Johnson Controls – Building Efficiency

Metasys - Building Energy Management System (BEMS)



Industry's Most Flexible & Scalable Building Management Solutions



Terence Tan T.T.
Director, Integrated Solutions
Johnson Controls Singapore
Building Efficiency

Johnson Controls

UNEP

UNEP SBCI
Sustainable Buildings & Climate Initiative

Buildings and Climate Change

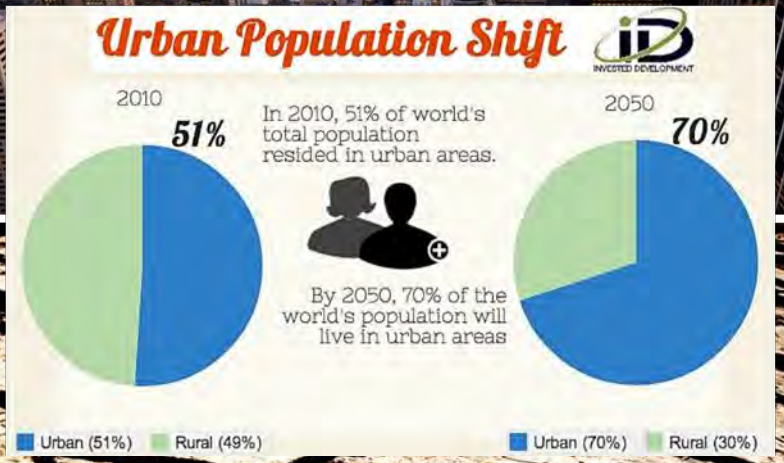
Summary for Decision-Makers



United Nations Environment Programme

Sustainable United Nations



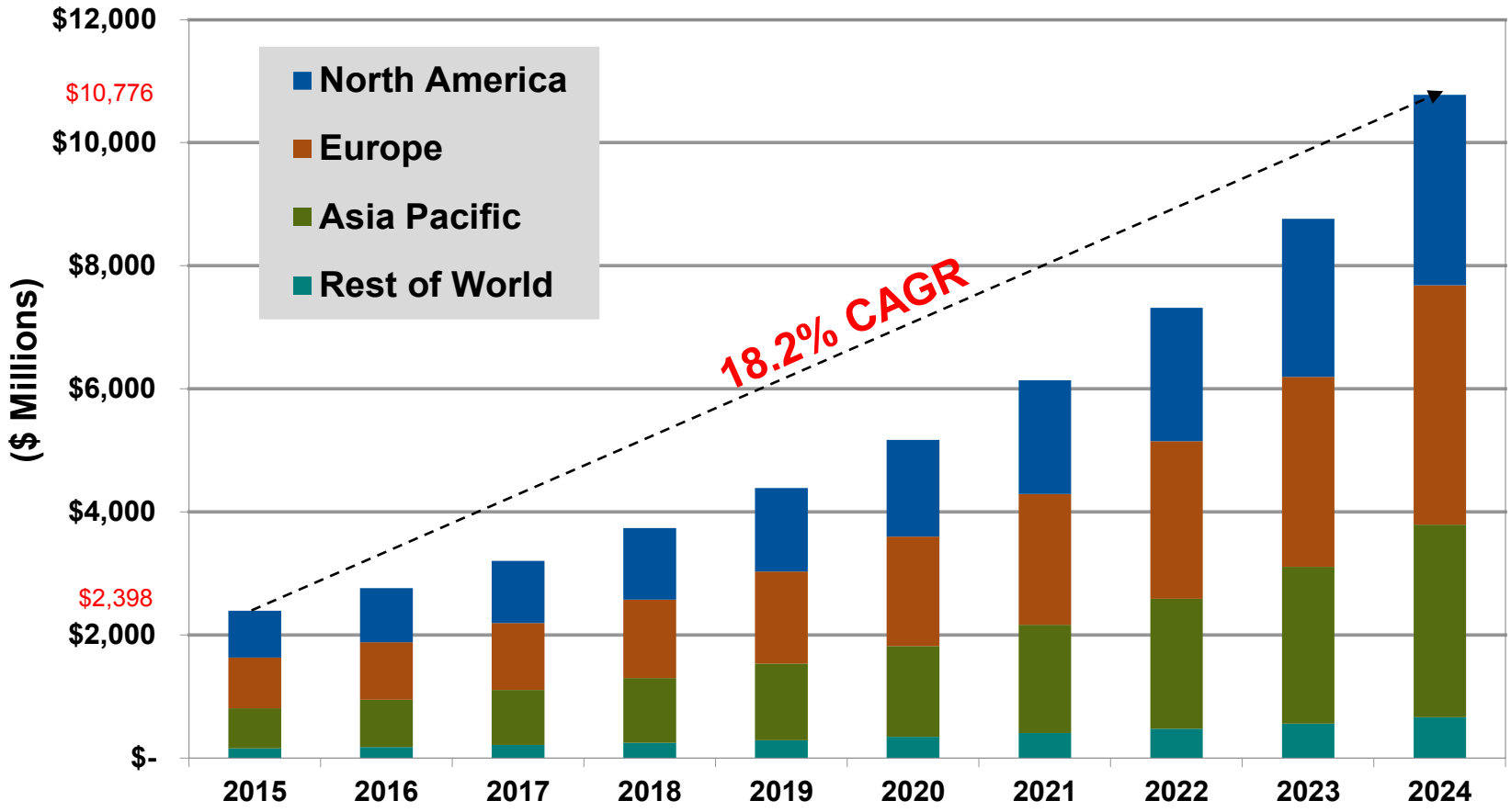


"Today, buildings are responsible for more than 40 percent of global energy used, and as much as one third of global greenhouse gas emissions, both in developed and developing countries."

UNEP

World Market Growth
Building Energy Management System (BEMS)

BEMS Revenue by Region, World Markets: 2015-2024



Source: NAVIGANT Research Report, Published 1Q 2015

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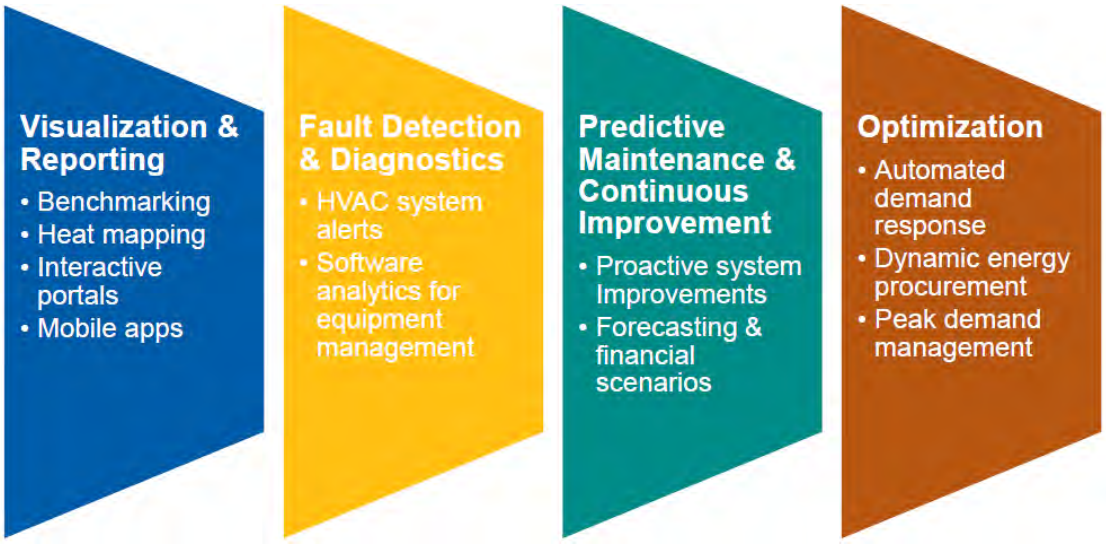
Building Energy Management System (BEMS) Defined

Report dated 1Q 2015

NAVIGANT RESEARCH

Building Energy Management System
Hardware, software and services for Energy Efficiency and Systems Optimization.

Building energy management systems (BEMS) are the data-driven decision support tools. It is an encompassing term for technology and service offerings that deliver business improvements, including cost savings.



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Survey Findings by BCA

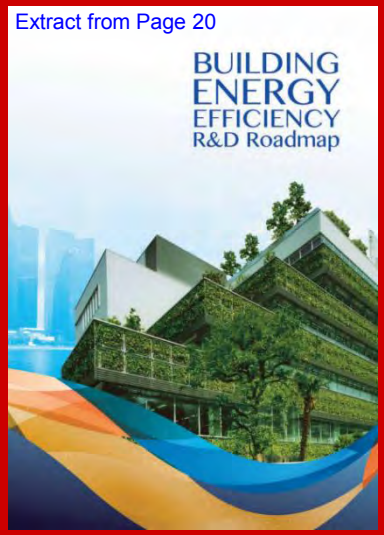
A survey suggested that 82% of buildings are installed with BMIS, but only 2% of the building managers are able to use them for targeting energy use. It was suggested that only 30% of the data collected from the BMIS was analysed and put to use (BCA, 2012a).

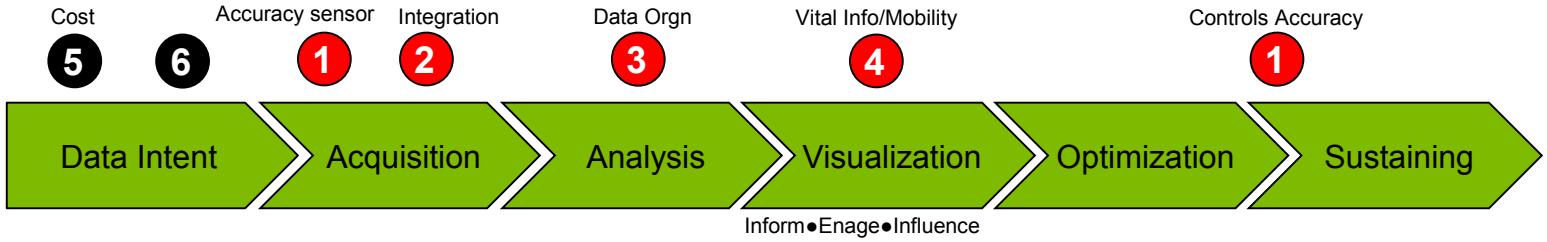
The following gaps were identified for BMIS technologies in the Singapore:

1) Lack of accurate sensors and controls
2) Lack of inter-operability & comms between various BMIS solutions
3) Lack of automated data organization
4) Lack of information availability to end user
5) Lack of cost effective sensing equipment
6) Lack of incorporation of BMIS components in M&E engineering packages

Source: Building Efficiency R&D Roadmap by BCA, NCCS and NFR – PMO (https://www.nccs.gov.sg/sites/nccs/files/Roadmap_BEE_20140729.pdf)

Extract from Page 20



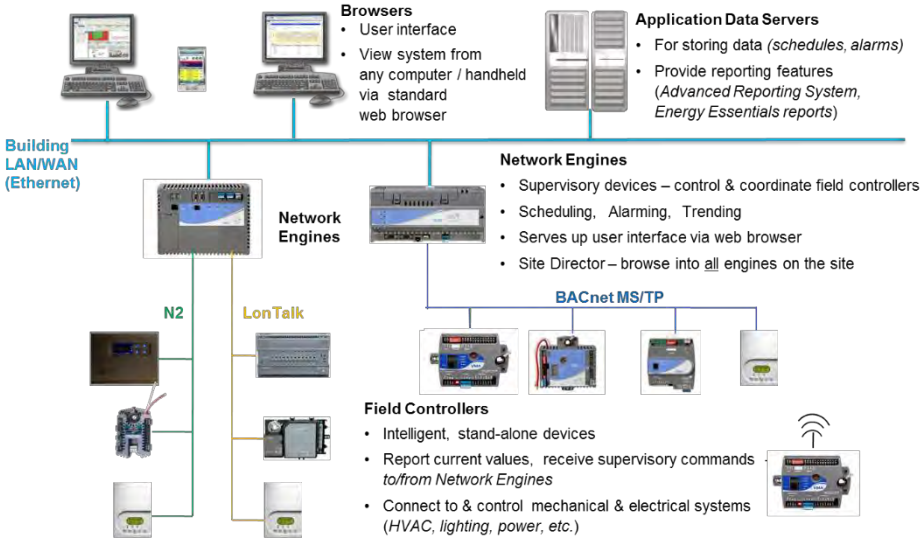


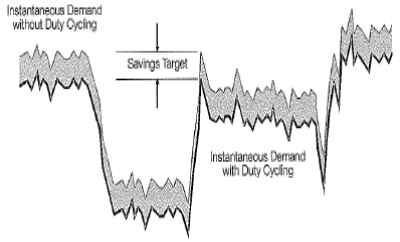
Building Data Management Process

BMIS – Building Management & Information System

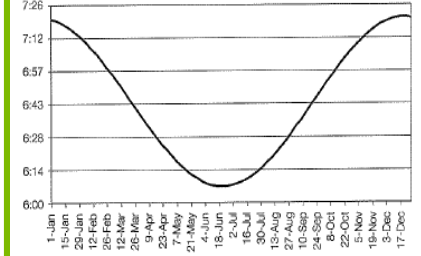
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Example of Energy Features in Most Building Management (& Information) Systems

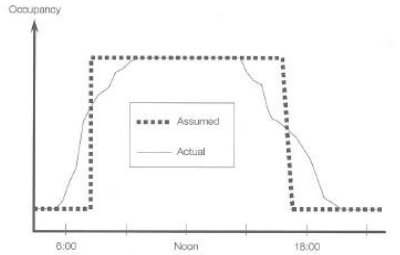




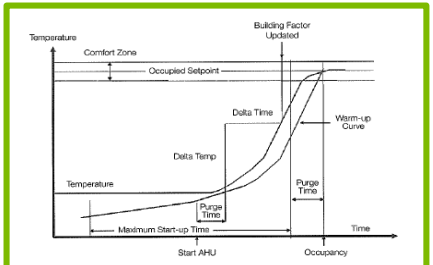
Duty Cycling



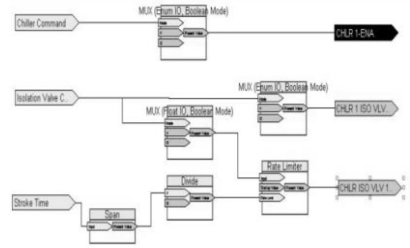
Daytime Switching



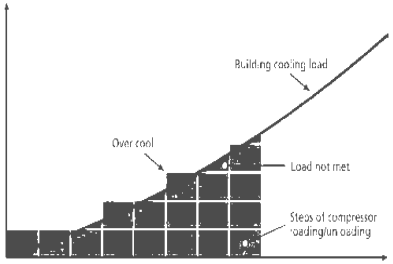
Occupancy Pattern



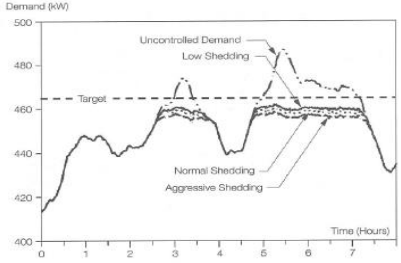
Optimal Start-Stop



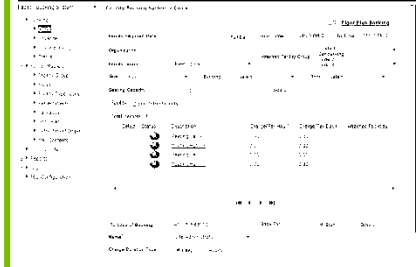
Chiller Plant Optimization



Chilled Water Temp Reset



Demand Limiting



Facility Scheduling

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Effective Buildng Energy “Management” System



Besides Measure the Right Things, also Measure them Accurately









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Impact of Inaccurate Temperature Sensors in Measurement & Verification System

1	2	3	4	5	6	7	8
Operating Parameters	CHWS Temp	CHWR Temp	Temp Diff	CHW Flow	Cooling Capacity	Elect Power Input	Chiller Plant Efficiency
	°C	°C	Δ °C	L/S	Ton	kWi	kWi/Ton
Actual Performance	7.00	12.00	5.00	168.20	1000	780	0.78
Error in Temperature	-0.50	0.50					
Distorted Performance	6.50	12.50	6.00	168.20	1200	780	0.65
Error % of Sensor vs Δ °C			10.0%			Error in Efficiency	0.13
						% Error	16.7%

a	b	c	d	e	f	g
Average Cooling Capacity	Annual Operating Hours	Cooling Load	Error in Efficiency	Error in Energy Savings	Tarrif Rate	Error in Energy Savings
Ton	Hrs	Ton-Hr	kWi/Ton	kWh	S$/kWh	S$
1000	8760	8,760,000	0.13	1,138,800	0.25	284,700
	24 Hrs x 365 Days	a x b		c x d		e x f

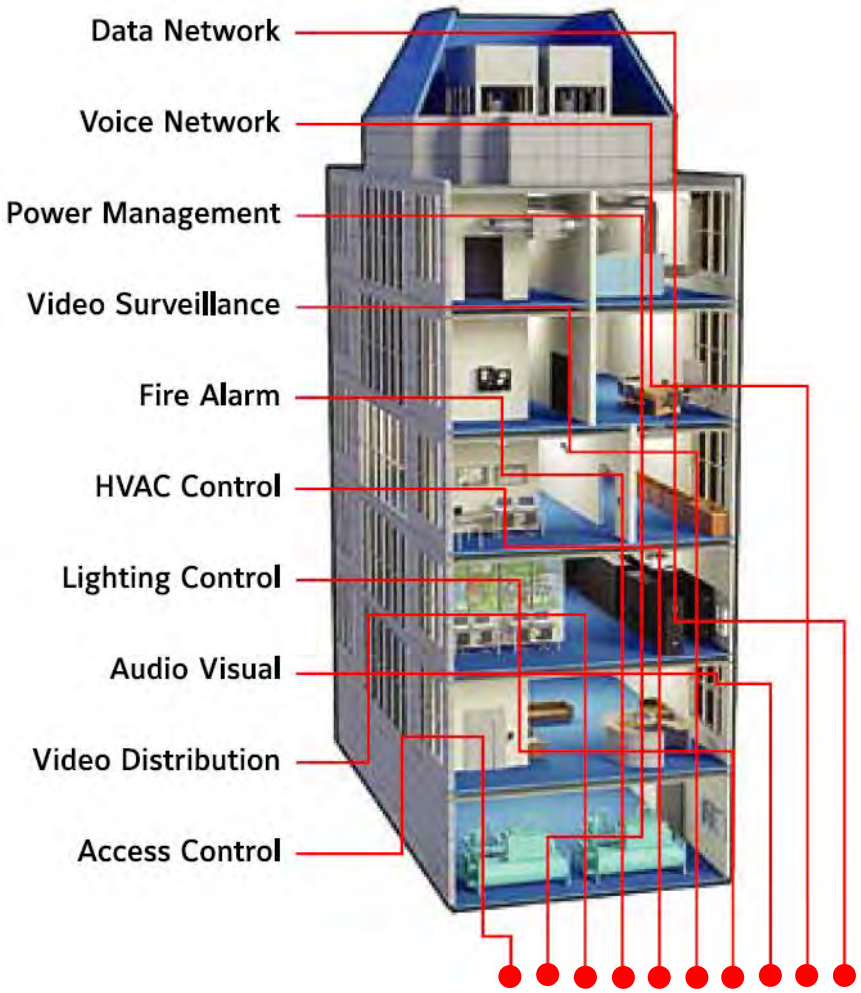
+/-0.5°C Temperature Error Results in S$$284,700 per year of Energy Saving Error!



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Gap 2

Traditional Silos of Building & ICT Systems



Multiple Management Consoles For Individual System Controls

"Lack of inter-operability & communications between various BMIS solutions"

Source: Building Efficiency R&D Roadmap
by BCA, NCCS and NFR – PMO

Each of the silo systems represents a "pain point" in the building management by building & facilities owners

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Lack of automated data organization
Lack of information availability to end user

Gap 3 4

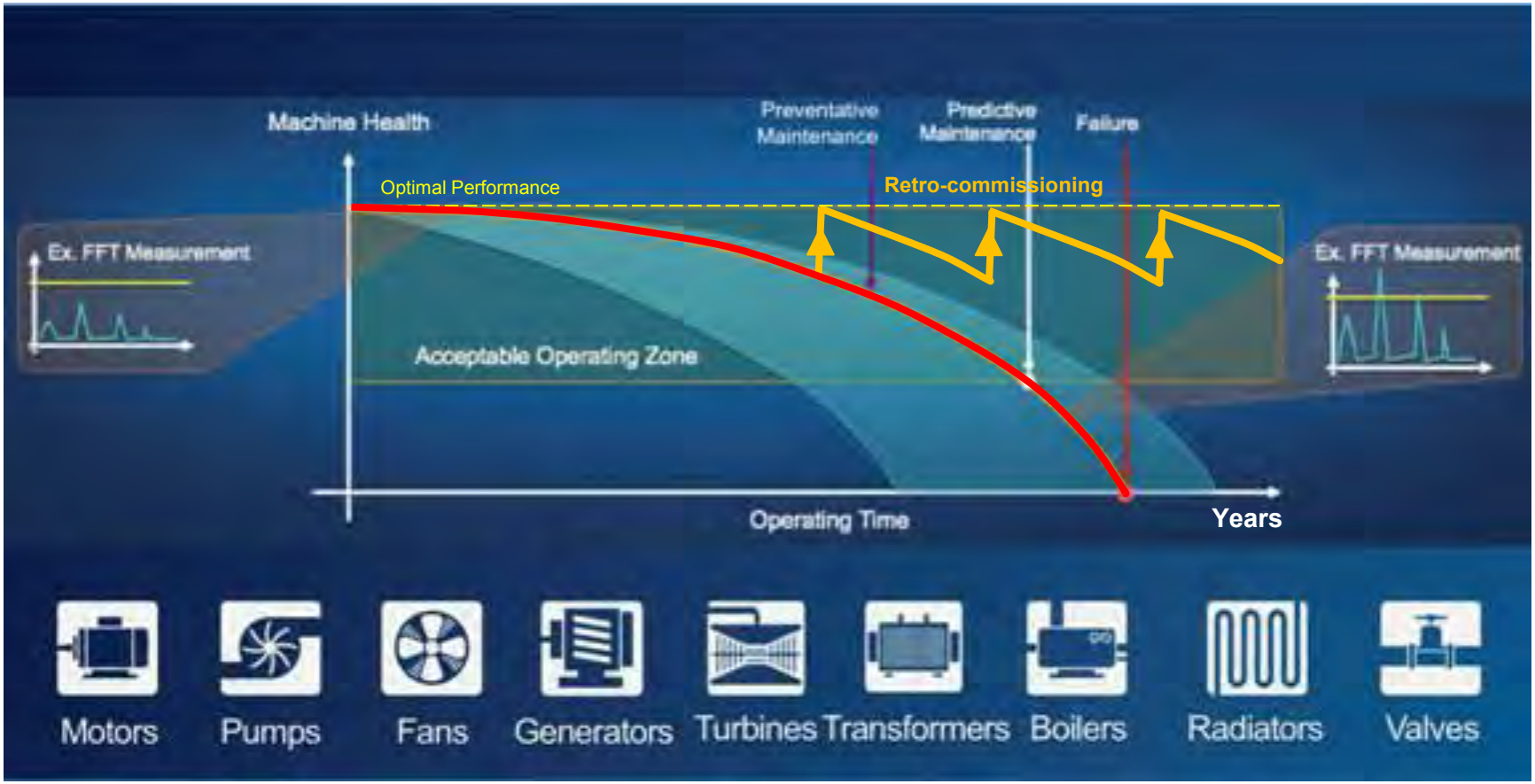
Trivial Many (Data) vs Vital Few (Information)



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Services: Maintenance & Retro/Continuous-commissioning

Why we do maintenance?
It is to prevent failures, failures consequences and inefficiency incl. energy waste, etc.

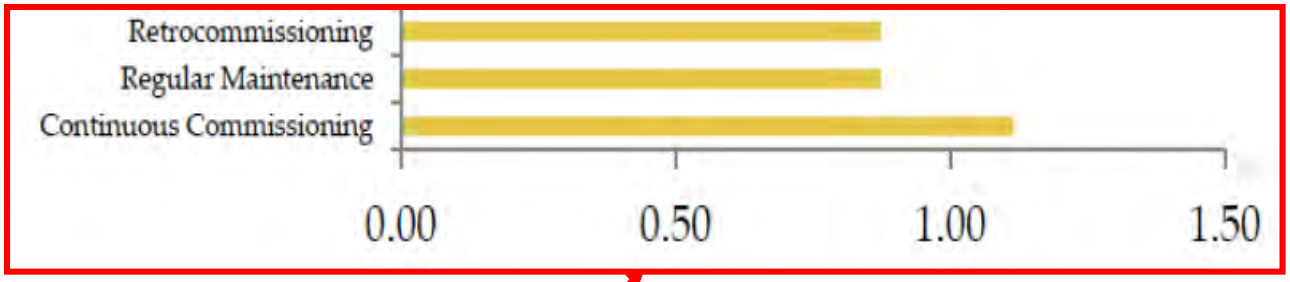


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Technical Energy-Savings Potential of the 57 Technology Options (EERE 2011)

Page 275: Appendix C Technical Energy-Savings Potential of the 57 Technology Options (Except Early-Stage Technologies)





Sources:
1. Gap Analysis and Technology Prioritization Workshop (Doc, Page 33), Prepared by Energy Research Institute @ NTU and Nexight Group
2. Energy Savings Potential and RD&D Opportunities for Commercial Building HVAC Systems (by US Department of Energy)

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Building Energy Management System

METASYS®
MASTER YOUR ENVIRONMENT.

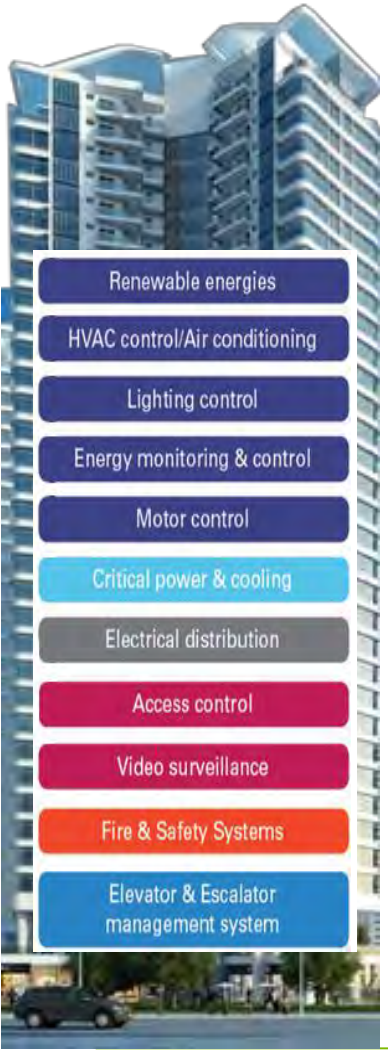


Johnson Controls' Knowledge in Building Performance



Johnson Controls

Integrate-ability, Flexible & Scalable Metasys Building Energy Management System



Cloud

INTERNET

ICT System

Cisco Energy Manager (CEM)

METASYS
MASTER YOUR ENVIRONMENT.

Enmetric Plug Load Solution

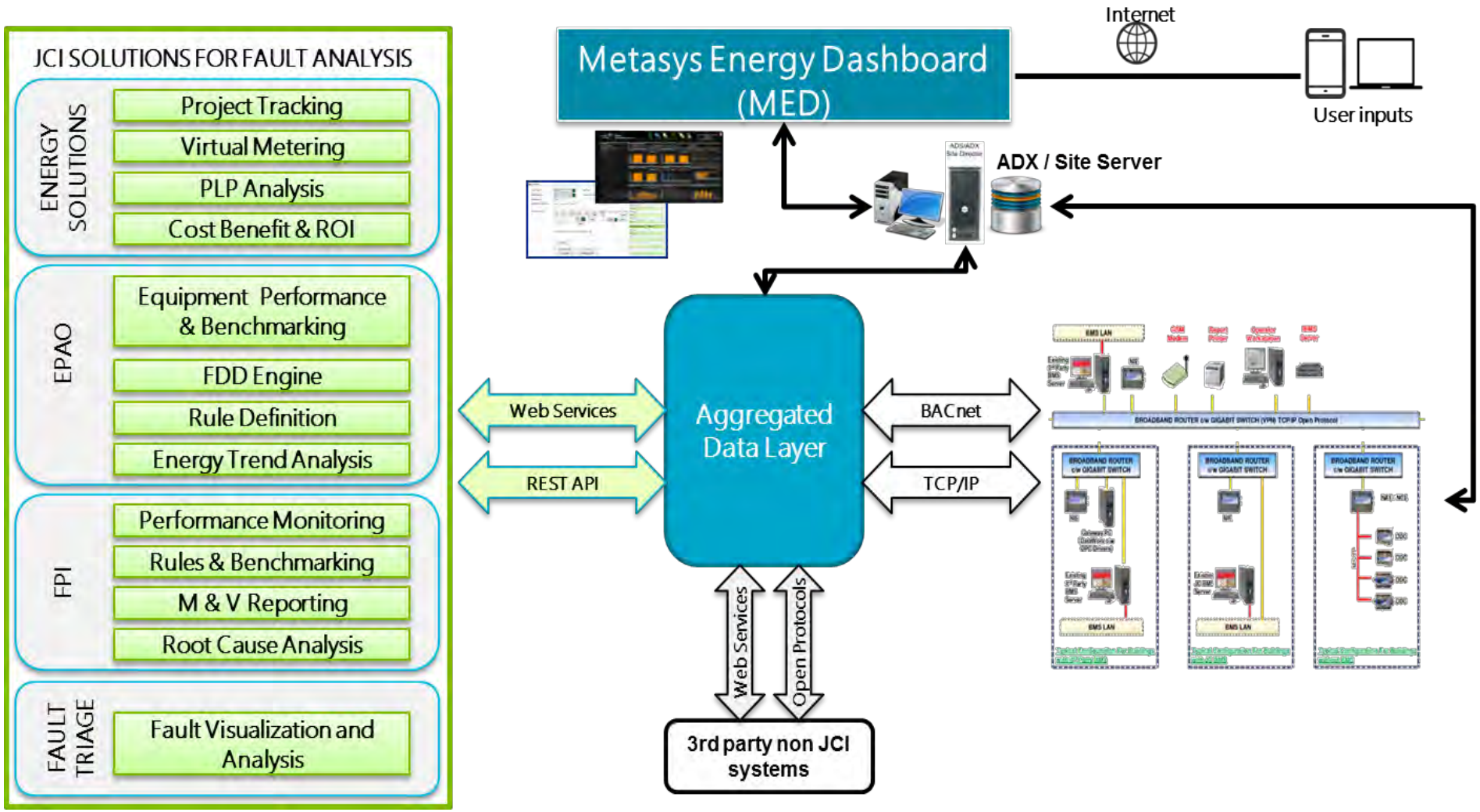
Wired & Wireless Sensing Solutions

Building Systems & Equipment

Chiller System | AHUs | HVAC Equip. | Fans | VAV box | Lighting | Water system | Others e.g UPS, GEN, Elect etc | Heating system | Lifts | Escalators

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Metasys Energy Management Optimization
Customized Application Architecture – On Premise Solution



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Metasys Enterprise Optimization (MEO)
For Building Portfolio Management

Metasys Enterprise Optimization Applications


GREEN KIOSK DASHBOARD


METER ANALYSIS TOOL


FAULT ANALYSIS TOOL


OPERATIONS DASHBOARD


WORK ORDER MANAGEMENT

Business Applications

Project Management Systems
Sustainability Reporting
Real Estate Management

Work Order / Work Ticket Systems
Financial Systems
ERP Systems

IBM Cognos
Tivoli software
Hitachi Consulting
We make it happen. Better.
ORACLE
SAP Business Objects

Data Management

Facility-related data from the network

Weather
Utilities
Work Order
Client-specific

Data Analytics
Data Warehouse

Processed facility data available through standard queries and API's

Aggregation • Normalization • Classification

Building Data Integration

Meters & HVAC Equipment



[+other monitored assets]
e.g. Data Center: PDU, UPS, Generator, Tank, inlet/outlet temperature, CPU utilization, etc.

Building Automation

TRANE
Schneider Electric
Johnson Controls
Honeywell
TRIDIUM
SIEMENS

Johnson Controls

Metasys 7.0 – User Interface (UI) Mobility Ready

Tour of Metasys: johnsoncontrols.com/metasys-bas-release





86%

Fewer Clicks

To Find Critical Information

Compared to hardware-focused interface



FACILITY STAFFS INCREASING USE OF MOBILE DEVICES

Because facility operators have no time to lose, mobile devices have become essential to their productivity. They enable facility operators to be in control even when they are on the go.

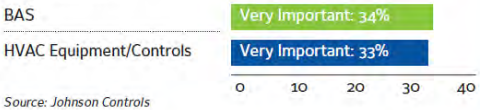
More than 40 percent of respondents to the 2013 Building Efficiency Panel IT Mobility Survey use mobile devices to access their BAS and HVAC equipment and controls. Another one-third of respondents said mobile access would be very important in the future.

Facility operators need to be where the problems are, and the rapidly evolving world of mobile technology is allowing them to streamline their on-the-go workflow. As more systems adapt to take advantage of the broad mobile trend, adoption is set to continue increasing.

Which of the following types of building-related data is accessed today by mobile devices?



As you look ahead 2 to 3 years down the road, how important will it be to access the following building-related data from a mobile device?



Source: Johnson Controls

Johnson Controls

Energy Dashboard & Reports Tool (EDART) & Kiosk

Energy Performance ● Equipment Performance ● Reports





Energy Performance



Equipment Performance



Tenant Billing



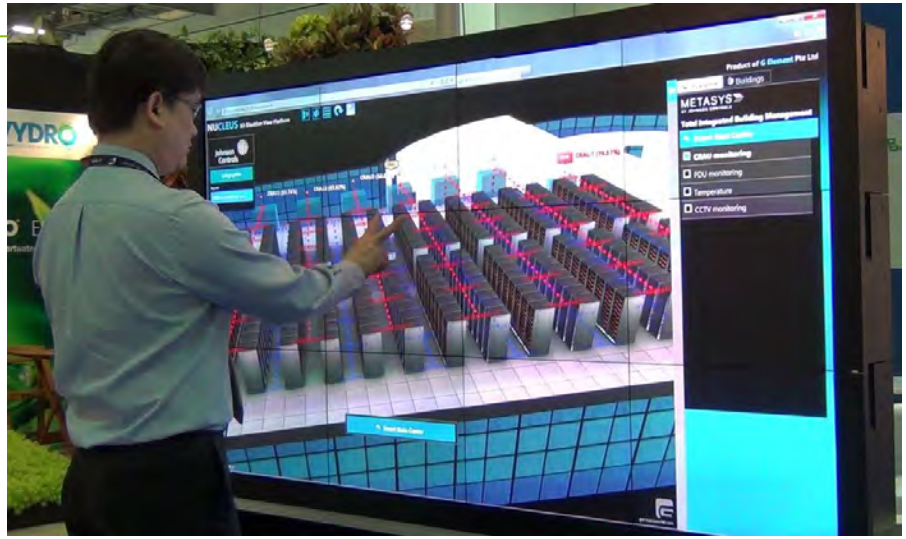
Document Repository



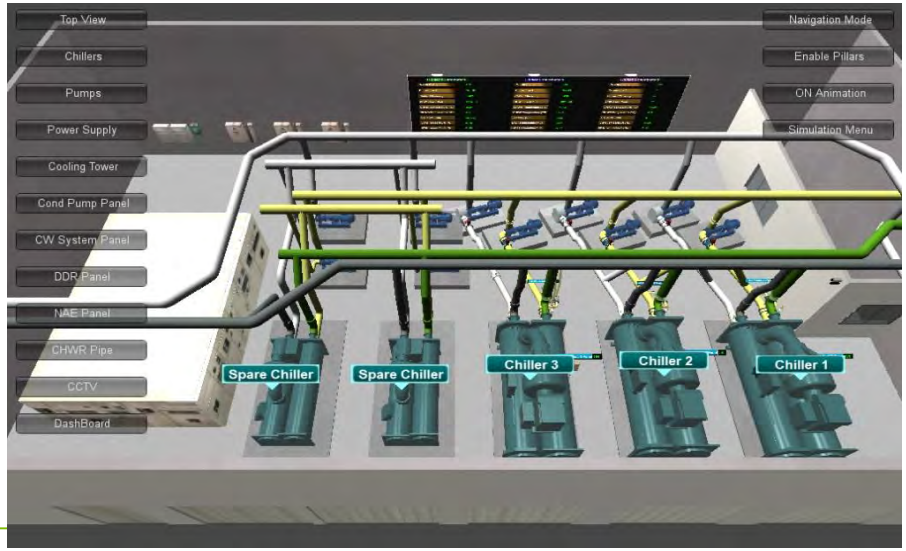
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Johnson Controls
Customized 3D Visualization of Buildings & Facilities







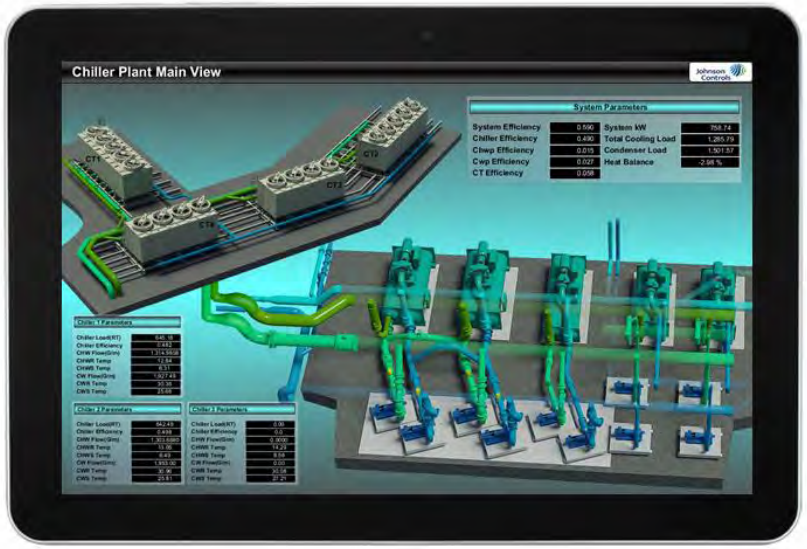


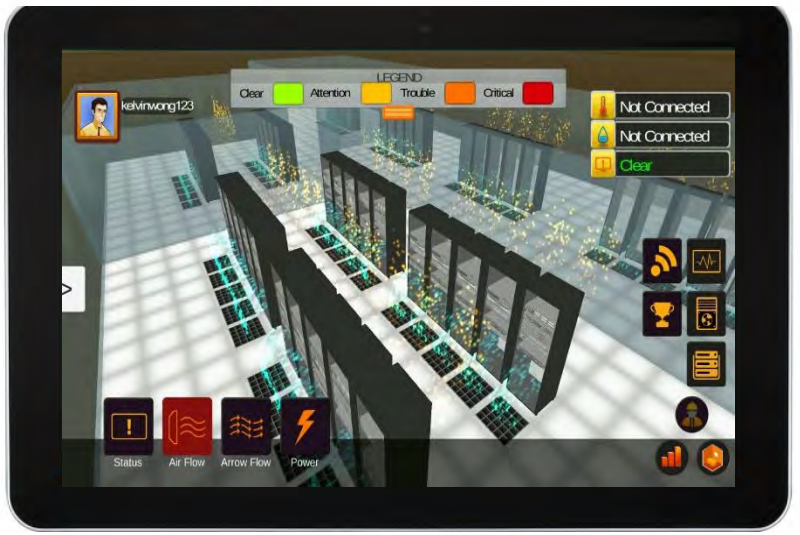
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Customized Dashboard & Mobile Visualizations For Unique User Experience









Johnson Controls



Enterprise Facility Information & Resource Manager (EFIRM)

- Asset Management
- Parts and Inventory
- Vendors & Contract Management
- Cost Management
- Workforce Management
- Maintenance Management
- Help Desk
- Dashboards
- Facility Setup
- Reports
- Data Logger
- Document Management
- Facility Billing
- Keys Management
- Tenant Billing
- Visitor Management
- Time & Attendance

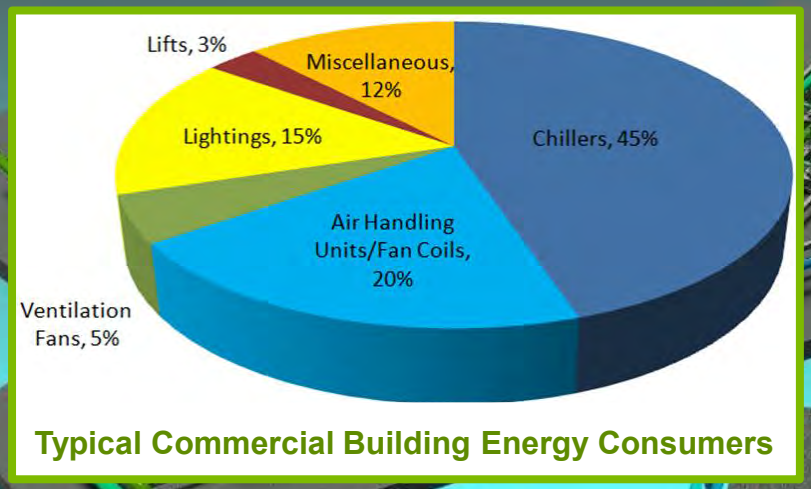
Smart Facility Management Solution

For Multiple Users & Stakeholders

Johnson Controls

Johnson Controls

Comprehensive HVAC Equipment ● Systems ● Services ● Solutions



Typical Commercial Building Energy Consumers



YORK®
INSTALL CONFIDENCE.

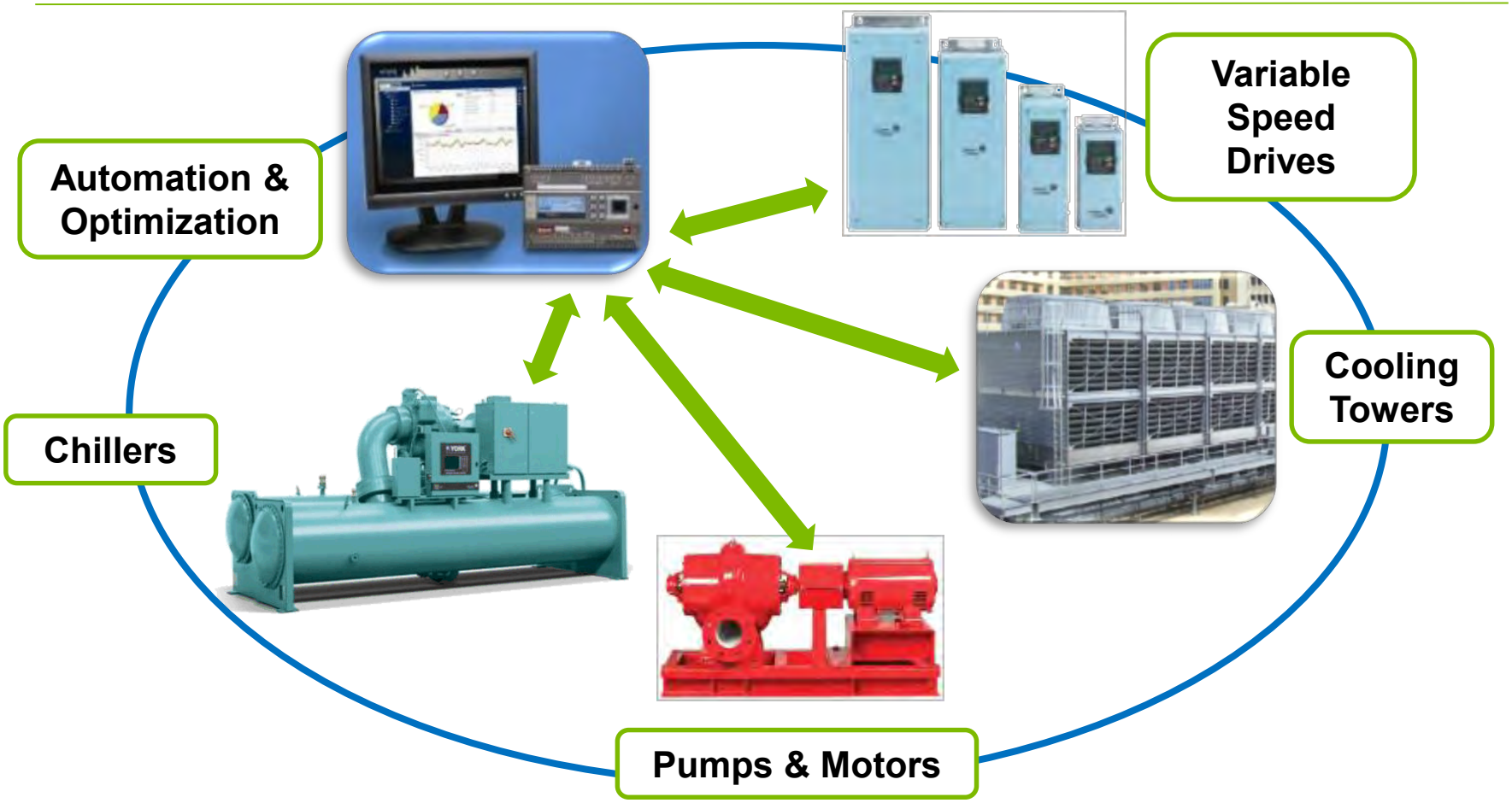
World Renowned Brands

Johnson Controls | YORK BY JOHNSON CONTROLS | Air Distribution Technologies | METASYS BY JOHNSON CONTROLS | Frick BY JOHNSON CONTROLS | SABROE BY JOHNSON CONTROLS



Efficient and capable components can get you only so far.

This is why we must optimize.



To maximize efficiency, plants should be designed & operated holistically

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Johnson Controls Chiller Plant Optimization (CPO) 10

Custom programs…..without the custom programming



Johnson Controls

METASYS
BY JOHNSON CONTROLS

The World's Leading Building Management System



Johnson Controls

Building Efficiency

Thank You

Metasys 7.0 – User Interface Mobility Ready



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