5i Platform

Technology-enabled services balancing energy savings, operational efficiency, and occupant comfort.
5i Platform of Technology-Enabled Services

- Focused on secure infrastructure, software applications, data science, field services, engineering excellence, and strategic partners.

- These services increase operational efficiency, improve occupant comfort, and deliver energy savings to end user customers.
The 5i Platform Journey

- **Visualization**: Visualizing energy data to understand usage across portfolios
- **Analytics**: AI and data science decode insights in energy data for fault detection and operational benefits
- **Control**: Buildings can be intelligently and continually controlled with cloud based solutions
- **Optimization**: Accurate prediction and optimization with automatic actions to achieve maximum energy efficiency
BuildingIQ 5i Platform

BuildingIQ 5i Platform is focused on secure infrastructure, software technology, data science, and engineering excellence.

### Software Services
- Si Portal Dashboard
- API
- 3rd party Integration
- Collaboration and Reporting
- Controls and Optimization
- Meter, Measure, Verify

### Managed Services
- 24/7
- Knowledge Transfer
- Oversight Services
- ESM Analytic Services
- Data Science and Engineering
- Training and Education

### Field Services
- Partner Network
- OEM White Label Partners
- Field Operations Support Staff
- Service Contractors

### Data Services
- Site Agent Appliance
- Wireless Gateways
- Sensors and IoT
- Weather
- BACnet Protocol
- Metering Equipment
- Utility Tariff and DR Signals

BuildingIQ 5i Managed Services provides site analysis, design, implementation, oversight, training, reporting and results.

---

BuildingIQ 5i Platform is focused on secure infrastructure, software technology, data science, and engineering excellence. BuildingIQ 5i Managed Services provides site analysis, design, implementation, oversight, training, reporting and results.
Information Rules
BuildingIQ Appliance

- A secure, intelligent, networked gateway, connecting building assets (BMS, meters, sensors) to the BuildingIQ 5i Platform
- Combination of hardware and BuildingIQ Site Agent software
- Deployed at the customer site, and uses secure connections to the internal BMS network and to the BuildingIQ Cloud

**Hardware**
- Intel NUC (small form factor PC)
- Intel Celeron Processor N2820
- 4 GB RAM, 64 GB SSD, Gigabit Ethernet LAN
- Alternatively, BuildingIQ Site Agent can be installed on virtual machine or customer hardware

**Software**
- Windows 8.1 Operating System
- BuildingIQ Site Agent software

**Redundancy / Resilience**
To guard against disruptions in cloud connectivity:
- Buffers control sequences being sent to BMS
- Buffers BMS data for transmission back to BuildingIQ Cloud

**Security**
- Sits behind customer firewall
- Leverages customer’s security model
- Outbound connections only, no incoming accepted
- BuildingIQ Site Agent software runs as a Windows service
- SSL 3.0 / TLS 1.1, AES 256
- Public / Private Key, RSA 4096

**Protocols & Connectivity**
- BACnet / IP network communication protocol
- TCP port 443 outbound connection to BuildingIQ Cloud
- UDP port 47808 (BACnet) outbound connection between BuildingIQ Site Agent software and the BMS
- Support for other communication protocols such as Modbus
Facility Worksite

Increase productivity

- Hyper-fast ticket creation
- Simple, intuitive scheduling
- Mobile, responsive design

Eliminate complexity and administration

- Rich user assignments
- L.T. one week setup and training

Simplify task management

- Automatic or manually assigned projects/work orders
- Single site or portfolio of buildings
- Centralized location to create, manage, assign work orders
Smart Tune

Full Service HVAC Controls tune-up
- Assessment, diagnosis, adjustment, and validation of HVAC and BMS controls
- Gather historical consumption and operational data
- Create audit reports and action plans
- Execute plans, monitor and confirm resolutions

Leverage Human Expertise
- Work with building staff, identify best practices, areas for improvement
- Local client services manager
Predictive Intelligence

**HVAC & BMS System Operations**

Maximize HVAC Controls and BMS Performance

- Continuous Commissioning
- 5i platform predictive analytics
- BuildingIQ building engineering expertise
- 24/7 support
- Anomaly detection
- Leverage human expertise
  - Root cause analysis
  - Proactive control strategy recommendations
Energy Worksite

An Information Management System (EIMS) that provides visualization of energy performance

- Feedback to building operator following operational/equipment changes
- Detection of issues
- Measurement of impacts of ESMs
- Remote access
- Customizable reports
- Light touch deployment
Automated Measurement & Verification

- Utility-grade, repeatable, scalable M&V
- One-time deployment supports current and future M&V needs
- Eliminates need for costly, on-site consultants
- Adheres to IPMVP, supports retrofits (option B) and whole building (option C)
- Strong 3rd party certifications
Demand Response

- Utility-grade, fully-automated Demand Response
  - Flexibility to use manual scheduling or automate
  - Easily opt out of specific events at building or zone level, before or during event
  - Adheres to utility program rules
  - OpenADR compliant

- Meet curtailment targets while adhering to comfort commitments

- Enhanced by BuildingIQ services team before, during, and after events

- Implementable as a EE/DR solution
Demand Response

• Utility-grade, fully-automated Demand Response
  • Flexibility to use manual scheduling or automate
  • Easily opt out of specific events at building or zone level, before or during event
  • Adheres to utility program rules
  • OpenADR compliant

• Meet curtailment targets while adhering to comfort commitments

• Enhanced by BuildingIQ services team before, during, and after events

• Implementable as a EE/DR solution
PEO - Modeling

Unique thermal model for every building.

Machine learning: an ever-evolving model

- Model evolves with the building through seasons and various modes of operation
- Capitalizes on every building’s natural thermal properties
- Incorporates multiple data streams including energy, weather, utility pricing, and BMS points
- Automatic discovery and learning produces truly customized models regardless of equipment types and operations
- Micro-adjustments made throughout the day to zone temperatures and pressures
- Shifts HVAC load to less expensive hours
- Ensures comfort with individual temperature requirements for each zone
- Dynamic setpoints delivered via on-site appliance
Managed Services

Virtual team to add to your own
- 100+ years of building experience
- Open team meetings
- Daily, weekly, monthly discussion and analysis

Adds “human” insight to big data
- Offloads data interpretation to BuildingIQ team of experts
- Maximizes in-house expertise

First line of “defense”
- 24/7 system monitoring
- Real-time anomaly detection and trend analysis
Screenshots
Dashboard Login
PEO Dashboard – Portfolio View

- **St Vincent Hosp-Xavier**
  - Size: 331k sq ft
  - 30-day total savings: $3,467
  - Mode: Controlling-Full Mode

- **52 Goulburn St Sydney**
  - Size: 156k sq ft
  - 30-day total savings: $1,960
  - Mode: Controlling-Full Mode

- **Museum of Contemporary Art Sydney**
  - Size: 163k sq ft
  - 30-day total savings: $1,903
  - Mode: Controlling-Full Mode

- **US_DOE_Waterfront East**
  - Size: 340k sq ft
  - Mode: Controlling-Full Mode

- **Wollongong City Council**
  - Size: 130k sq ft
  - Mode: Controlling-Full Mode

- **NVE - 3770 HHP**
  - Size: 64k sq ft
  - Mode: Control Enabled
PEO – Daily Performance View

$3,467
30-day total savings
ending 11-Dec-2017

7-Day Energy Saving Performance

© BuildingIQ 2018
PEO – Zone Detail View
Energy Worksite – Dashboard View
Energy Worksite – Benchmark View
## Facility Worksite – Workflow and Asset Management

### Dashboard Tools
- Asset Manager
- Communicator
- Document Manager
- Snapshot
- Projects & Tasks
- Preventive Maintenance

### Resources
- Calendar

### Administration
- Manage Worksite

### MyWorksite

![MyWorksite Screenshot]

### Update Status

<table>
<thead>
<tr>
<th>Item ID</th>
<th>Time</th>
<th>Description</th>
<th>Status</th>
<th>By</th>
<th>To</th>
<th>Assigned</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>5092453</td>
<td>11/16/2017 11:53:00 AM</td>
<td>Lighting</td>
<td>Submitted</td>
<td>Smith, Pat</td>
<td>BuildingIQ Sales Demo</td>
<td>Demo 2, BuildingIQ Sales, Hejmanowski, Ken</td>
<td>Building #2</td>
</tr>
<tr>
<td>5091124</td>
<td>11/14/2017 10:33:00 AM</td>
<td>HVAC</td>
<td>Submitted</td>
<td>Smith, Pat</td>
<td>Hejmanowski, Ken</td>
<td>Demo 1, BuildingIQ Sales</td>
<td>Building #1</td>
</tr>
<tr>
<td>5089059</td>
<td>11/9/2017 11:26:00 AM</td>
<td>Energy Usage - Equipment Concern</td>
<td>Submitted</td>
<td>Smith, Pat</td>
<td>Hejmanowski, Ken</td>
<td>Demo 1, BuildingIQ Sales</td>
<td>Building #1</td>
</tr>
<tr>
<td>5061959</td>
<td>9/20/2017 5:28:00 PM</td>
<td>Energy Usage - Zone Control Issue</td>
<td>Submitted</td>
<td>Smith, Pat</td>
<td>Hejmanowski, Ken</td>
<td>Demo 1, BuildingIQ Sales</td>
<td>Building #1</td>
</tr>
<tr>
<td>5056144</td>
<td>9/8/2017 12:52:00 PM</td>
<td>Energy Usage - Equipment Concern</td>
<td>Submitted</td>
<td>Smith, Pat</td>
<td>Hejmanowski, Ken</td>
<td>Demo 1, BuildingIQ Sales</td>
<td>Building #1</td>
</tr>
</tbody>
</table>

© BuildingIQ 2018
Thank you!

David MacLean ASHRAE BCxP, LEED AP BD&C
Vice President
McMac Commissioning Services, LLC. (McMac Cx)
713-857-6499
david.maclean@mcmaccx.net
www.mcmaccx.com