



Building Intelligence Group Master Agent for Online Energy Manager

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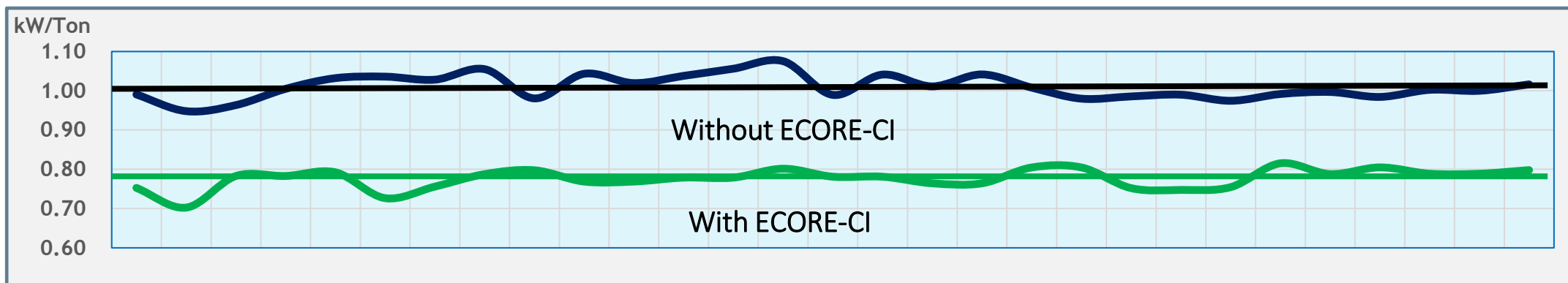
<https://www.edgebsmart.com/>

ONLINE ENERGY MANAGER *ECORE-CI*®

PATENTED AI-DRIVEN BAS/BMS HVAC/Heat-Load Optimization for Commercial,
Multi-Family and Industrial Facilities

HIGH-IMPACT ECM* SOLUTIONS with SUPERIOR ROI
that SUPPORT MEP FIRMS and ECM PROJECTS

*ECM = ENERGY CONSERVATION METHOD



ECORE-CI[®]

Efficient **CO**oling & **RE**frigeration Platform for
Commercial & Industrial Facilities based on
OEM's Patented Technology

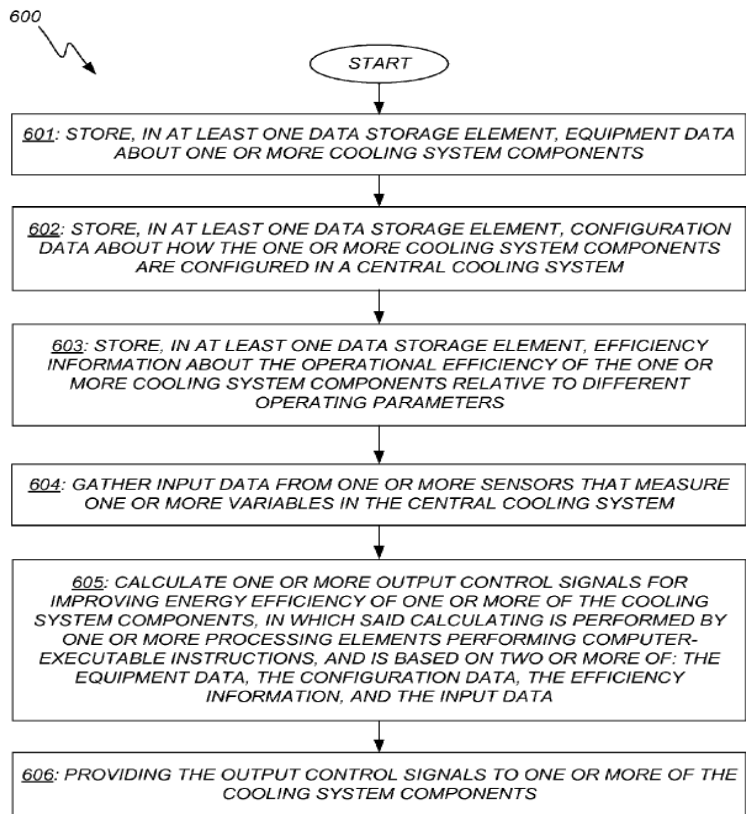
REVOLUTIONIZE ENGINEERING DESIGN CONSULTING WITH **AI-DRIVEN HVAC OPTIMIZATION TECHNOLOGY**

- 25%-40% HVAC ENERGY REDUCTION USING AI TO CONTINUOUSLY OPTIMIZE AND BALANCE KEY SYSTEM VARIABLES
- MINIMUM CONSTRUCTION EFFORTS
- NO IMPACT ON WARRANTY'S OR COOLING LOAD

United States Patent

(10) **Patent No.:** **US 8,660,702 B2**
 (45) **Date of Patent:** **Feb. 25, 2014**

CENTRAL COOLING AND CIRCULATION ENERGY MANAGEMENT CONTROL SYSTEM



7,174,732	B2 *	2/2007	Taniguchi et al.	62/183
7,664,573	B2 *	2/2010	Ahmed	700/276
7,908,117	B2 *	3/2011	Steinberg et al.	702/182
2010/0076605	A1 *	3/2010	Harrod et al.	700/276

ABSTRACT

A novel central cooling and circulation energy management control system is provided, including an energy management controller device, a central cooling system, and associated methods, according to various embodiments. In one illustrative embodiment, a central cooling energy management controller device includes one or more signal connections, one or more electronic memory elements, and one or more processors. The controller device has access to resources that are either stored on the electronic memory elements or are accessible via the signal connections. The resources include an equipment data table, an equipment and operational configuration table, an operational efficiency matrix, and executable instructions. The processor determines operational control signals for energy-efficient operation of a central cooling system, based on sensor input from the central cooling system, and on data from the equipment data table, the equipment and operational configuration table, and the operational efficiency matrix; and provides the operational control signals via the signal connections.

BE SAFE:
ECORE-CI is
Patent
Protected

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APPLICABLE TO ALL LARGE BUILT SPACE CENTRAL HVAC SYSTEMS

Hotels



**Cold Storage
Warehouses & Data Centers**



**Shopping Malls &
Transport Hubs**



**Hospitals &
Commercial Prop.**



**Colleges/
Universities**



**Industrial
Plants**



ECORE FEATURES

**PROPRIETARY
TECHNOLOGY**

**OPTIMIZES
COOLING
EFFICIENCY**

**COST
REDUCTION
23 - 40% of
GUARANTEED**

**WARRANTY
NEUTRAL
GUARANTEED**

**PRICED FOR
GUARANTEED ROI
PAYBACK <3-
YEARS
GARANTEED**

**NON-INTRUSIVE
IMPLEMENTATION
NO DISRUPTION
TO OPERATIONS**

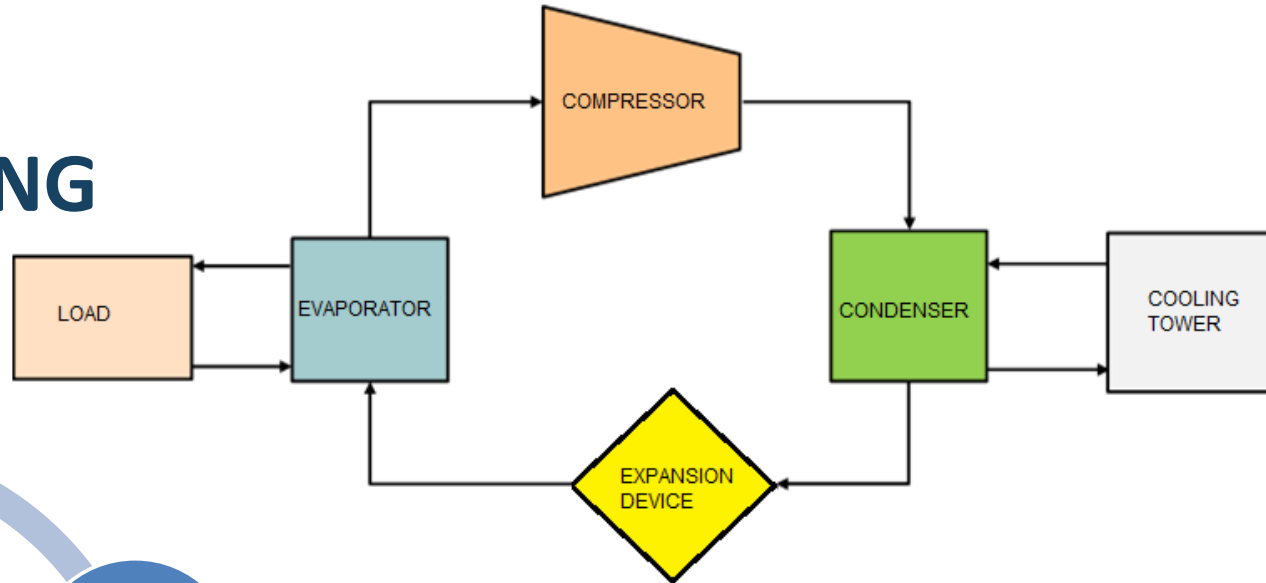
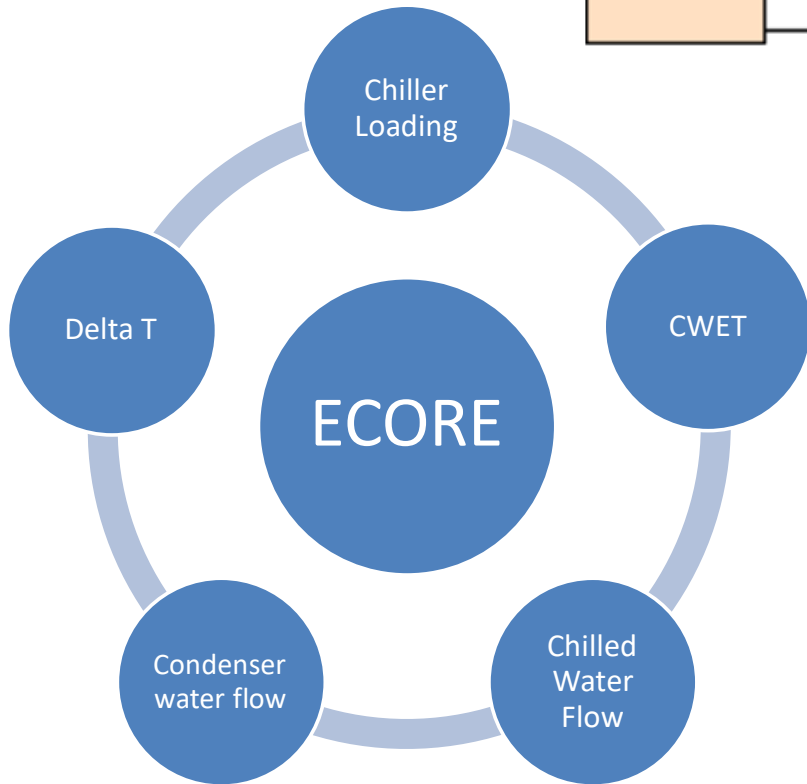
**AIR-GAPPED OR
REMOTE
MONITORING
ISOLATED SELF-
CONTAINED OR
CONNECTED**

**ADAPTABLE
ANY BMS/BAS
or HMI SYSTEM**

**AUTOMATED
RESPONSE
ALARMS AND
CORRECTIVE
ACTIONS**

Implemented numerous successful chiller system optimization projects since 2013 demonstrating energy and cost savings of 23-40% with paybacks under 3 years

ECORE OPERATING PRINCIPLES



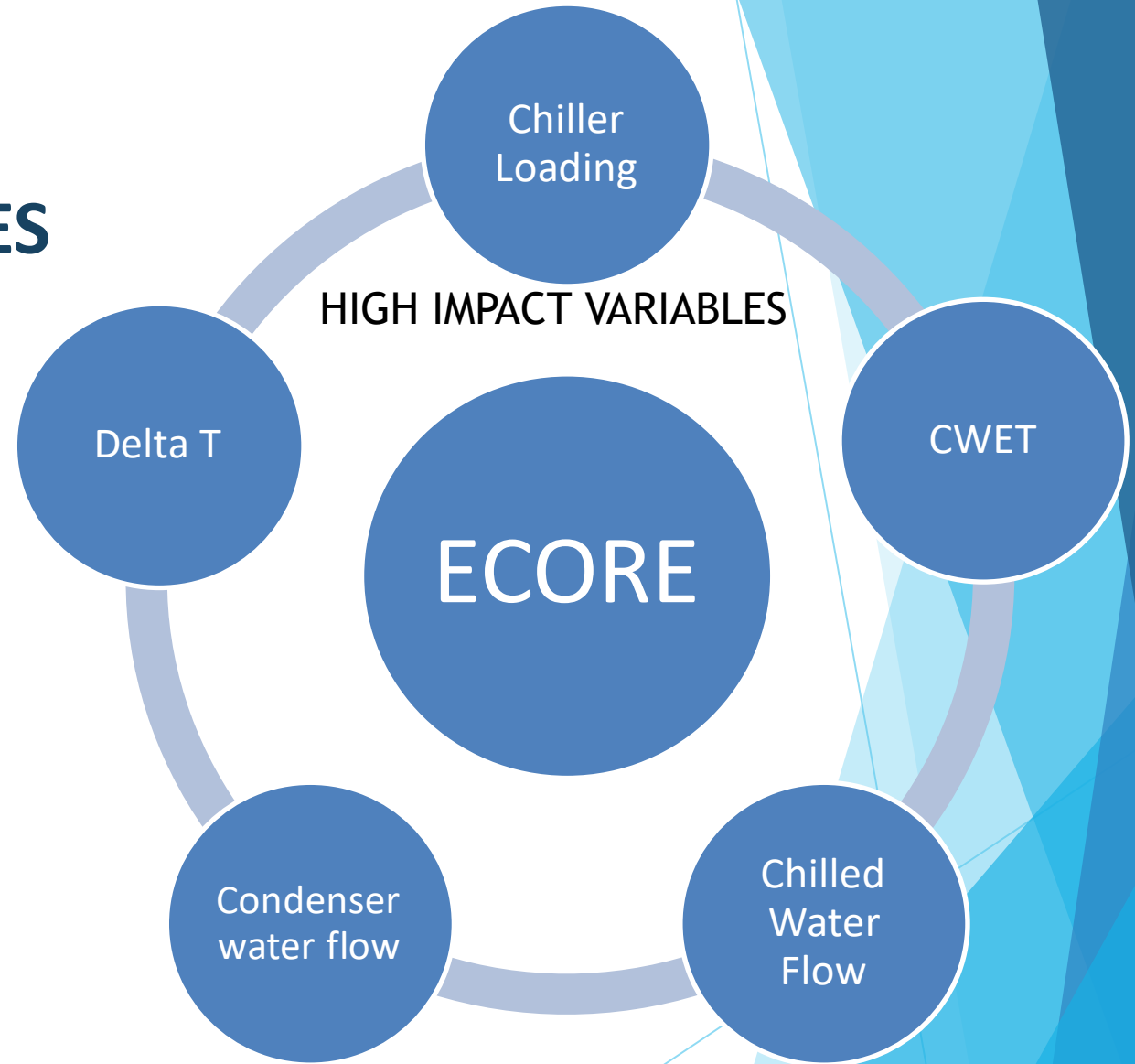
► ECORE is designed, customized, installed and self-maintains to continuously deliver optimum kW/Ton by automatically adjusting major operating parameters, consistent with the chiller manufacturers' specifications for operation and safety without affecting cooling load.

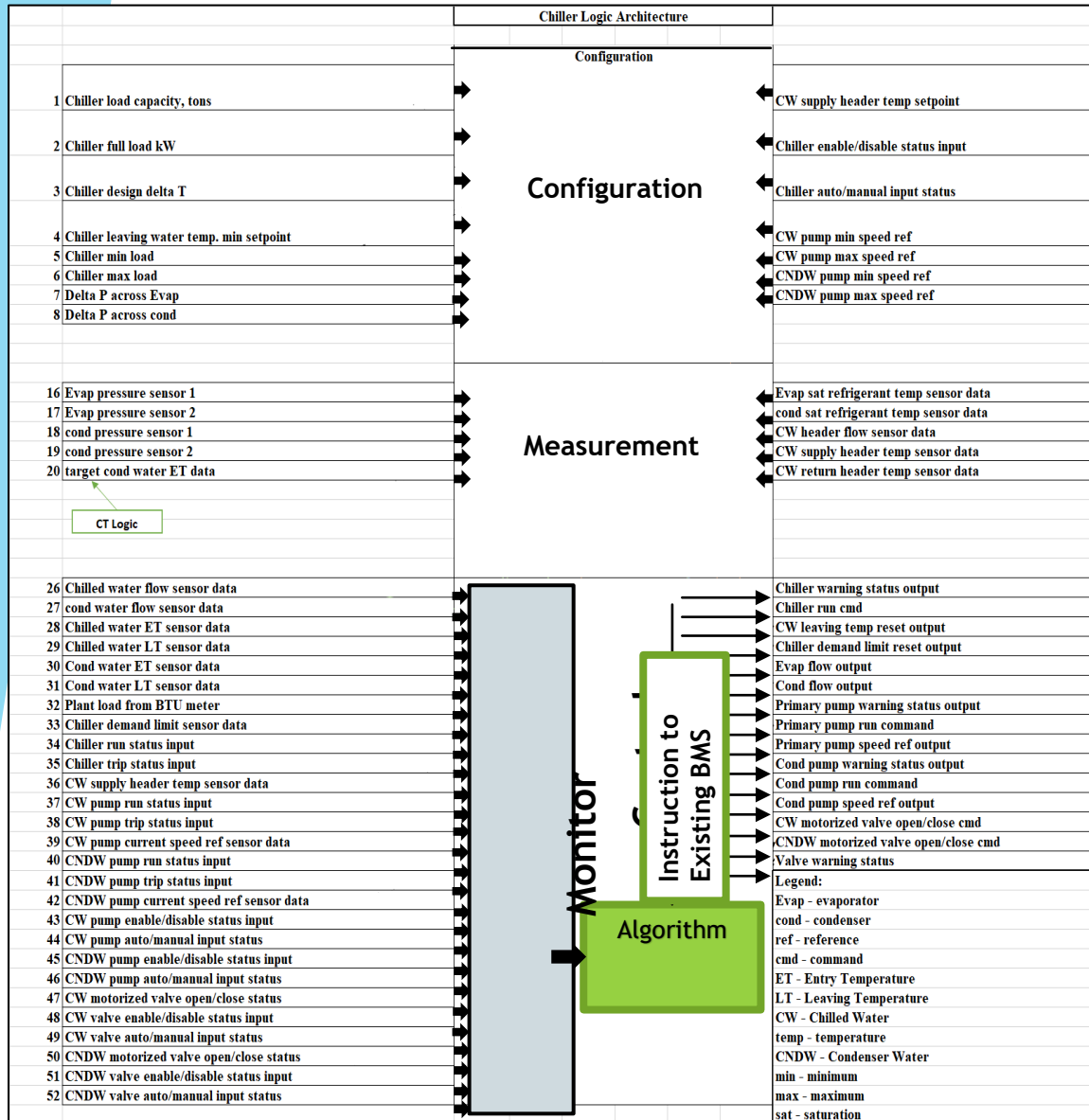
ECORE OPERATING PRINCIPLES

Dynamically optimize set-points based on changing Cooling Loads, Ambient Temperature and Relative Humidity to minimize kWh/Ton

PRIMARY MANAGED VARIABLES:

- CWET
- Chiller Loading Balance Across Multiple Chillers
- Delta T
- Condenser Water Flow Rate
- Chilled Water Flow Rate
- Other high-impact variables





Key Features

- Complex calculations executed in real time.
- Dynamically optimize major and minor control points.
- Sends commands to BMS/BAS/SCADA for execution and logging.
- A.I. machine learning keeps HVAC supply side optimized for entire equipment lifecycle.
- Small adjustments = big savings
- Set it and forget it (remote options available)
- No warranty impact or operational disruption.
- On/Off switch

USER INTERFACE



Displays system configuration



Shows equipment operating conditions



Summarizes performance



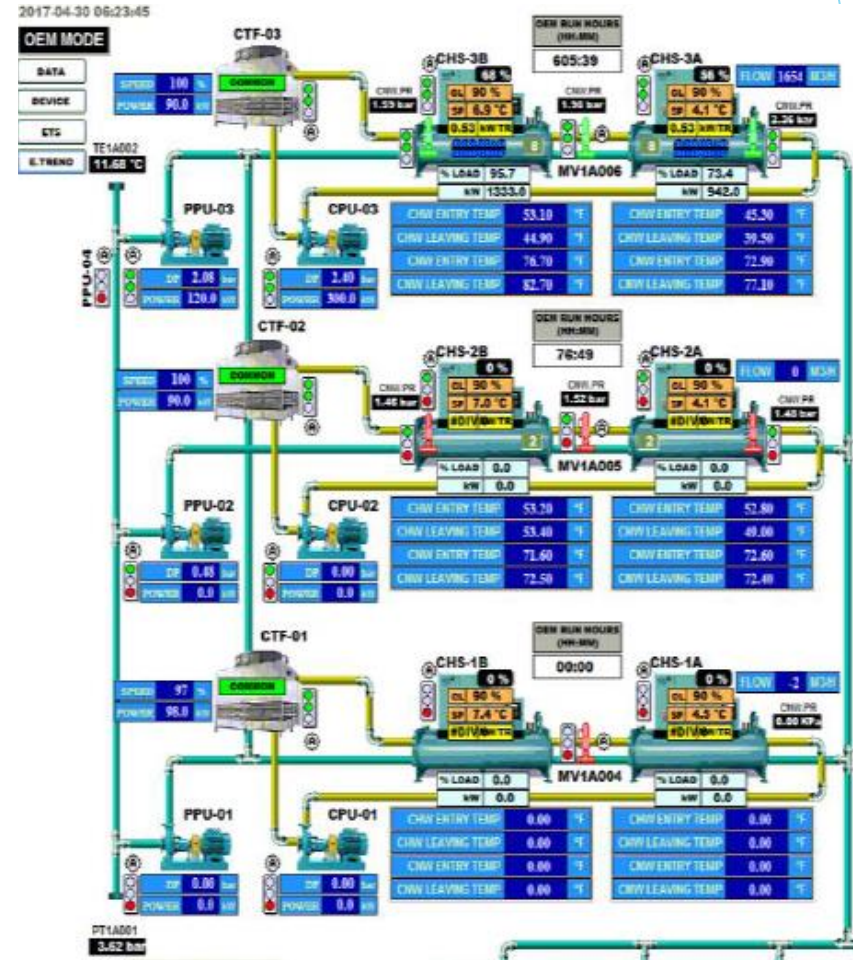
Provides pre-set alarms



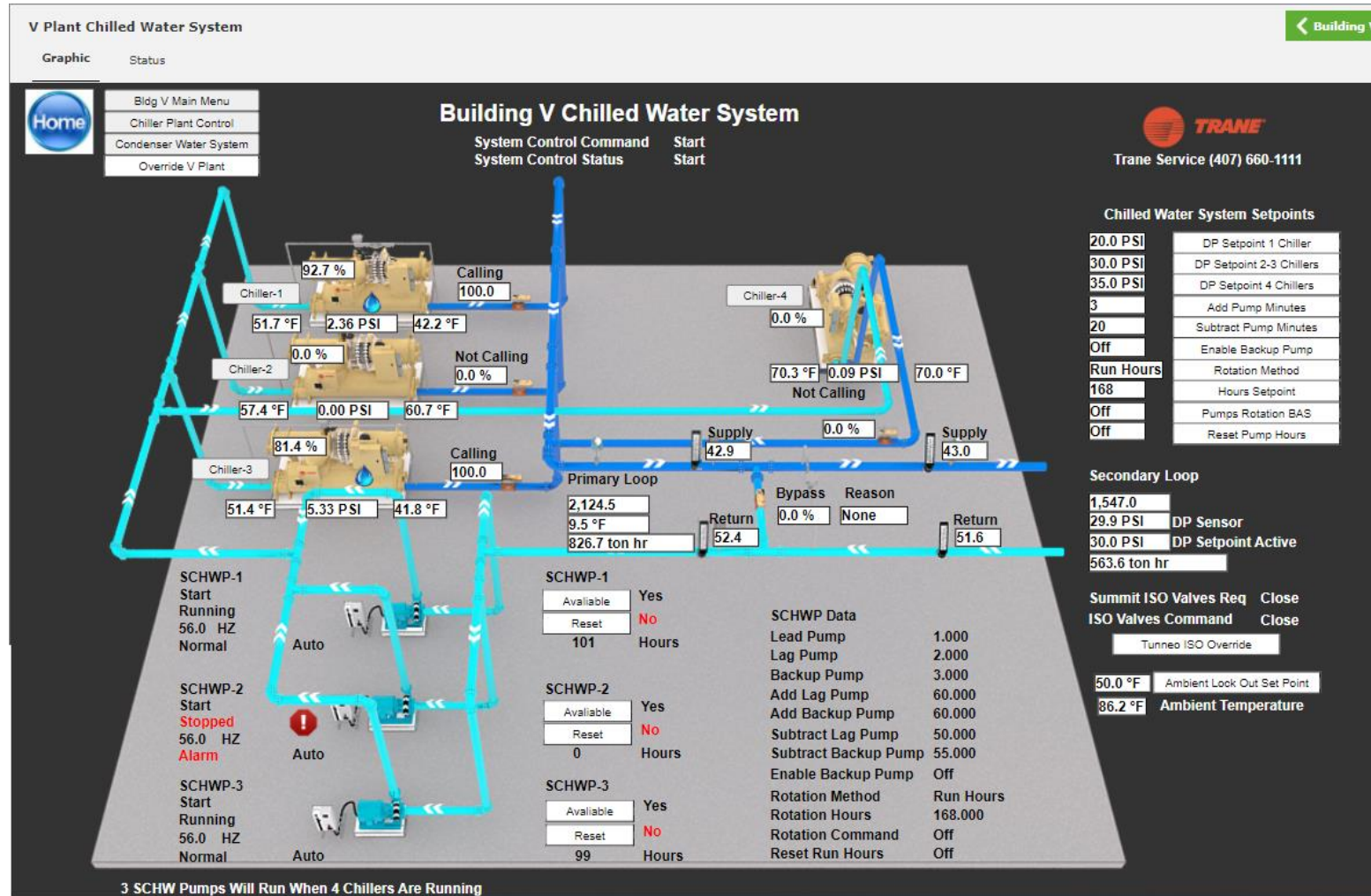
Allows identification of operating issues



Facilitates troubleshooting and repairs



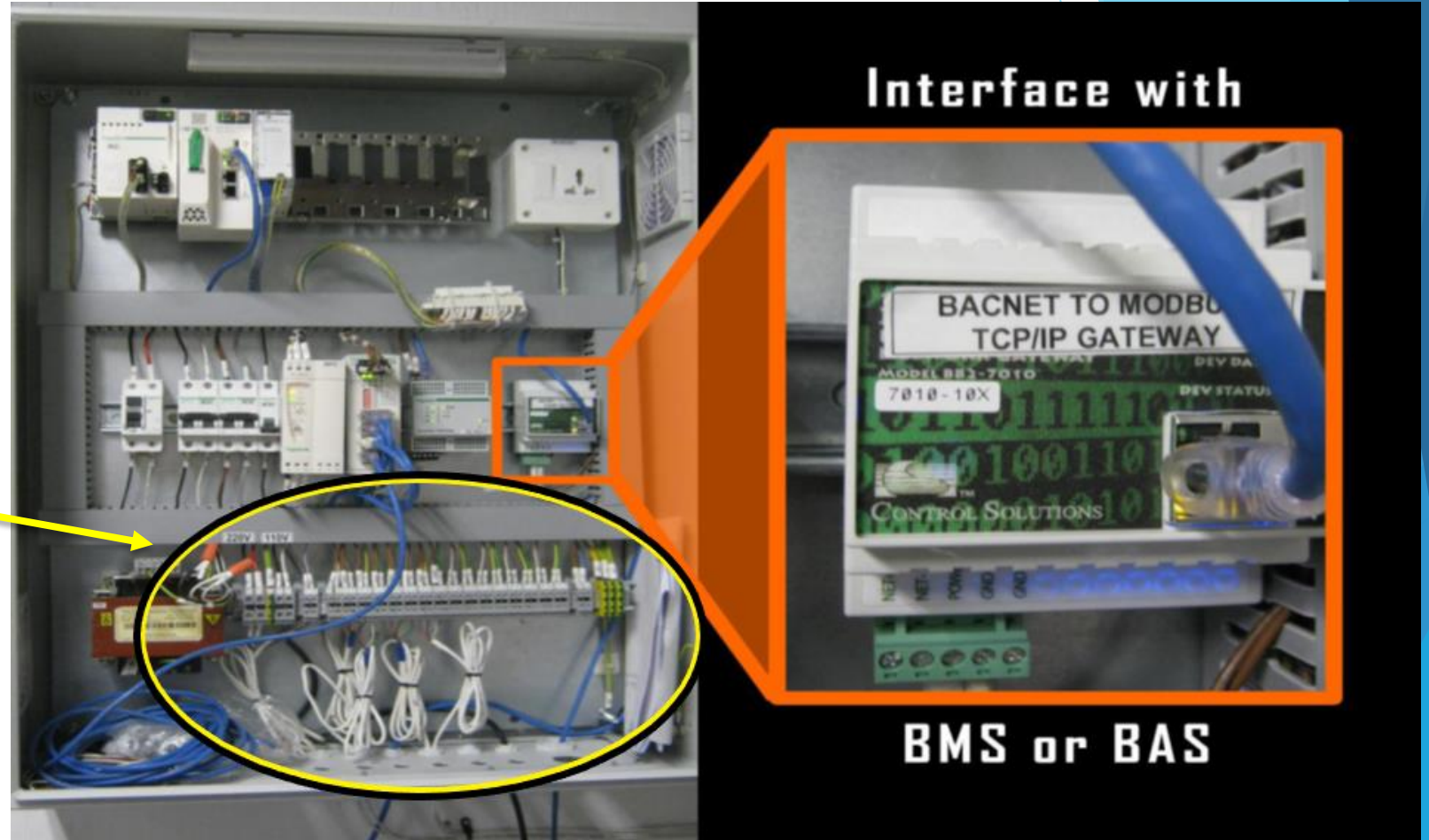
Typical Screen Shot



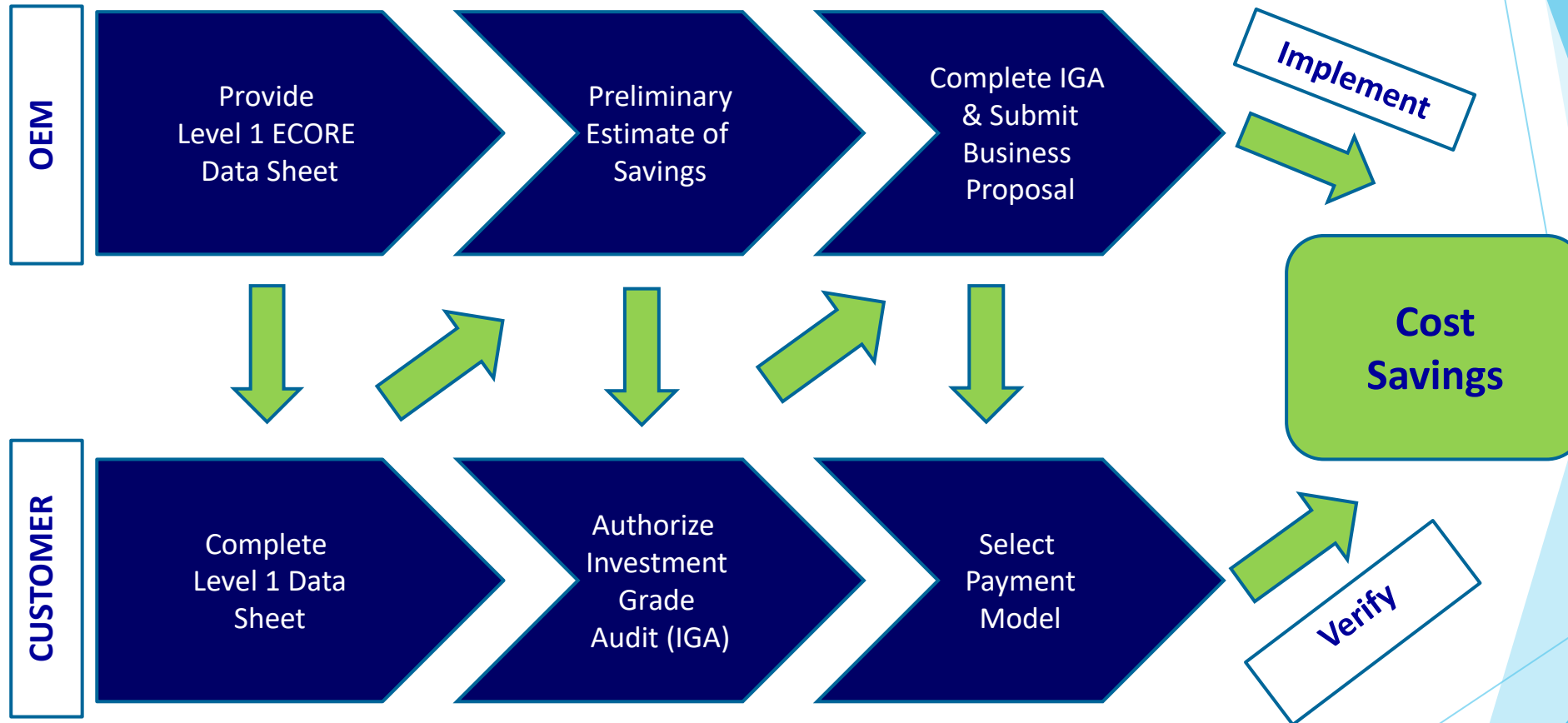
INSTALLATION

Most efforts are performed off-site by customizing the AI programming that is designed to continuously inform the BAS/BMS/SCADA to make adjustments based on changing conditions.

If the BAS/BMS does not natively collect data, address or control important system points, OEM may add sensors for data collection and control of such added elements as VFDs.



IMPLEMENTATION PROCESS



LEVEL 1 DATA SHEET

Complete the data sheet to the right for any property:

- We'll return a conservative estimated minimum savings and project cost.
- The savings estimate generally improves as we verify information.

EDGE Building Intelligence		For Assistance Please Contact:		Ted Flomenhaft EDGE Building Intelligence 5004 4 th Avenue Brooklyn, NY 11220 P: (646) 257 1500 x101 M: (845) 598-9705	
OEM-Tech Data Level 1 Data Sheet for Preliminary Assessment					
Facility Name	REQUESTED				
Facility Type	REQUIRED				
Location (City, Zip Code)	REQUIRED				
Contact Information (Name & Title)	REQUIRED				
Contact Information (Phone)	REQUIRED				
Contact Information (e-Mail)	REQUIRED				
DATA ITEM	UNITS	AMOUNT			
Central Cooling System with Chilled Water Loop	Yes/No	REQUIRED			
Hours of operation (Weekly or Annual)	Hours/Week or Hours/Year	APPROXIMATE			
Annual electricity consumption - 2019	kWh	APPROXIMATE			
Annual electricity cost - 2019	\$	REQUESTED			
Approximate % of total electricity use for HVAC	%	APPROXIMATE			
Total conditioned floor area	Square Feet	APPROXIMATE			
Is there a data center in the facility?	Yes/No	REQUIRED			
Type of chillers	Air- or Water-Cooled	REQUIRED			
Number of chillers	#	REQUIRED			
Installed chiller capacity	Tons	APPROXIMATE			
Average operating chiller capacity	Tons	APPROXIMATE			
Chiller Condenser Water Entry Temperature (if known)	°F	REQUESTED			
Existing Building Management System (BMS)	Type of System	REQUIRED			
Can we get remote access to the BMS to read data?	Yes/No	REQUESTED			
Chiller Plant Optimizer (if installed)	Make or Brand	REQUESTED			
Please provide kWh & cost by month for 2019*					
2020 (Required)			2019 (Required)		
Month	kWh	Cost (\$)	Month	kWh	Cost (\$)
Jan			Jan		
Feb			Feb		
Mar			Mar		
Apr			Apr		
May			May		
Jun			Jun		
Jul			Jul		
Aug			Aug		
Sep			Sep		
Oct			Oct		
Nov			Nov		
Dec			Dec		
Total	0	0	Total	0	0
Chiller Information					
Chiller #	Make	Model	Year	Refrigerant	
Chiller # 1	REQUIRED	REQUIRED	REQUIRED	REQUIRED	
Chiller # 2	IF APPLICABLE	IF APPLICABLE	IF APPLICABLE	IF APPLICABLE	
Chiller # 3	"	"	"	"	
Chiller # 4	"	"	"	"	
Chiller # 5	"	"	"	"	
Chiller # 6	"	"	"	"	

*Note - Data for 2019 is requested to avoid issues related to the shutdown due to COVID in 2020.

Science Park - New Haven, CT / 2020

- ▶ **Building Size:** 106,000 square feet
- ▶ **Property Type:** Mixed use, offices and laboratories
- ▶ **Building Management System:** Automated Logic
- ▶ **ECORE Chiller System Optimization** - implemented by strategic partner: EIC
- ▶ **Savings Achieved:** >30%
- ▶ **Case study document in preparation**

Related Properties Office Building, CT /2020

- ▶ 180,000 Square Feet office building
- ▶ Measures Installed
 - Dynamic Set-Points for Heat Pumps
 - Optimizing Cooling Tower Supply Temperature
 - Installing and controlling VFDs for Chilled Water Pumps
 - Controlling outside air intake
- ▶ Savings Achieved ~ 30%
- ▶ Implemented by strategic partner: EIC
- ▶ Case study document in preparation

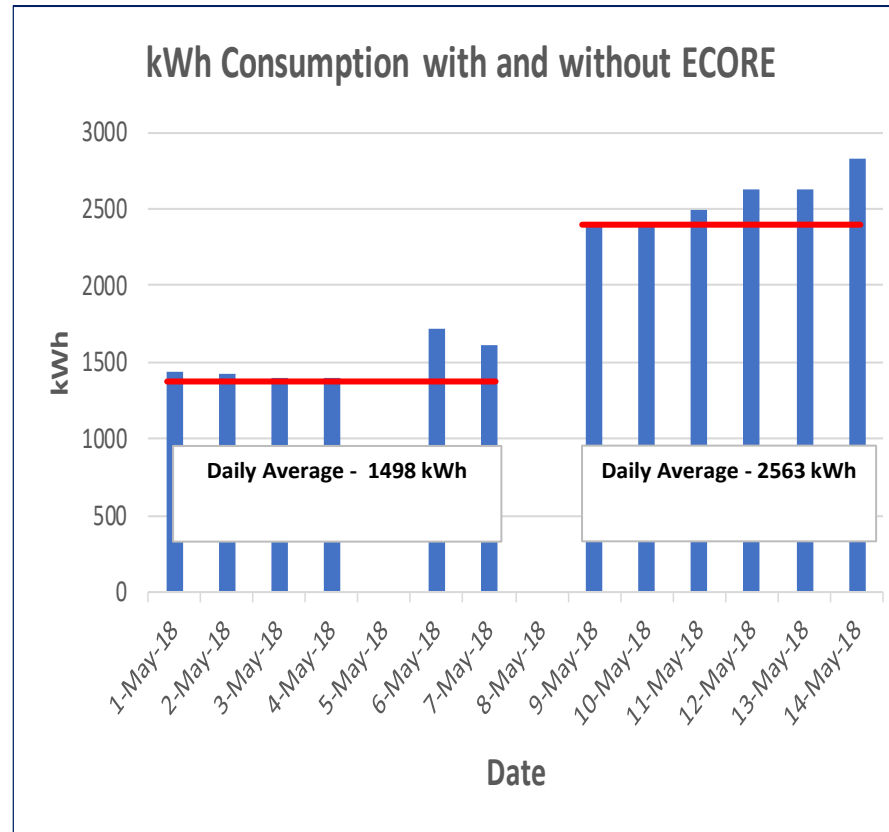
John's Island Club

- Beach Club in Vero Beach, Florida
- Integrated with Johnson Controls' METASYS BMS

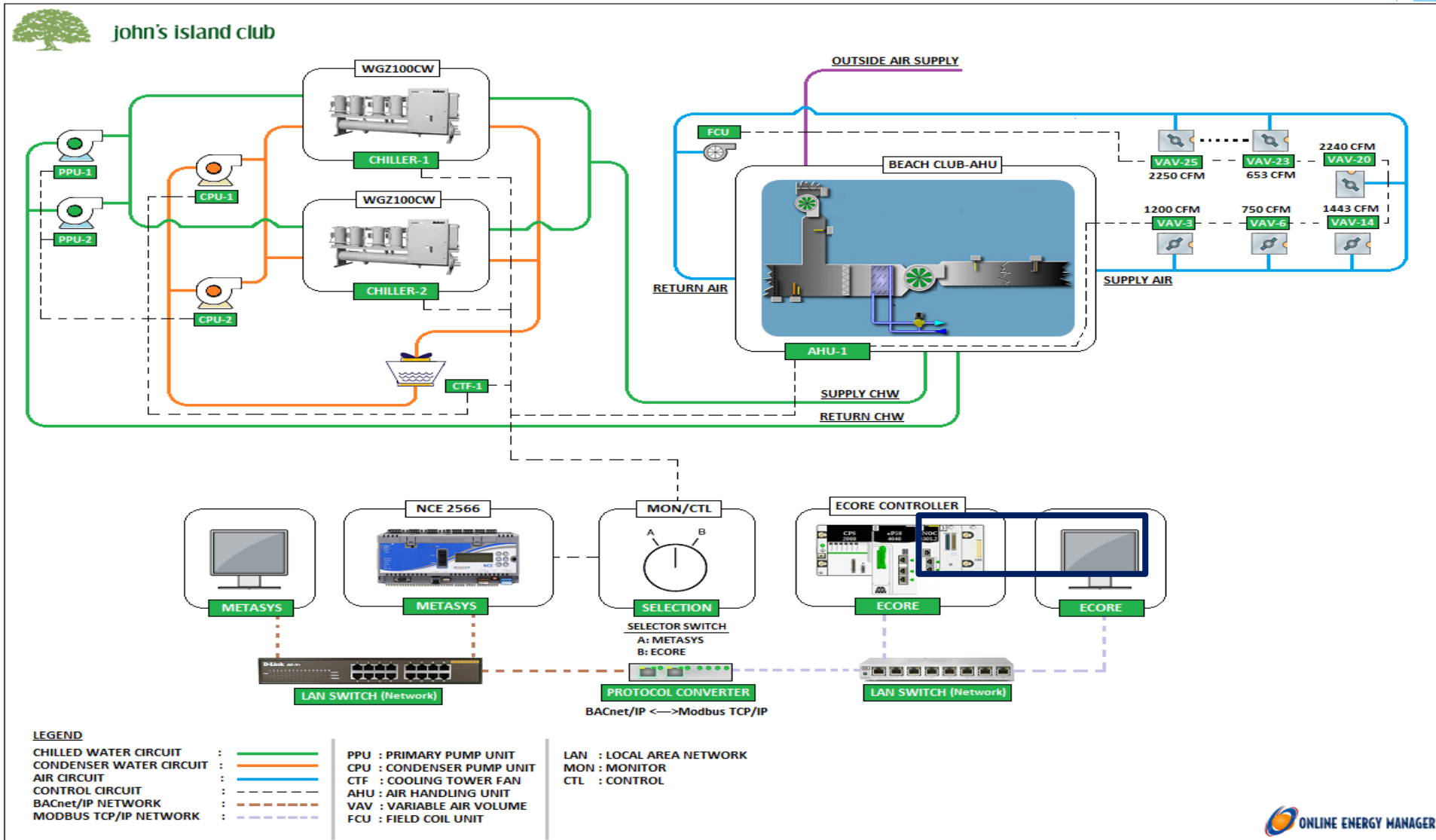
"In the recent measurement and verification (M&V) conducted during May 2018 the results showed that the ECORE system saved an average of 1,065 kWh per day (41.6%) "

- Rex Wilson
- Director, Facilities,
- John's Island Club

- ECORE installation saved over 40% of cooling energy

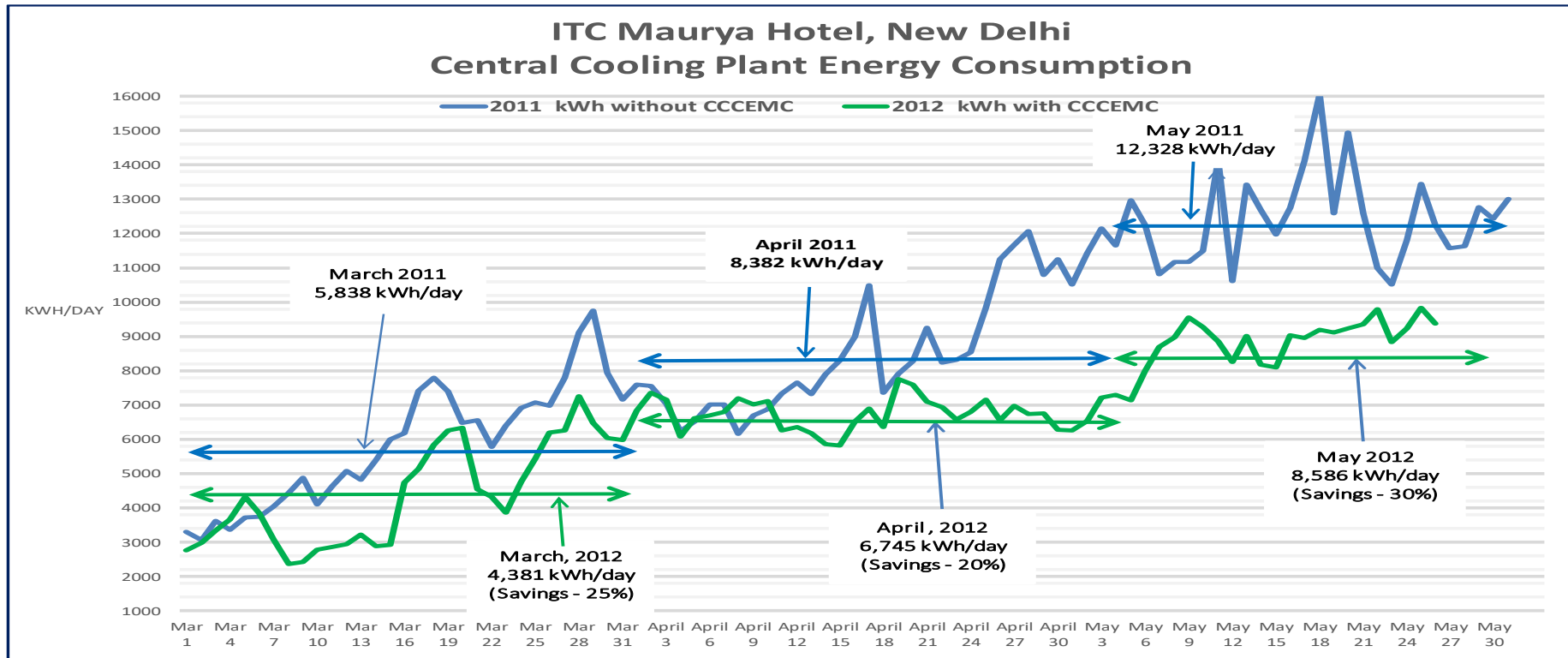


ECORE System Architecture – John's Island Beach Club

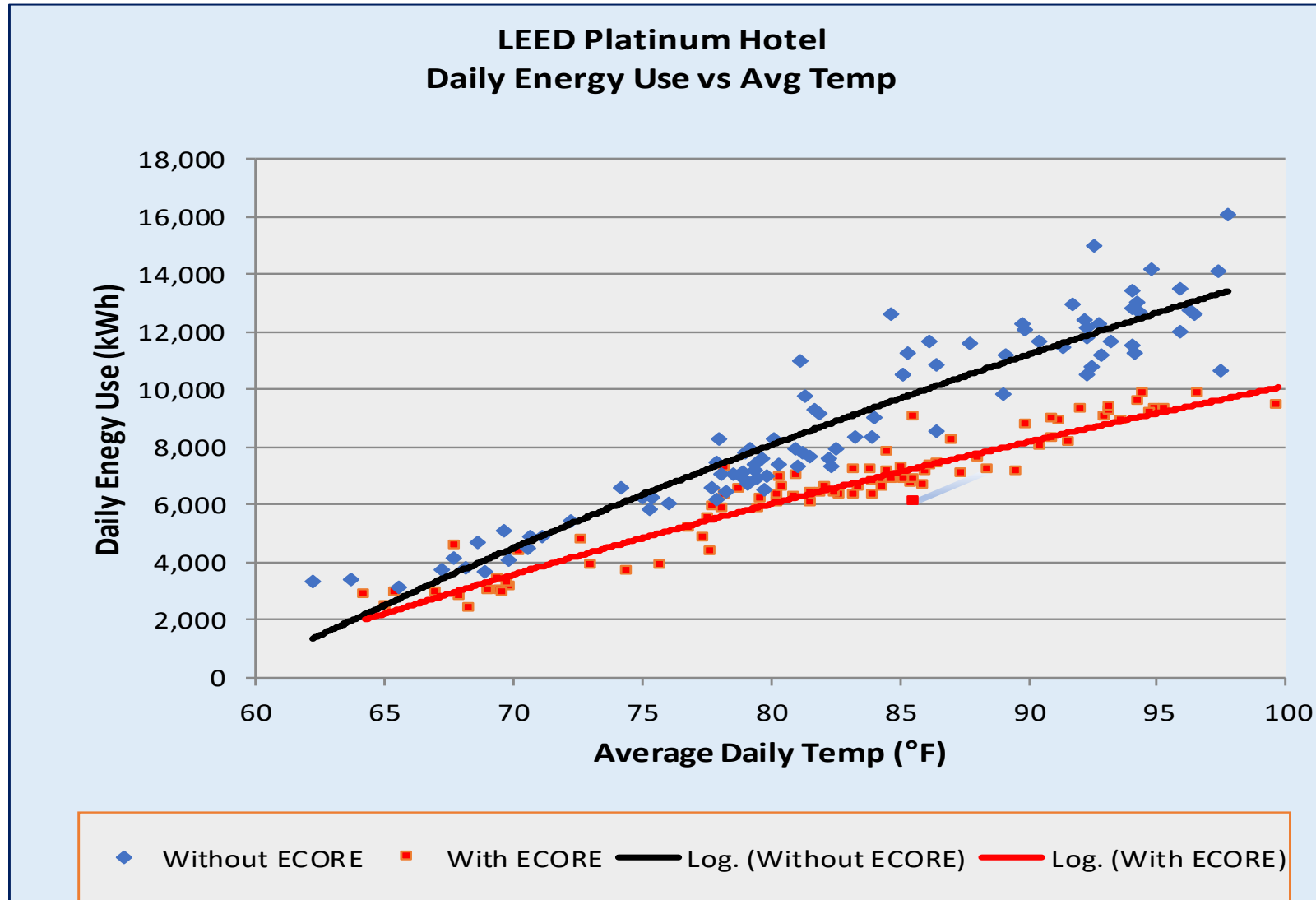


ECORE-CI CASE STUDY: LEED Platinum Hotel

- Flagship hotel of the ITC chain
- Was one of the most energy-efficient hotels in the world
- ECORE installation saved about 30% of cooling energy
- Payback ~ 2 years

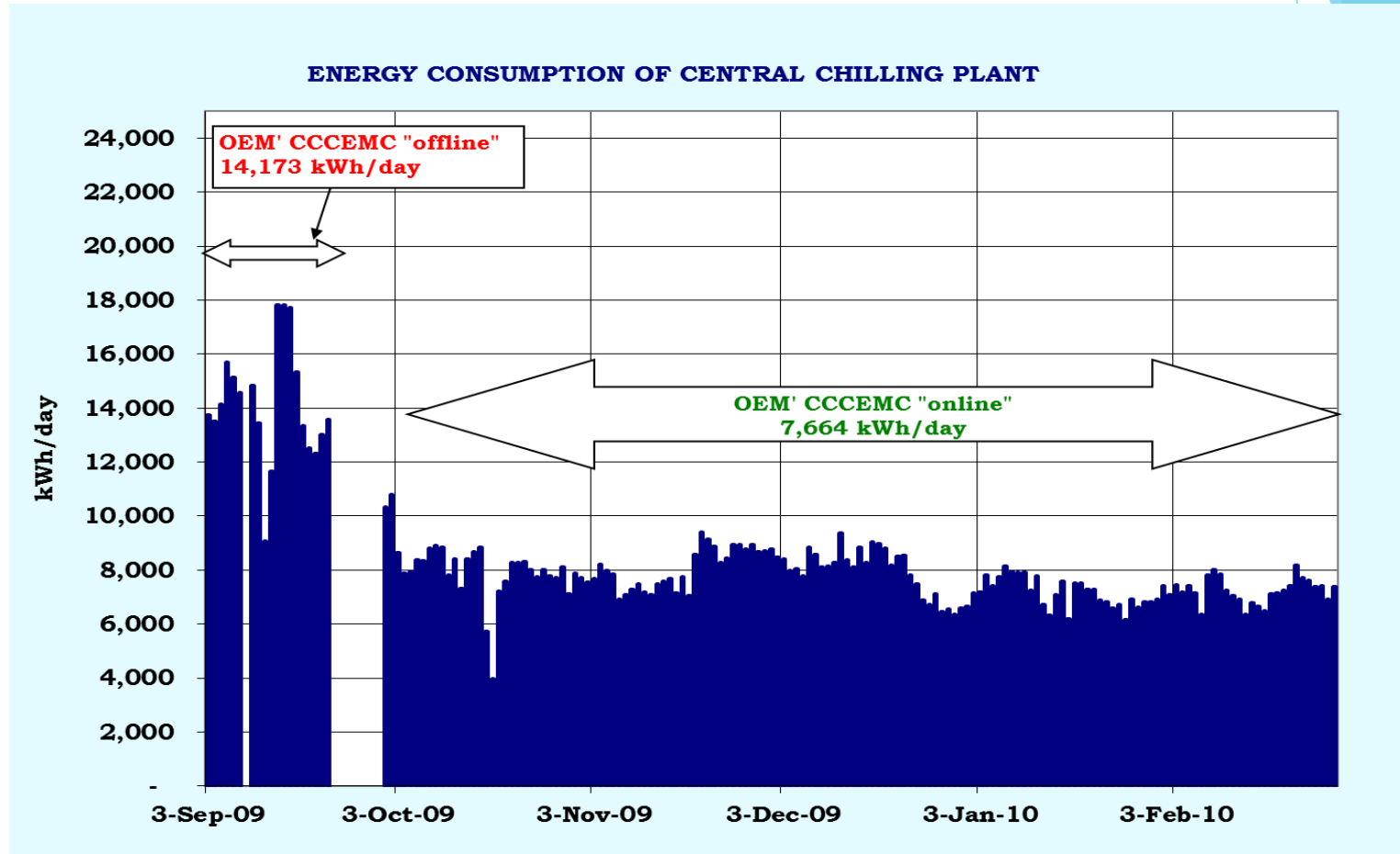


Savings vs. Temperature



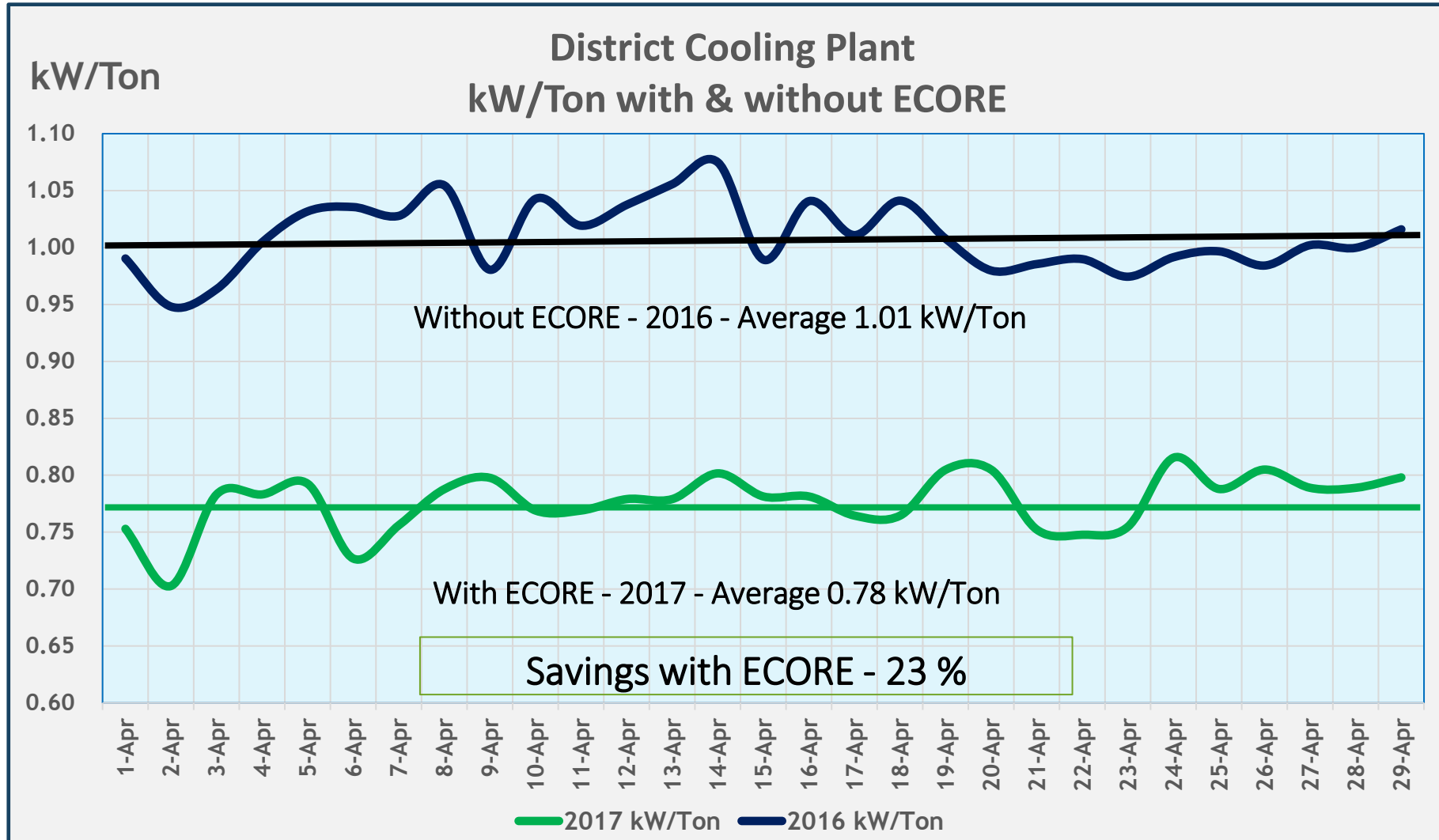
ECORE-CI CASE STUDY - Luxury Hotel

- ▶ 392 guest rooms
- ▶ Cooling capacity – 700-800 tons
- ▶ Annual use - 4 million kWh
- ▶ Savings – 1.3 million kWh
- ▶ Savings >30%
- ▶ Payback ~ 2 years



DISTRICT COOLING PLANT

LOCATION	Middle East
CONFIGURATION	10 chillers & 23 energy transfer stations
FACILITIES SERVED	Data Center, process cooling and comfort cooling
COOLING CAPACITY	25,000 tons
ENERGY PRICE	4.0 cents/kWh
FACILITY ENERGY COST	US\$ 3.2 million
ANNUAL SAVINGS	15 million kWh (~US\$ 600,000)



- ITC Hotels (Starwood Group) - General Manager, Sustainability
 - *“ITC Hotels are the first LEED Platinum certified hotel chain in the world ...we have installed OEM’s patented systems in 7 of our luxury hotels and in our HQ building..... The systems have helped us to considerably improve our central A/C plant efficiency....”*
- EESL, India’s Super ESCO – Chief General Manager (Technical)
 - *“EESL has conducted a technical evaluation and site assessment of OEM’s system through an independent expert*... ..EESL believes there is reasonable potential to save energy consumed by central plant HVAC systems through optimized controls....”*
 - *The independent expert is a scientist with the Lawrence Berkeley National Lab.

Testimonials (Continued)

- ▶ Frost and Sullivan – Practice Leader, Technology Innovation Group

“Patent landscape analysis was conducted search results were reviewed by our subject matter experts to identify and review relevant documents”

“Detailed review of these documents showed that no direct technological overlap was present with OEM’s patent and hence OEM has a unique solution in the market”

Project Summary

ECORE INSTALLATIONS									
Facility	# of Sites	Chiller Make and System Size	Chiller Plant Optimizer Replaced/Added	Installed Capacity (Tons)	Baseline Consumption (kWh/Year)	Energy Savings (kWh/Year)	Cost Savings (\$/year)	Year Installed	Application
District Cooling Plant in the Middle East	1	Mitsubishi 4*5000 Tons & York, 1 * 5000 Tons	Allen Bradley - Custom design	25,000	80,000,000	16,800,000	\$1,008,000	2016	Process, Data Center & Comfort Cooling
LEED Platinum-certified Luxury Hotels of the Starwood Group	9	Carrier (10), Trane (24) & York (5)	Carrier CPM, Trane Tracer Summit, Metasys	8,000	25,000,000	5,000,000	\$425,000	2011-2015	Hospitality Industry
Office Building	1	McQuay 3 * 600 Tons	Quantum, Japan	1,800	1,000,000	200,000	\$24,000	2015	Office
Office Building	1	York 3 * 250 Tons	Honeywell	750	1,200,000	240,000	\$21,600	2015	Office
Dairies	2	Frick Compressors (8)	None	500	3,300,000	800,000	\$68,000	2010	Dairy
Luxury Hotel	1	Trane 4* 500 Tons	None	2,000	5,500,000	1,400,000	\$154,000	2009	Hotel
Country Club	1	McQuay 2*100 Tons	Metasys	200	2,500,000	1,000,000	\$80,000	2018	Social Club
Wyndham Hotel	1	McQuay 3*400 Tons	Honeywell	1,200	2,500,000	Currently Under M&V		2019	Hotel
Totals	17				121,000,000	25,440,000	\$1,780,600		

Payment Terms

PAYMENT MODEL	PAYMENT TERMS
Standard Contract <ul style="list-style-type: none">• 20% down• 80% upon verification using IPMVP Protocol*	Payment totaling approximately 2.5x annual cost savings – payable on project deployment and savings verification
Performance Participation <ul style="list-style-type: none">• 20% down• 65% of savings for 5 years	Quarterly payments, 65% of cost-savings for 5 years - includes maintenance & support
Licensing Model	TBD

* <https://evo-world.org/en/products-services-mainmenu-en/protocols/ipmvp>

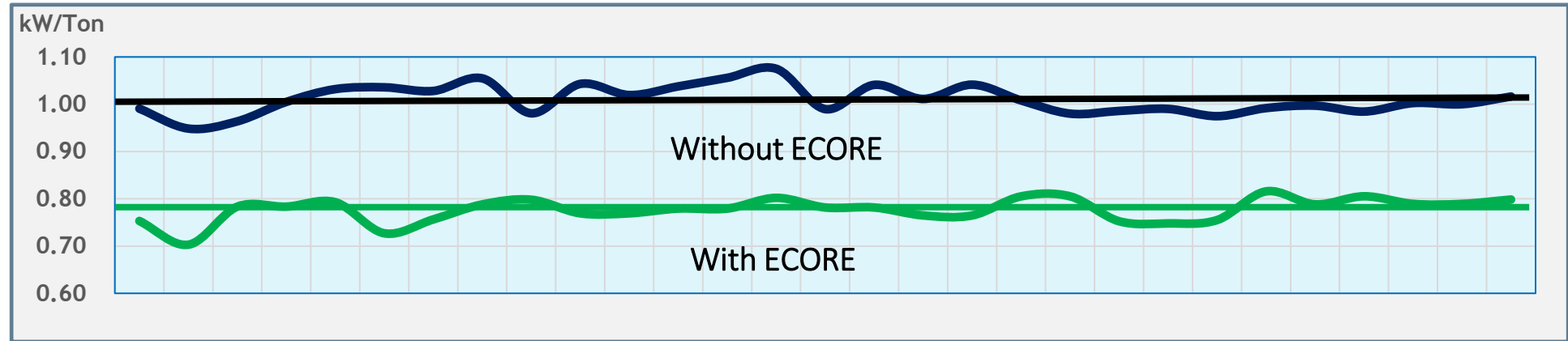


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Thank you!

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Online Energy Manager

Ted Flomenhaft
CEO

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