Cloud Computing 101 and Challenges to deploying Smart Building Technologies

So Cal AEE Meeting
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Tim Hayes, Sales Director
Background

Software Technology

• Local Area Networks
• Mobile Telecom Operations Software
• eCommerce Software
• Tenant & Energy Software

Megatrends

• Consumer Choice, Technology, Legislation & Capital
Technology

- Decision Making Cloud-based Software
  - Beyond Analytics to Optimization
- Learns Thermal Model
- Lowers HVAC energy use, Maintains Comfort
- Continuously Adapts and Optimizes
BuildingIQ Today

- 40 + million sf
- 75+ Customers

Representative Clients

- **City**: Washington DC
- **Federal**: GSA, FBI
- **Hospital**: NY Presbyterian, St. Vincents
- **University**: UCLA, CSU, Alabama CCD
- **REIT**: Brookfield, Kilroy, Equity Office
- **Corporate Campus**: Medtronics, Informatica

Australian Public Company

- Industry, Venture and Institutional Investors
Partnerships to Accelerate Adoption

Collaborations

Partners with Utilities for EE and open ADR
Representative Results

NYC Office Tower

$1.6 Million Saved
Over 4 Years

HVAC Spend
Annual Reduction = 17%

Largest Gold LEED-EB in NYC
2.5 million square feet

108 DR events Las Vegas area. portfolio of buildings including office and casino properties achieved a 17% reduction in peak demand

Emerging Technologies Group 3rd party 18 month evaluation – IPMVP Option B 11% HVAC kWh reduction, comfort maintain / improved, DR events
BuildingIQ in the EMIS Landscape

- **Analytics & Reporting**
- **Fault Detection & Diagnosis**
- **Facility Management**

+ **Focused Setpoint Control**
  - AHU Temperature
  - AHU Pressure

**Closed Loop Energy Savings**
Cloud Based
Predictive Energy Optimization™
Custom Comfort

CEO and Executives
71°-72°, Opt Out, no DR shed

Marketing and Finance
68°-74°, allow DR shed

Vacant
68°-76°, allow DR shed

Meeting Rooms
70°-75°, allow DR shed

Retail Space
68°-74°, allow DR shed
Predictive Energy Optimization
Predictive Energy Optimization

Operating Hours

Occupancy Start 8am

Off Peak
Peak Rate
Off Peak
Peak Rate

Cooling Energy
Measurement & Verification

- Adheres to IPMVP*
- Cloud-based
- Automated

*International Performance Measurement & Verification Protocols
Monthly Energy Savings Reports

Typical Weekday Load Profile

November 2014

Savings this Month

Reported any when 3G16-1Gf

Cumulative Savings Summary

Energy Cost ($) Energy Saved ($) Savings Percentage Reduction

Basis: $4,744.24 $46,645 Actual $5,756.67 $58,756 Savings $5,016.7 5,126 Percentage Reduction 27.4%

Monthly Performance

Feb 2 2014 to Nov 2014

Lifetime Savings (from Feb 2, 2014)

Reported any when 3G16-1Gf

Cumulative Savings Summary

Energy Cost ($) Energy Saved ($) Savings Percentage Reduction

Basis: $48,790.64 $457,856 Actual $556,444.0 364,444 Savings $57,596.50 75,856 Percentage Reduction 13.78%

Notes

Building IQ Confidential
Building Visualization

Building Summary
- Name: Tyler Tower
- Location: 123 Broadway St
- Size: 234k ft

Savings
- $2,300
- 30-day total savings

5-Week Control Status
- Details: install...
- Settings: config...
- Status: control enabled
- Operating days: 100%

Notifications
- Critical: 3
- Warning: 2
- Info: 1

Demand Response
- Events: Past 7 + Next 7 Days
- Details: Pending 1, Completed 1, Aborted 1, Scheduled 1, In Progress 1, Canceled 1

7-Day Energy Savings Performance

Communication Status
- Control of BMS: On
- New Notifications: Critical, Warning, Info
- Demand Response: Events

Building Time: 14:52
Outside Temp: 72.9°F
Site Agent: 4.1.8
Real-Time Troubleshooting

Power and baseline real-time data

Equipment OFF

Sudden drops in SAT for short periods of time

ZT, SAT, and SAP closely following BIQ set points
Software Terms 101

- BMS / EMS vs EEMS / EIS
- Software
  - On premise
  - SaaS / Cloud computing
- Reports
  - Dashboards, KPI’s
- Big Data
  - Analytics, Thresholds, Alarms
- Protocols – Modbus, BacNet, Zigbee, IP
- Architecture – LAN, WAN, MESH
Software Value

As Perishable as Fruit

Improves a process or provides information, both

Buy vs Rent

Buy

• Maintain data, Fix, Upgrade
  – Analytics, Thresholds, Alarms

Rent

• Architecture – LAN, WAN, MESH
Cloud Computing 101

Pros
• Economies of Scale
• Distributed / redundancy
• Rapid development
  – New features
• Easy integration with other systems

Cons
• Cyber Security
• Transitioning off your data
• Custom features
Building Data 101

- Consumption - Meter data
- Indoor Air – Temp, Pressure, Quality
- Chilled Water – Temp, Pressure, Flow
- Weather - Outside Air Temp, Humidity, Irradiation, Wind
- Utility Tariff – Peak, Off Peak
- Occupancy – Quantity, Heat, Patterns
- Whole Building – Total Thermal Mass

New
- Alternative Generation
- Battery Storage
What’s Working - Broader Market

- Decision Support
  - Measure, analyze, improve
    - Dashboards, History, Predictions, Actionable Information
    - Meter data, BacNet IP, Middleware

- Utility Programs
  - Monitor Based Cx

- Government
  - Weather Data
  - Portfolio Manager
What’s Working - Early Adopters

- Automated control of HVAC
  - Air side
  - Chilled water
  - Software and Managed Services

- Optimized Microgrid – Demonstration Projects
  - Local storage tied with Optimization
  - More Occupancy information
Biggest Obstacles

• Replacing physical things
  – pneumatic air handlers, roof top units
  – Fixtures, t-stats, sensors

• Shared/Open Standard Protocols still a WIP
  – BMS, Lighting, Others need to speak a common language

• Rebate tools lagging behind solutions
  – Mechanical based v Operational Intelligence based
Biggest Obstacles

• Slow adoption by an aging workforce
  – Chief Engineers, Director of FM (construction background)
  – Concerns over automated control

• IT / Facilities divide
  – Cyber Security, Internet Access

• Shared/Open Standards still a WIP
  – BMS, Lighting, Others need to speak a common language

• Rebate tools lagging behind solutions
  – Mechanical based v Operational Intelligence based
Moving Past Analytics

**YESTERDAY:**
"Manual BMS"
- Static
- Manually tuned
- Only as good as the operator
- Lacks “energy awareness”
- Capex intensive

Semi-automated comfort

**TODAY:**
"Building Analytics"
- Retrospective
- Reports and to do lists
- ROI dependent on people or capital
- Does not impact real-time operations

Identifies issues and outliers to fix

**TOMORROW:**
"Building Optimization"
- Intelligent continuous control of BMS
- Adaptive, self-learning
- Clear ROI + reduced operating burden
- Grid-integrated: peak load aware
- Paid for from savings
- Delivered as a service

Automated, optimized energy management

Realized Energy Savings

Predictive - Economics Driven - Automatic - Continuous
Future: Truly Intelligent Building

Like a Smart Phone
- Auto awareness, continuous decisions
- True interoperable, Part of the grid
- Decision Support, Preferences, Decision Making

.............Like a self driving Prius

Traffic incident on CA-57 N/Orange Fwy.
-reported via Waze app
THANK YOU!

www.BuildingIQ.com

Tim Hayes
Sales Director, Southwest
timh@buildingiq.com
949.400.8508