ENERGY & WATER EFFICIENCY

CESS Chiller Energy Saving System

AI-Driven Cooling and Refrigeration Optimization
Reduces energy-related operating costs and GHG emissions 20-40%

What is CESS (Chiller Energy Saving System)?

CESS (Chiller Energy Saving System) reduces cooling and refrigeration energy use by 20-40%. Our patented AI/Machine-Learning technology dynamically manages large centralized cooling systems using their own native controls through its standard interface, for a non-disruptive implementation. In a typical commercial property, cooling is approximately 40% of the total energy consumption; and 20-40% savings would lead to a substantial reduction in total energy use, costs and GHG emissions.

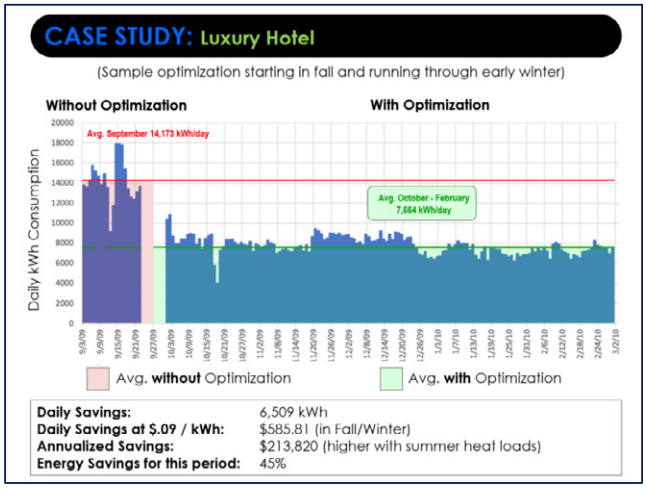
CESS consists of a series of customized software-driven algorithms implemented on a Programmable Logic Controller (PLC) panel that determines and optimally adjusts the functioning of various chiller system components (chillers, fans, pumps, air handling units, variable frequency drives (VFDs) and cooling towers).

Key features

1. Patented Technology
2. **20 to 40%** reductions in cooling-related energy, costs and greenhouse gas (GHG) emissions with **1 to 3 year payback**
3. CESS relies on native chiller system controls consistent with manufacturer specifications; therefore, there is **no impact on manufacturer warranty**
4. OEM backs CESS with a **performance guarantee**
5. Implementation is **completely non-disruptive** to present-state operations
6. Capable of **remote monitoring** and troubleshooting
7. Flexible interface for **easy connection to any building management or building automation system (BMS/BAS)** and human-machine interface (HMI)
8. Diagnostics provide **automated response and corrective action suggestions.**

CESS vs. BMS/BAS

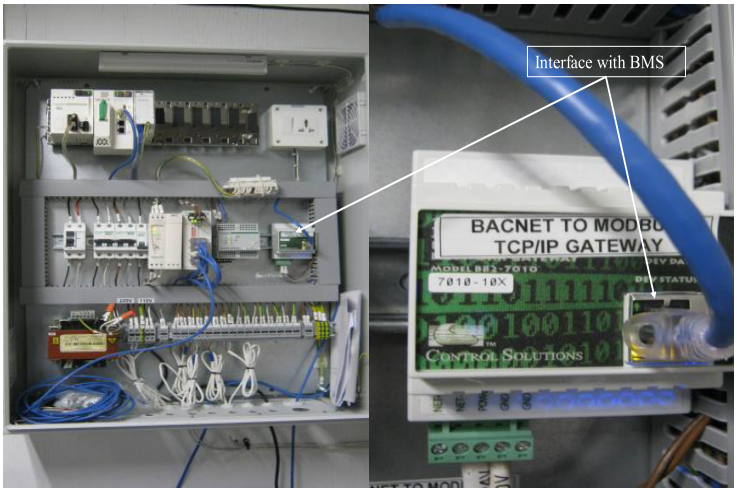
Your BMS or BAS generally has the capability to specify various chiller set-points, but it **does not automatically adjust or optimize** the set points in response to changing weather conditions or user requirements. **CESS continuously and dynamically modifies operating parameters** to obtain optimum efficiency without operator intervention. CESS does not replace you BMS or BAS; CESS makes it smarter.



How long does CESS need to run before realizing savings?

Instantaneously! CESS will improve the system efficiency as soon as it's turned on and commissioned.

CESS manages BMS or BAS settings through a direct interface, effectively becoming its bolted-on brain. It communicates with the BMS/BAS using a BACnet to Modbus connection, processing real-time data from the BMS/BAS to determine and make appropriate adjustments to optimize the chiller system operation.



If you can't measure it, you can't manage it!

Chiller system efficiency is measured by the power required to provide the cooling needed by the "user" and is expressed in terms of kilowatts per ton of cooling (kW/Ton). One key advantage of CESS is continuous measurement of the kW/Ton.

How does CESS improve chiller efficiency?

CESS is designed, customized, installed and maintained to continuously deliver optimum kW/Ton by adjusting the main factors affecting the chiller efficiency based on the ambient conditions (such as dry bulb temperature, relative humidity, wet bulb temperature, etc.) and on the cooling requirements or "cooling load" in the building or facility.

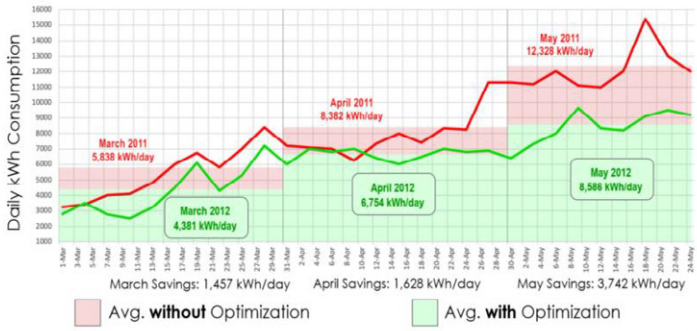
Typical Applications

Hospitals, Hotels, Data Centers, Shopping Malls, Large Office Buildings, Food and Beverage Processing, Pharmaceutical and Chemical Industries, District Cooling Plants, and other facilities.

CASE STUDY: LEED Platinum Hotel

(Sample of 9 ITC/Starwood Group Hotels – This one: Maurya in New Delhi, India)

Optimization impact in rising temperatures from March to May



Daily Savings:	2,275 kWh (Avg. across all three months)
Daily Savings at $.09 / kWh:	$204.75 (in spring e.g. March to May)
Annualized Savings:	$74,733 (higher with summer heat loads)
Energy Savings for this period:	25% (This is on an already LEED Platinum Hotel)

PROVEN RESULTS: Optimization Highlights

Performance Counts:
Examples of projects implemented by the Energy Intelligence Center's Chief Technology Officer and Chief Implementation Officer since 2011 across facilities with chillers including: Trane, Carrier, York, and McQuay

Property Types (included below to show range of Installed Cooling Capacity from 200 to 25,000 Tons)	Installed Cooling Capacity (Tons)	Pre-Optimization Annual Electricity Consumption for Cooling (kWh/Year)	Energy SAVINGS (kWh/Year)	Cost / kWh	Cost SAVINGS ($/Year)	% SAVINGS
District Cooling Plant	25,000	80,000,000	16,800,000	$0.04	$672,000	21.0%
Office Building	1,800	1,000,000	200,000	$0.12	$24,000	20.0%
Dairy	500	3,300,000	800,000	$0.09	$68,000	24.2%
Golf and Beach Club	200	2,500,000	1,000,000	$0.08	$80,000	40.0%
LEED Platinum Hotels for ITC/Starwood Group:						
Hotel 1:	1,680	3,100,000	930,000	$0.09	$85,846	30.0%
Hotel 2:	2,000	3,972,413	834,122	$0.13	$107,794	21.0%
Hotel 3:	900	2,430,000	558,636	$0.13	$72,193	23.0%
Hotel 4:	700	2,100,000	500,000	$0.13	$64,615	23.8%
Hotel 5:	800	2,211,665	637,147	$0.11	$72,537	28.8%
Hotel 6:	750	1,508,558	346,873	$0.09	$32,019	23.0%
Hotel 7:	900	1,604,360	270,005	$0.09	$24,924	16.8%
Hotel 8:	1,200	3,175,310	598,859	$0.10	$59,886	18.9%
Hotel 9:	600	1,590,739	452,670	$0.09	$41,785	28.5%
Totals for these projects with the Average % Savings:			**23,928,311**		**1,405,599**	**24.5%**

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