



Convergence of IOT & Operational Efficiency:  
*Roy Arindam, Vice President - APAC*

Market Brief

## Hospitals

Positive Cash Flow Through Energy Reduction

## St John of God Hospital, Murdoch WA

- 500 plus Bed Private Non-Profit Hospital
- 24 x 7 Emergency Department
- 16 Operating theatres
- 5 x Endoscopy, 2 x Angiography Suites
- Major Palliative Care & Cancer treatment Services
- 35,000 sqm plus NLA



## Infrastructure: HVAC Mechanical Plant/ BMS Points

- Central Chilled Water Plant with York & Trane Chillers (2 x Big, 2 x small)
- 3 Boilers/ 8 Pumps
- 37 AHU's/ 5 FCU's
- 400 VAV's
- Multiple Wings
- 2 x Major BMS Systems controlling portions of the HVAC System
- BMS 1: 21,000 plus Points
- BMS 2: 5000 plus Points

# Primary & Secondary Challenges at St John of God

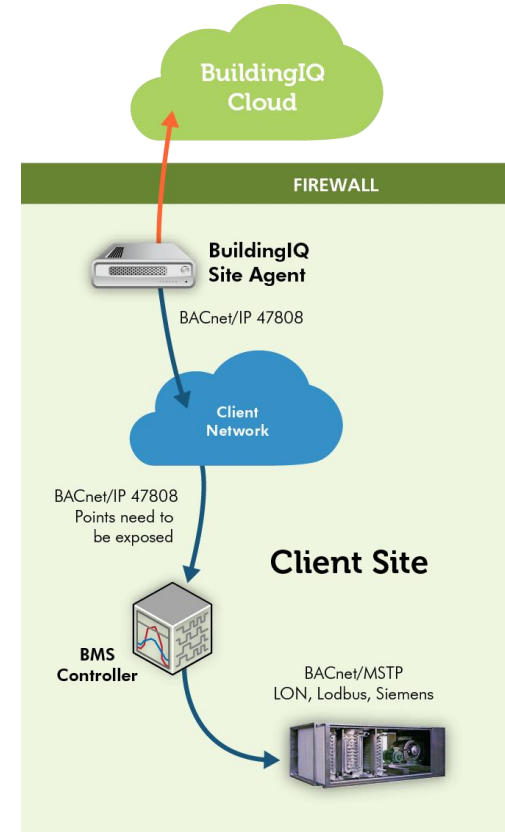
- High Energy Usage
- 50% plus of Energy Use related to HVAC
- KVA Profile close to Peak Demand threshold
- Need to drive 5% Cost reduction
- Complexity w/2 Control Systems
- Critical Infrastructure
- Non-disruptive
- High Security
- Budgetary Constraints
- Complex Operations
- Minimal Skill Set



## BuildingIQ Value

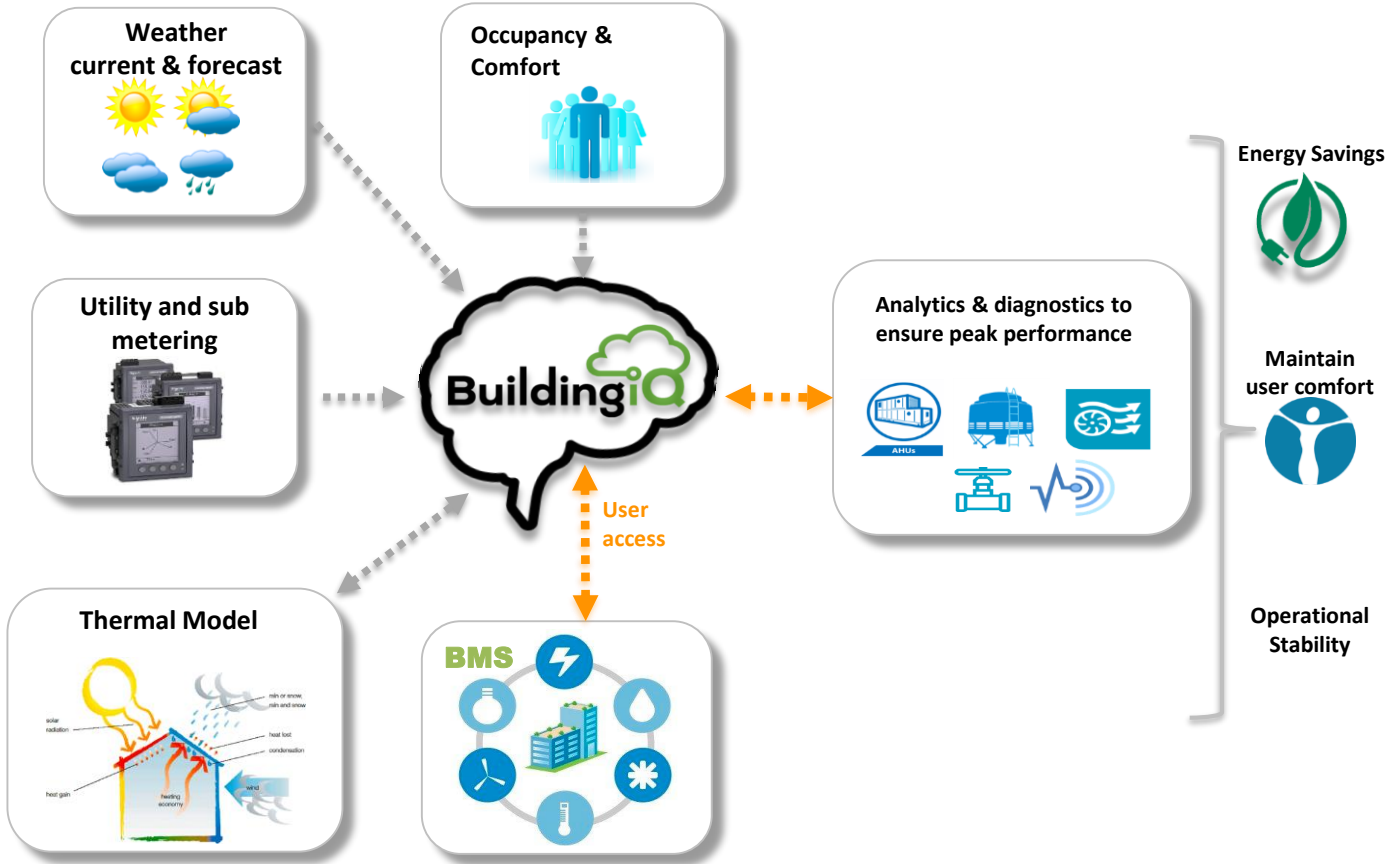


# The IOT Solution BuildingiQ





## The Architecture @ St John of God Hospital









## Outcome based Fault Detection Process:

Collect Data	Identify Faults	Filter/Troubleshoot	Triage/Prioritize	Action	Implementation Support	Validate (M&V)
<ul style="list-style-type: none"> <li>•BMS</li> <li>•Meters</li> <li>•IoT</li> <li>•Comfort Feedback</li> <li>•Equipment history</li> <li>•Service contracts</li> <li>•Site priorities</li> </ul>	<ul style="list-style-type: none"> <li>•Rules-based Analytics</li> <li>•Machine Learning</li> <li>•Expert Review by Buildings Engineers</li> </ul>	<ul style="list-style-type: none"> <li>•Remove False Positives and duplicates</li> <li>•Find root cause</li> </ul>	<ul style="list-style-type: none"> <li>•Quantify Impact</li> <li>•Energy</li> <li>•Comfort</li> <li>•Operations</li> <li>•Scheduled Work</li> <li>•Client Input</li> </ul>	<ul style="list-style-type: none"> <li>•Text/Email</li> <li>•Mobile App</li> <li>•Regular Meetings</li> <li>•Reports</li> </ul>	<ul style="list-style-type: none"> <li>•Troubleshooting</li> <li>•Contractor management</li> <li>•Planning</li> </ul>	<ul style="list-style-type: none"> <li>•Data confirms resolution</li> <li>•Quantify per measure savings</li> <li>•Quantify building level savings of service</li> </ul>



## Heat Map Analysis using Data Streams from the 1<sup>st</sup> BMS

AHU	OSCILLATION							DEVIATION		
	ChWV	HWV	RAF	SAF	SAT	ZT	SAP	ZT	SAT	SAP
AHU-01	CL	N	CL	CL	WL	N	N	CL	CL	SL
AHU-01 L1						N		WL		
AHU-01 L2						N		WL		
AHU-01 L3						N		WL		
AHU-01 LG						N		WL		
AHU-02	CL	N	CL	CL	N	N	N	WL	CL	SL
AHU-02 L1						N		WL		
AHU-02 L2						N		WL		
AHU-02 L3						N		WL		
AHU-02 LG						N		WL		
AHU-03	CL	N	CL	N	N	CL	N	WL	WL	N
AHU-03 L1						N		WL		
AHU-03 L2						N		WL		
AHU-03 L3						N		WL		
AHU-03 LG						N		WL		
AHU-04	CL	N	CL	N	WL	N	N	WL	WL	N
AHU-04 L1						N		WL		
AHU-04 L2						N		WL		
AHU-04 L3						N		WL		
AHU-04 LG						N		WL		
AHU-15	WL	CL	N	N	CL	CL	N	CL	CL	N
AHU-20	CL	CL	N	N	CL	CL	N	CL	CL	N
AHU-70	CL	CL	CL	WL	CL	CL	N	WL	CL	N
AHU-71	CL	N	CL	SL	N	N	N	CL	N	SL

Legend	Grading
	N - Normal
	WL - Warning Level
	CL - Concern Level
	SL - Severe Level
	Not Mapped
	Flat line

*Description of Issues:*  
**ChW** - Control Oscillation and/or not responsive.  
**HW** - Control Oscillation and/or not responsive.  
**Fan Speed** - Control Oscillation and/or not responsive.  
**SAT Oscillation** - Supply Air Temperature Reading Going up and down.  
**SAP Deviation** - Supply Air Pressure not meeting setpoint  
**SAT Deviaton** - Supply Air Temperature not Meeting Setpoint  
**ZT Oscillation** - Zone Temperature going up and down persistently

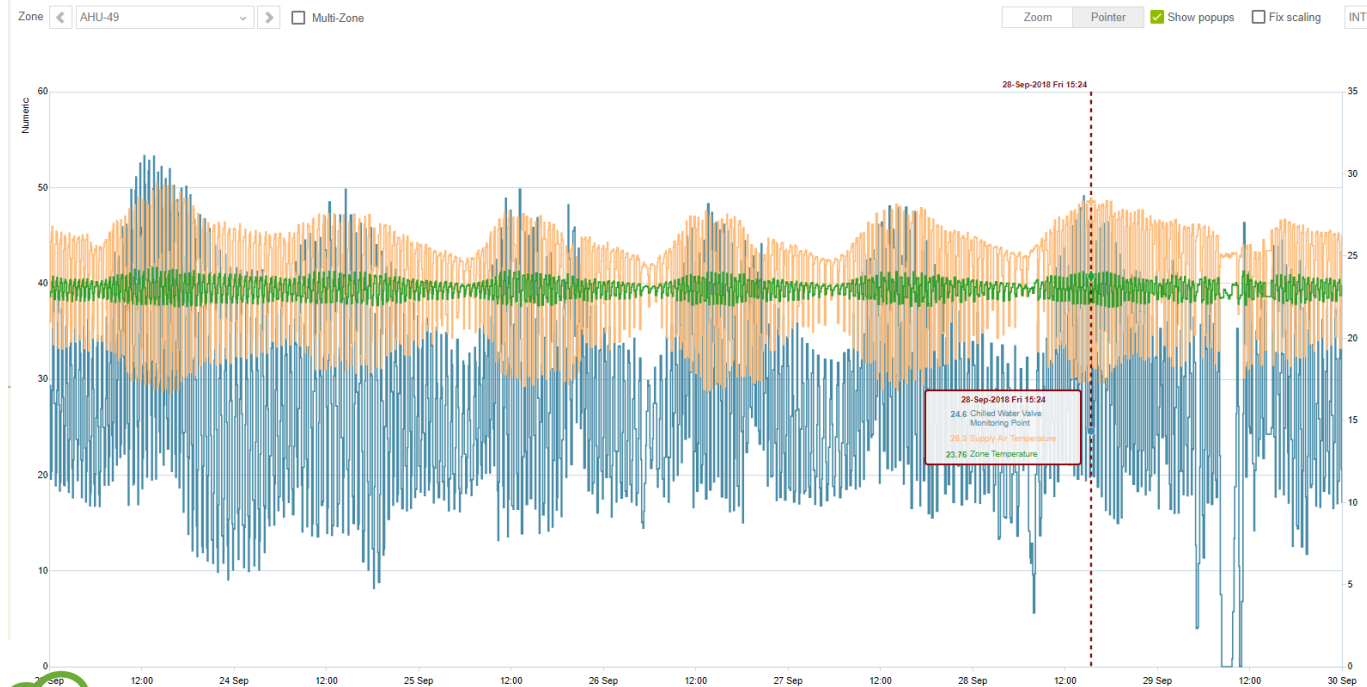


## Heat Map Analysis using Data Streams from the 2<sup>nd</sup> BMS

Zones	Oscillation							Deviation		
	CHW	HW	Fan	OAD	SAT	SAP	ZT	SAT	SAP	ZT
AHU-73 (Endoscopy)										
AHU-74 (Endoscopy)										
AHU-75 (Endoscopy)										
AHU-76 (Endoscopy)										
AHU-77 (Endoscopy)										
AHU-78 (Endoscopy)										
AHU-79 (Endoscopy)										
AHU-93 (CSSD)										
AHU-94 (CSSD)										
AHU-95 (CSSD)										
AHU-96 (CSSD)										
AHU-97 (CSSD)										
AHU-100 (Centre East)										
AHU-100 GL										
AHU-100 L1										
AHU-100 L2										
AHU-100 L3										
AHU-101 (North West)										
AHU-101 GL										
AHU-101 L1										
AHU-101 L2										
AHU-101 L3										
AHU-102 (North East)										
AHU-102 GL										
AHU-102 L1										
AHU-102 L2										
AHU-102 L3										

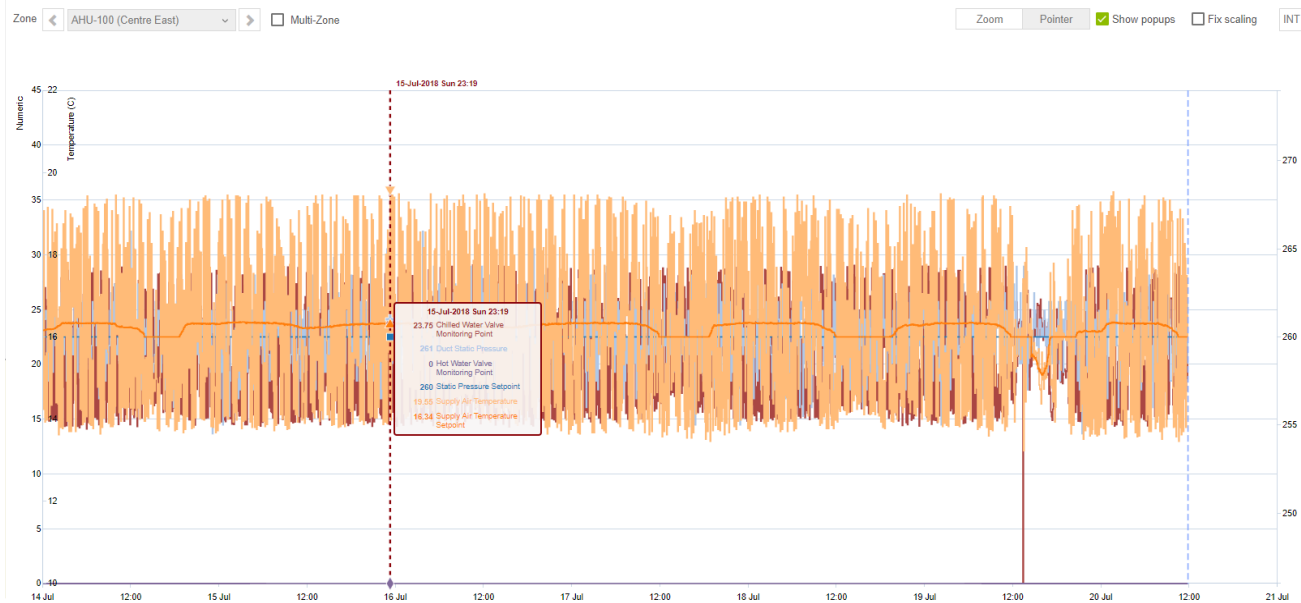


## BMS 1: Chilled Water Valve vs Supply Air Temp vs Zone temp Oscillation





## BMS 2: Chilled Water Valve vs Supply Air Temp Oscillations

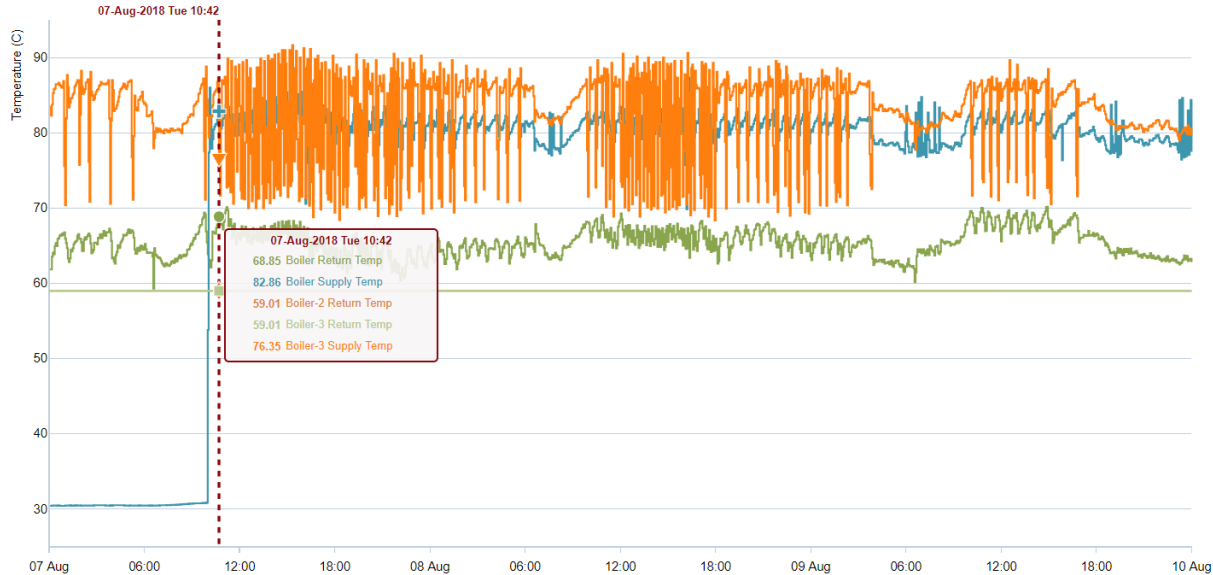




## BMS 2: Boiler Instability

Zone SW-AHU-100 (Centre East)  Multi-Zone

Show popups  Fix scaling



## Chiller Plant: Excessive Use of Large Chillers



### Logged when BuildingIQ is Operational

	Baseline	Actual	Savings
<b>Expenditure</b>	\$22,057.64	\$20,239.06	\$1,818.57
<b>Usage (kWh)</b>	221,693	203,697	17,996

Approximate time this month BIQ was in control: null

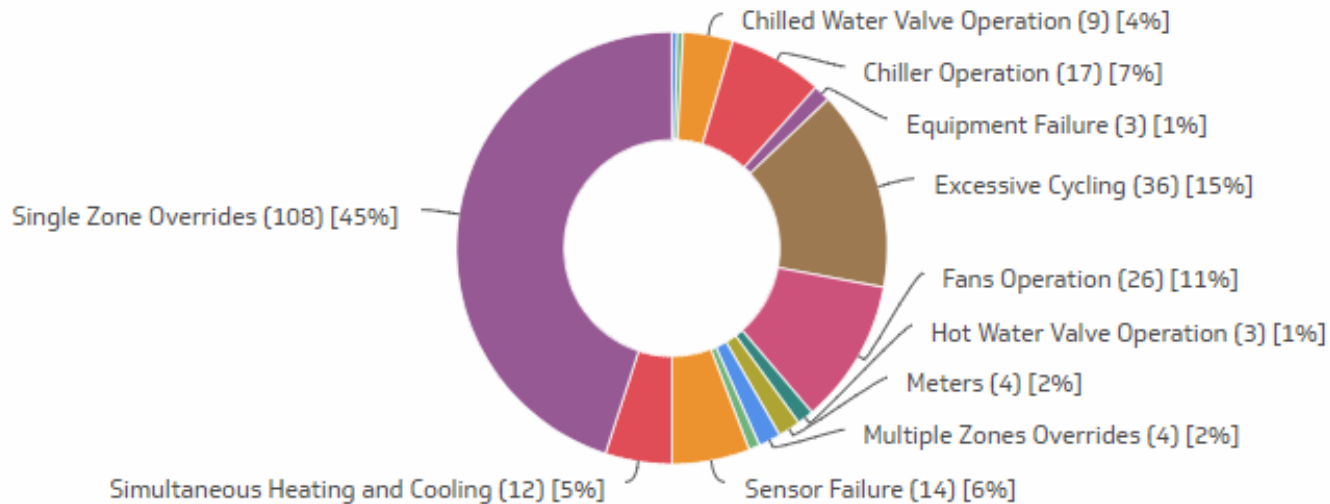
Zones under control as of report run date: 23%

**8.24%**  
**(\$) Percentage Reduction**



## Typical Issue Summary: Hospitals

### Identified Issues (Historical)



## The Outcome:

- 5% Reduction in net Building Power Usage (10% HVAC Power Usage Reduction) within 6 months time frame by optimizing 50% of the Building
- Additional 3-5% of Total Energy Reduction achieved recently due to Chiller Staging Strategy Improvement
- Ongoing Identification of Operational Issues
- Prioritization of Faults that have an impact on higher Energy Spend
- Solid Process to orchestrate actions on OPEX Investment
- Monthly Coordination with Incumbent BMS Contractors on the best outcome for the Client.
- Tailoring towards Asset Driven Maintenance



# Reasons for BuildingIQ's success in Hospitals

- Staff and Patient Comfort is top priority
- No Major changes to the Building are required
- Using the Building's current and historical cluster of data
- Improving Building's performance
- Cost reduction (OPEX) is the major benefit
- Increasing Asset Lifetime
- 24 x 7 Extension to staff through the Remote NOC
- Remote Expertise: A Phone Call Away
- Cyber Security is the best in the Business

# Customer's Feedback

"This is fantastic. You're telling us things we need to know just at the time we need to know them. Your team is like the eyes and ears of our building, bringing advanced capacity and complementary expertise to the table".

*Senior Engineer,  
St. John of God  
Murdoch Hospital*

BMS to

# Thank you!

Email us: [roya@buildingiq.com](mailto:roya@buildingiq.com)

