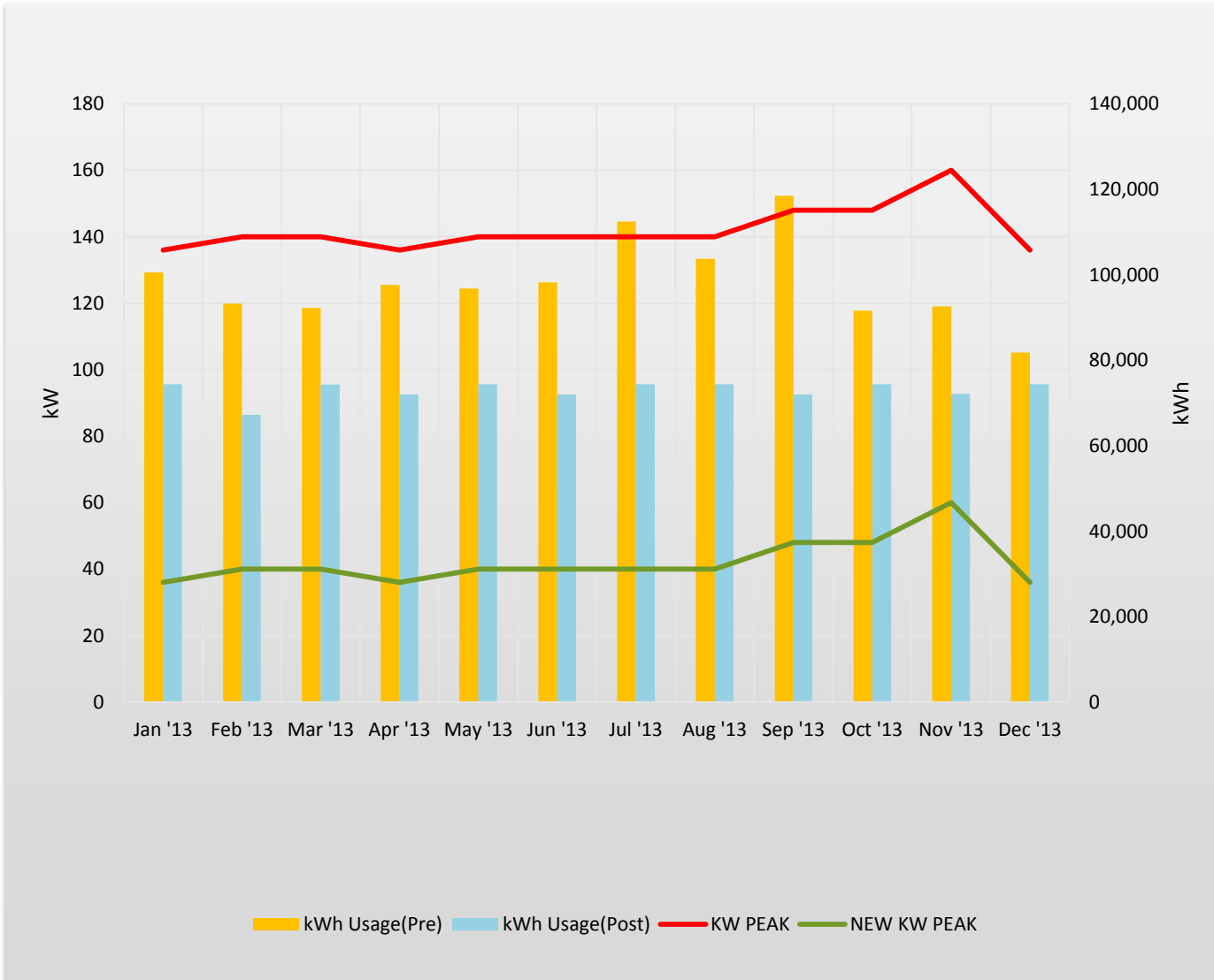
Actual Energy Signature vs. Utility Load Shape



Interval Meter Savings
Actual Meter Data Cost vs. Utility Load Curve Cost



CHP 100 kW Microgrid Solution

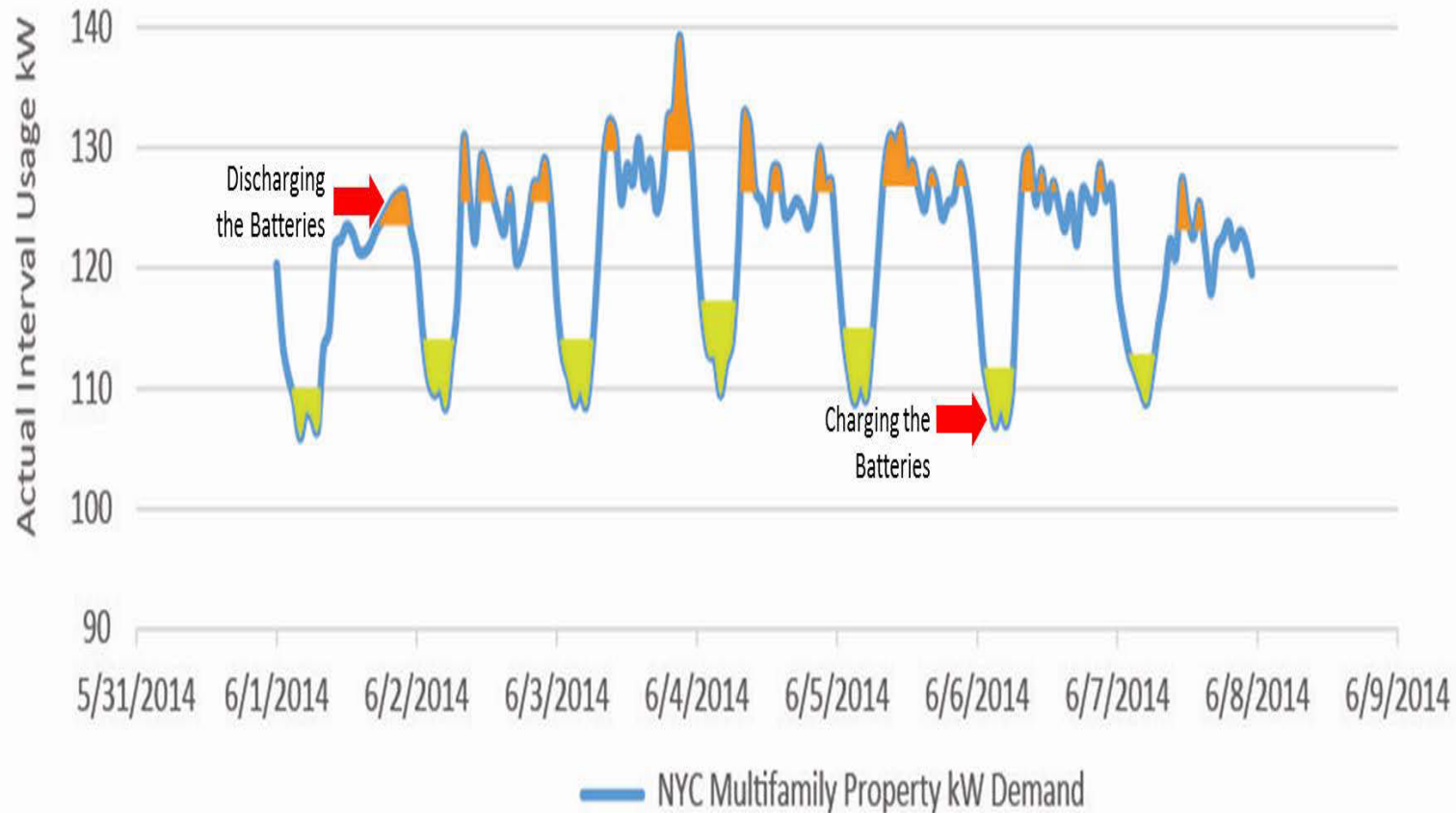


Benefits of CHP Microgrid include:

- Reliable back up power
- Ability to run two elevators
- Ability to provide critical lighting
- Domestic hot water production
- Reduce exposure to higher volatility power rates
- Reduce Carbon Emissions by 1,288Metric Tons per year
- Ability to operate Life Safety Equipment
- Approx. 95% reduction in electric cost
- Approx. 90% in electric off peak reduction
- Dual mode system enables immediate transfer to grid
- Availability rate of 95%
- Remote monitoring



Battery Energy Storage Peak Shaving



Based on ETS large multifamily building assessments, peak loads on a typical day are more than 40% of the median load and constitute less than 10% of the primary demand billing hours. By shaving 15% of peak demand during primary demand billing hours, up to 35% savings can be achieved in utility distribution demand charges.

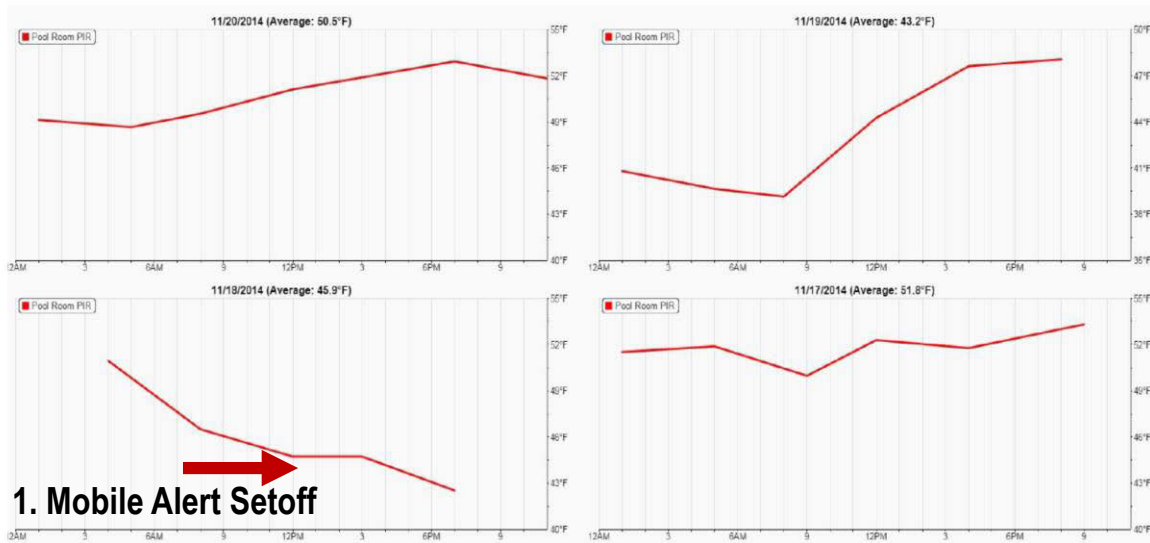
Benefits of Energy Storage include:

- Lower utility distribution demand charges with peak demand shaving
- Reduce ISO Capacity Tag charges and arbitrage off peak market rates
- Back-up power for critical operations
- Ability to tie-in onsite renewable sources of energy, solar, micro-wind
- Expand EV garage charging stations and mitigate any demand surge



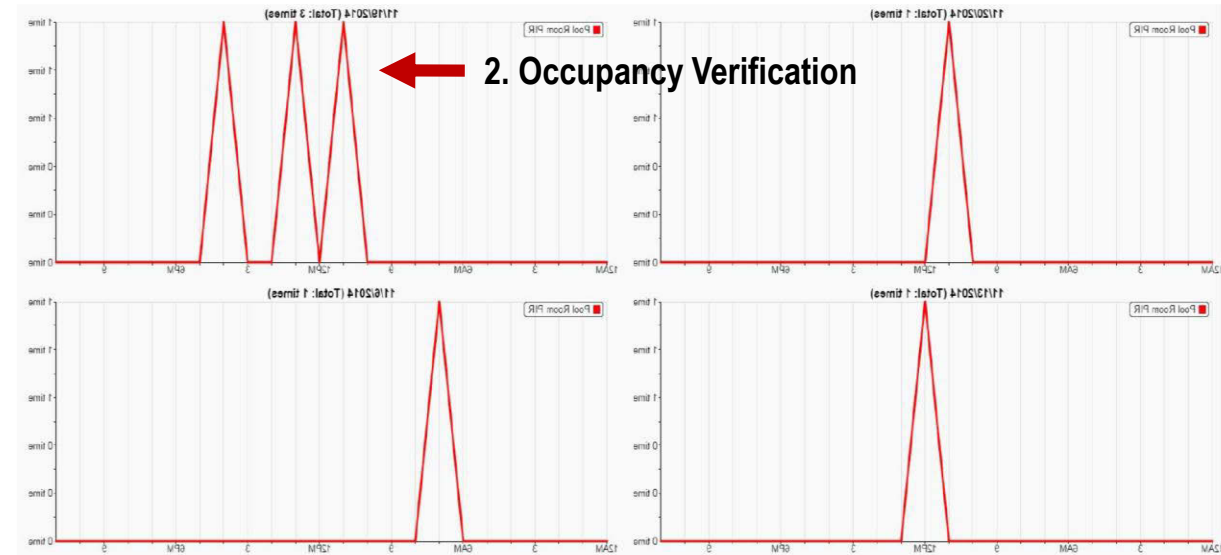
Behavior Management Case Study: Fault Detection Diagnostics

Temperature Sensor and Water Pipe Burst Prevention Protocol



1. Management set temperature protocol threshold of 45 degrees to trigger mobile alerts and email to take action and turn on heat units in water pipe equipment room to avert potential pipe burst and property damage.

Water Pipe Equipment Room Occupancy Sensor

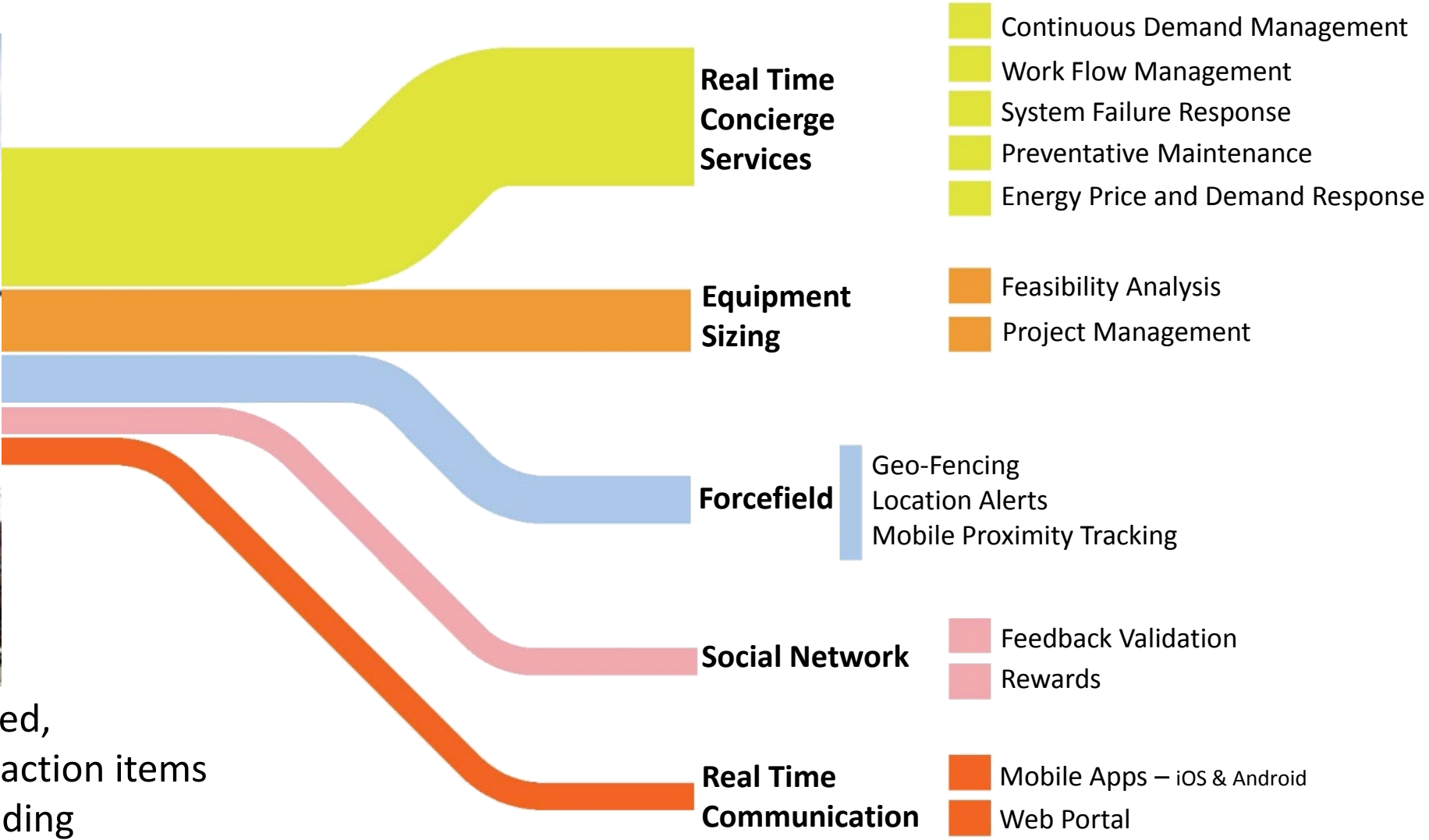


2. ETS Concierge monitoring sensor alerts, notified management that equipment room temperature below threshold, and occupancy sensor validated that staff had not entered area to turn on heaters. After a higher level staff member was alerted, staff was dispatched. Sensors verified occupancy, and temperature rise.

Open Protocols and Interoperability Standards enhance ICT Data Services



Data resources are acquired, processed, analyzed, and action items are communicated to building management. All in real-time.





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