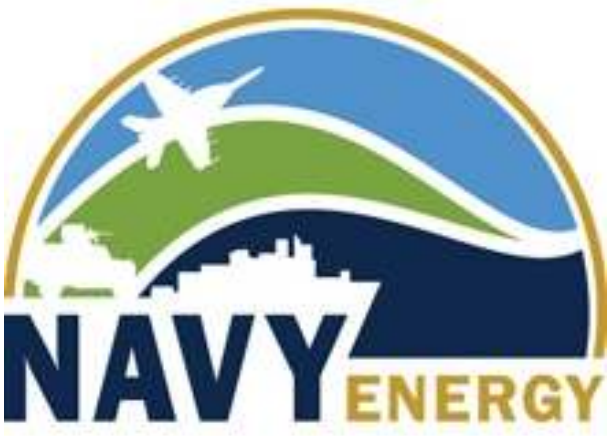
Mission Assurance, Renewables and the Smart Grid



Mark Wagner
Vice President Government Relations
Johnson Controls, Inc.

October 13, 2010

Agenda

1. **The Art of the Possible: 29 Palms ESPC Project**

2. **A Day in the Life of a Smart Building**

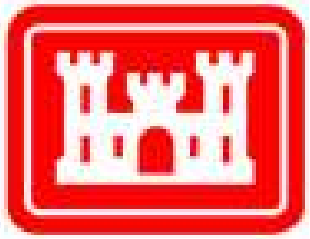
3. **Section 2841 – FY10 Defense Authorization Bill**

U.S. Marine Base – 29 Palms in Southern California Energy Savings Performance Contract (ESPC)

- ***Renewable Energy:*** **8 acre photovoltaic farm – Over 1 MW of power**
- ***Energy Savings:*** **Building Management System & lighting upgrades**
- ***Improved Quality of Life & future MilCon Savings:*** **New central chillers**
- ***Energy Security:*** **Cogeneration plant – 7 megawatt / dual fuel**
- ***$65M Investment*** **– No upfront cost to Navy**

Energy Savings Performance Contracts (ESPC)

- A powerful tool for financing energy efficiency projects
- Many energy service companies (ESCOs) available
- Working with you, the selected ESCO designs, constructs, finances and services the project
- Examples of the many technologies available:
  - Lighting improvements
  - Building Automation Systems
  - HVAC Upgrades & Controls
  - Water Efficiency
  - Boilers & Chillers
  - Electric Motors and Drives
  - Cogeneration systems
  - Renewable energy

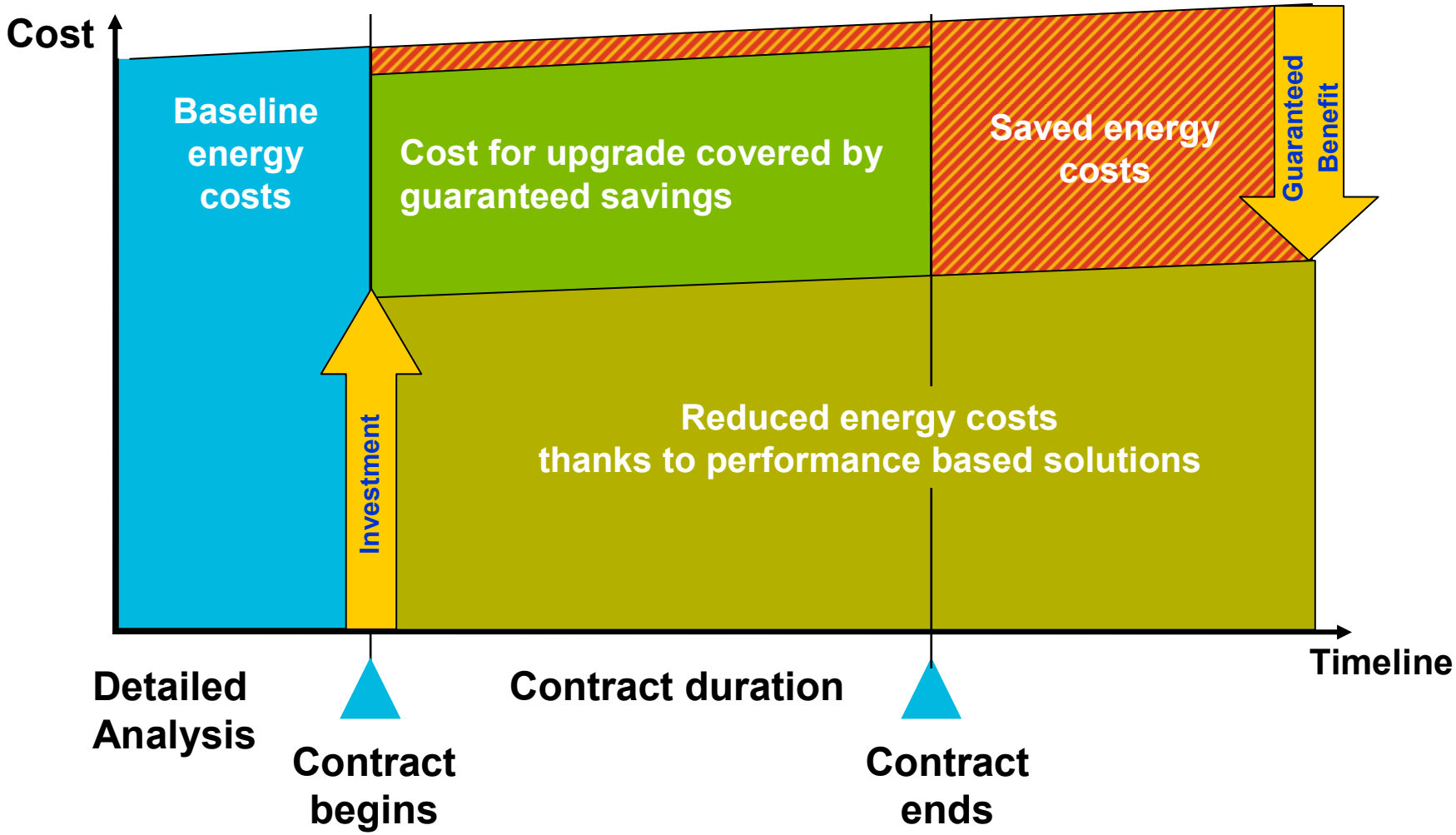


- Department of Energy & Army Corps of Engineers have IDIQ contracts

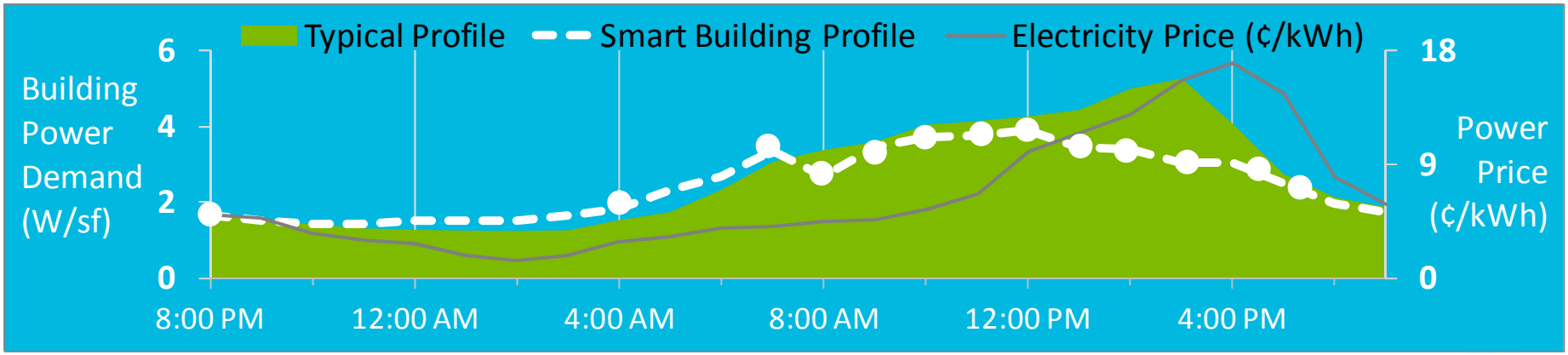
Benefits of ESPCs

- No upfront investment by facility owner
- Investment is paid back over time with energy savings
- Energy savings are guaranteed
- Performance of new equipment is guaranteed
- Rigorous Measurement & Verification of savings
- Reduced energy consumption & smaller carbon footprint
- Enhanced indoor environment
- DOE & Army ESPC IDIQ's to streamline process
- Stimulates local economy and jobs

ESPC Model: How it Works



A Day in the Life of a Smart Building

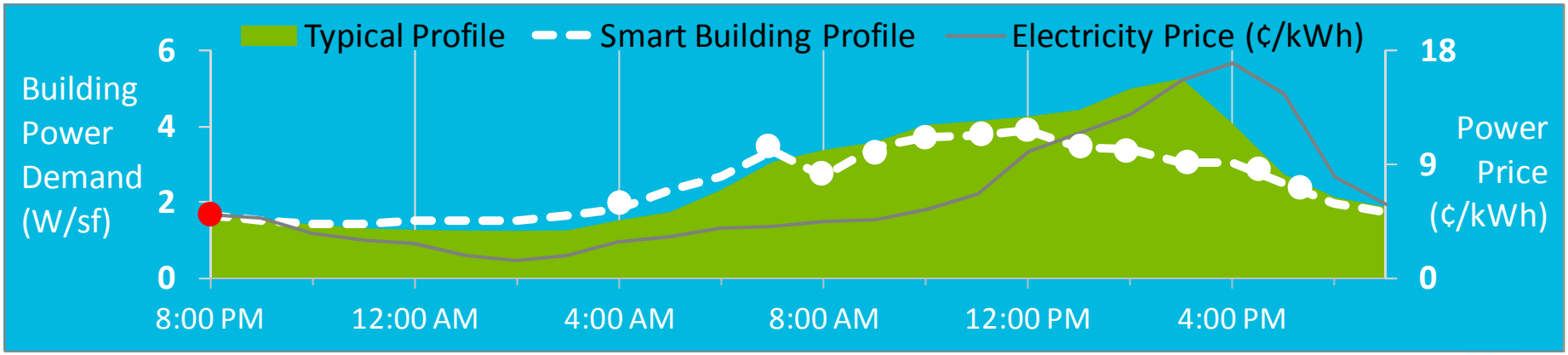


A more comfortable, safe and sustainable world.

Johnson Controls

8:00 pm
Smart planning for tomorrow

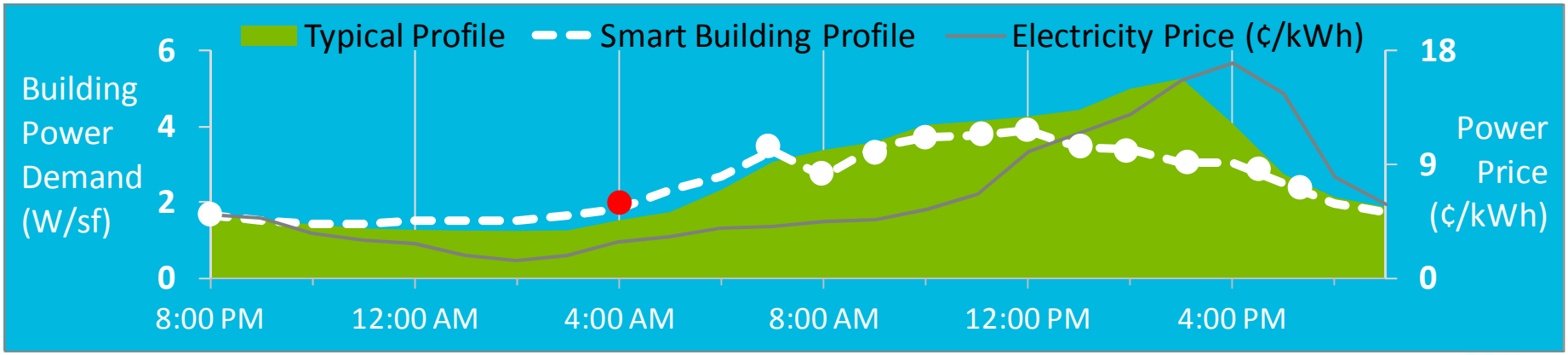
- System accesses tomorrow's weather forecast
- Real time price forecasts are received from the electric utility
- System schedules night time ice storage generation



Johnson Controls

4:00 am
Chiller fault detected

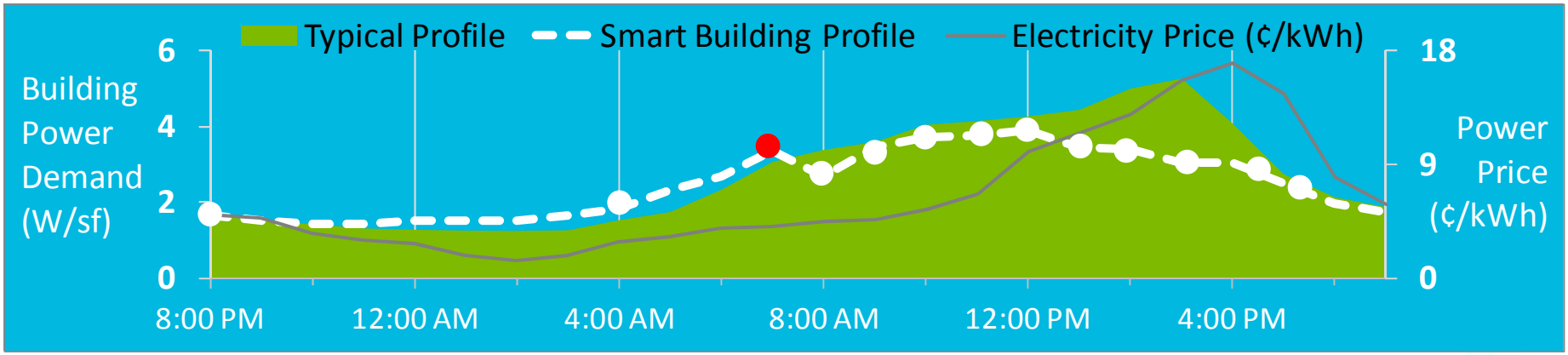
- On-board diagnostics determines a chiller valve has failed
- System calculates costs associated with this fault based on real time price forecasts
- System auto-generates a work order and notifies facility manager by smart phone



Johnson Controls

7:00 am
Chiller repaired

- Service technician arrives after being dispatched automatically
- Technician quickly fixes problem knowing the source and the new parts required
- Repair allows system to generate enough ice prior to spike in prices anticipated later in the afternoon

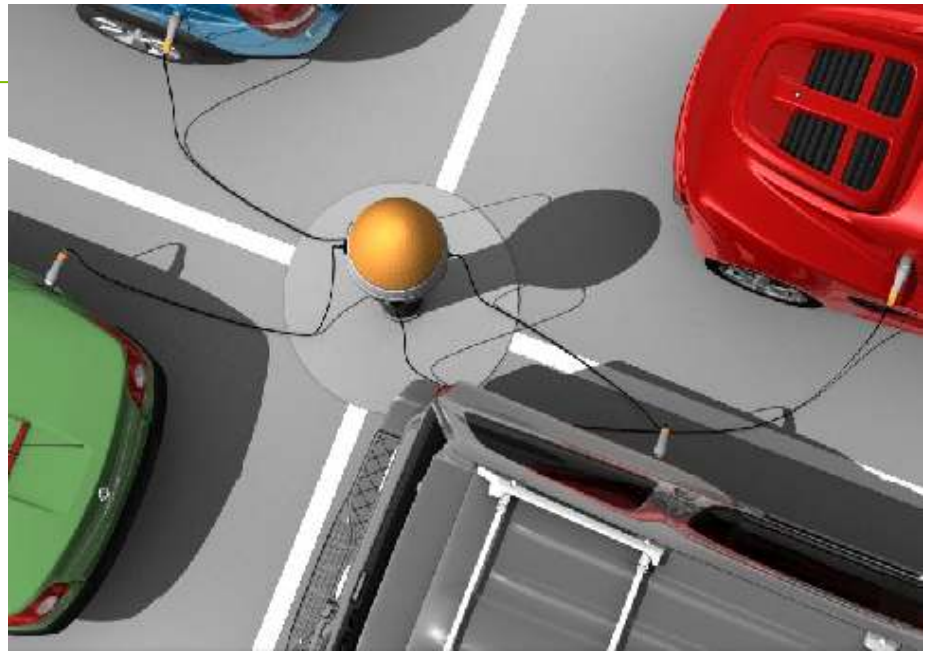


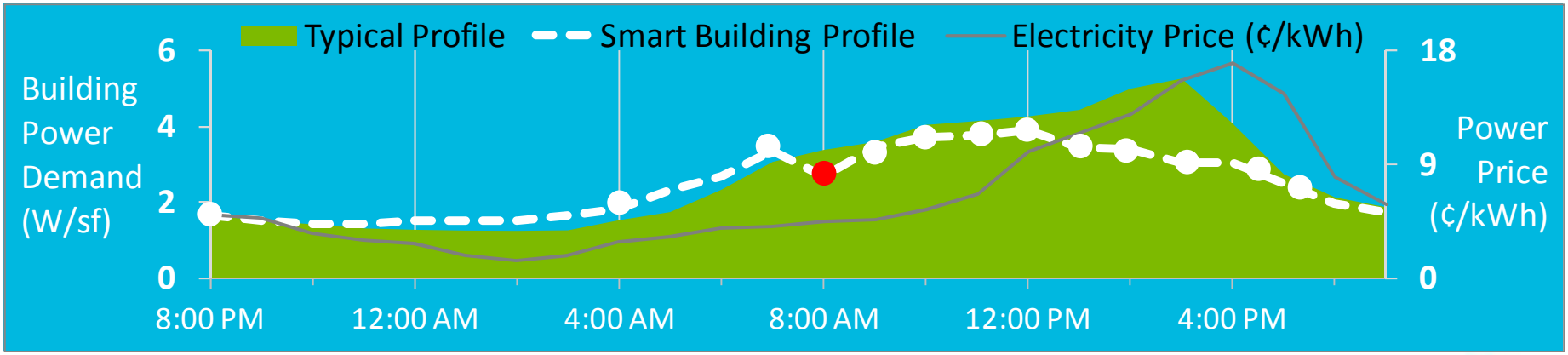
Johnson Controls

8:00 am

Employees plug in vehicles at work

- Electric or plug-in hybrid vehicles recharge when real time price of electricity is low
- Smart charging supports voltage regulation for the local utility
- Purchase or sale of power to building is automatically factored into payroll system



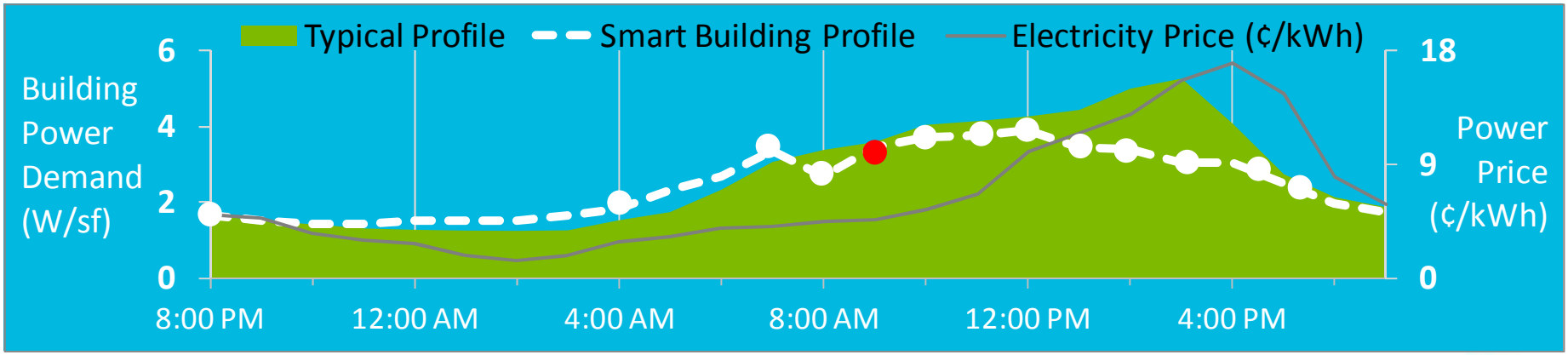


Johnson Controls

9:00 am
Meeting space is ready to go

- The building management system prepares the conference room for a meeting with 15 people

- Occupancy and CO_2 sensors provide an override in the case less or more people attend the meeting

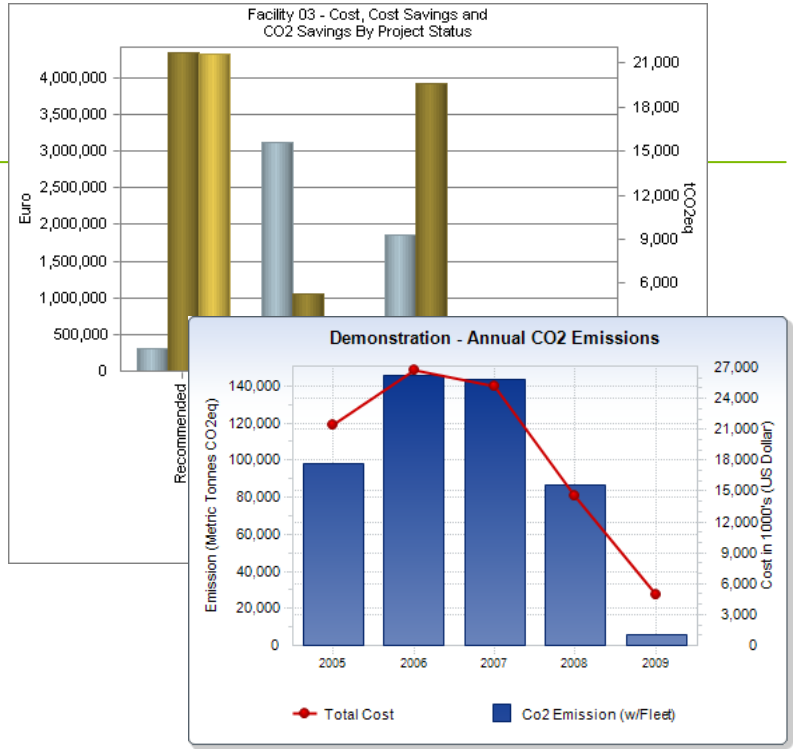


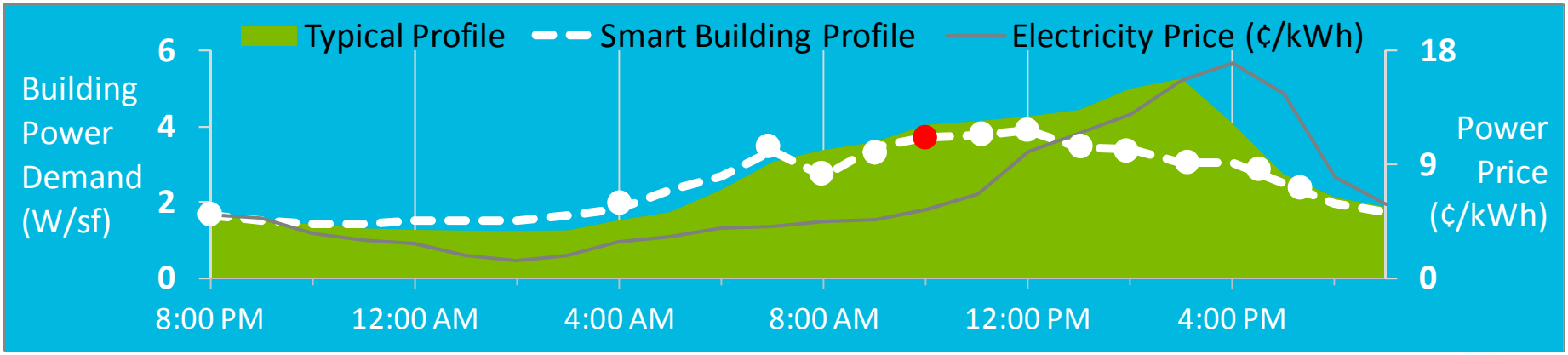
Johnson Controls

10:00 am
Call for carbon reporting data

- OFEE calls and asks the Sustainability Manager about the base's carbon management strategies

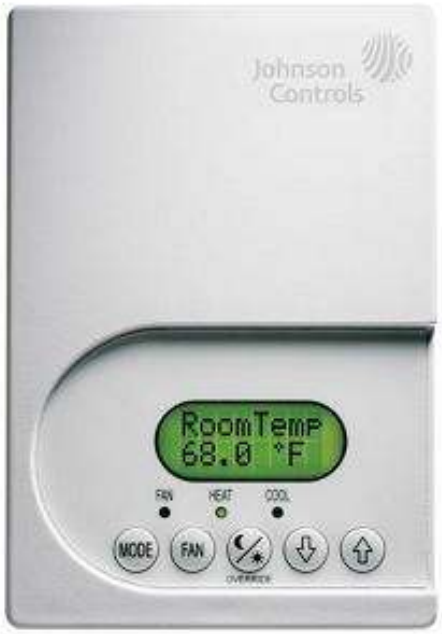
- Enterprise dashboard provides access to carbon emissions data for the most recent quarter and annual carbon reductions



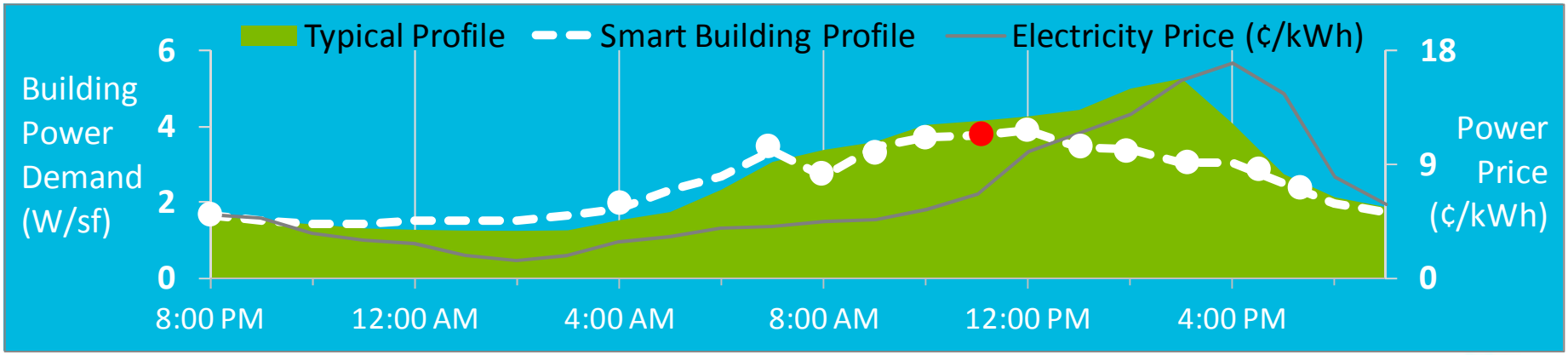


Johnson Controls

11:00 am
Utility power price triggers automatic demand reduction



- The price for electricity from 12pm-2pm exceeds the threshold pre-defined by the base
- The following actions to reduce power demand are taken:
  - reset space temps by 2°F
  - slowly dim lighting 20% in occupant spaces
- Actions and impact reported back to utility



Johnson Controls

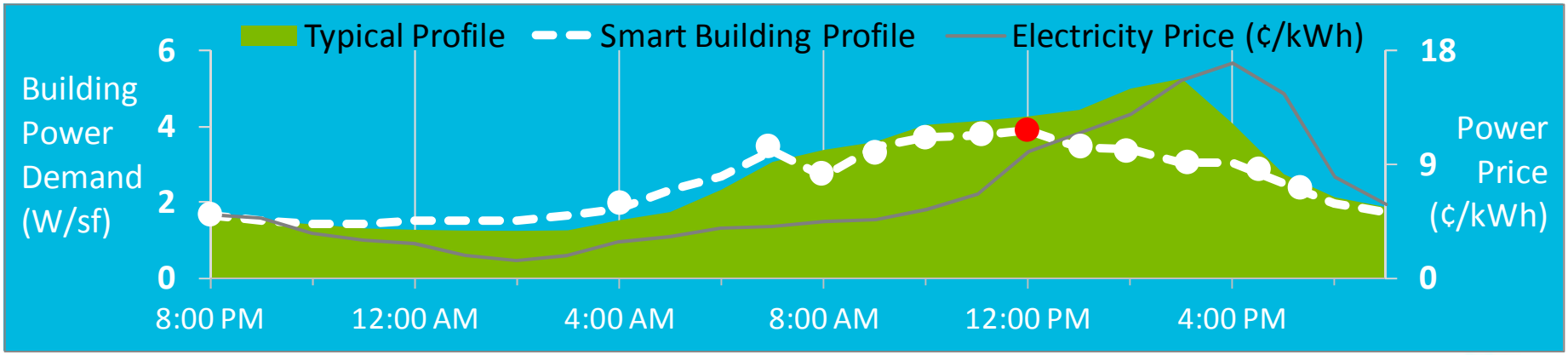
12:00 pm

Power price triggers automated demand reduction for the building

•The building management system also takes action in common areas:

- dispatch ice storage cooling
- increase chilled water set point
- dim lighting in common areas by 20%

•Actions and impact are reported back to utility



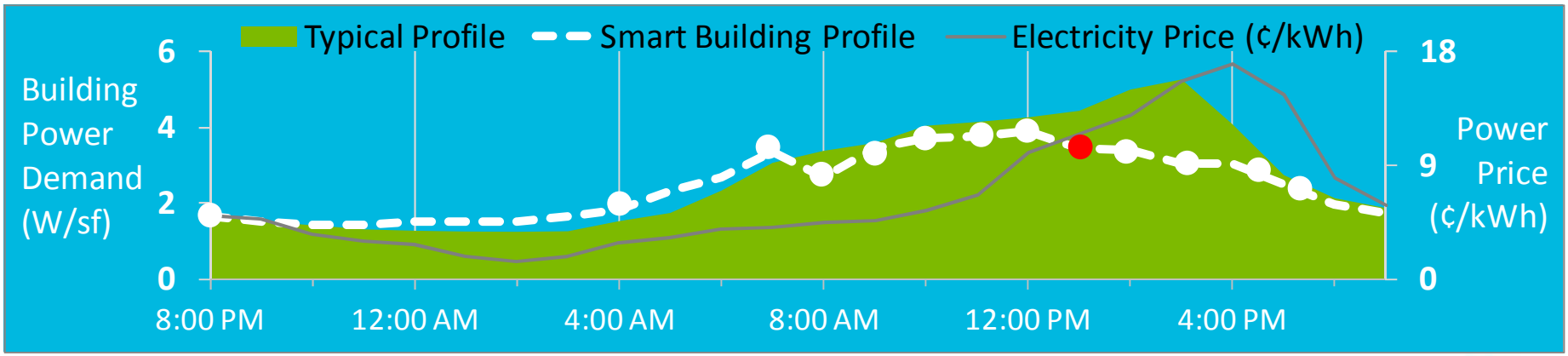
Johnson Controls

1:00 pm

Higher price triggers more aggressive automated reductions

- Dim lighting by 40%
- Reset space temps by 4°F
- Throttle non-production servers

- Actions and impact are reported back to the utility

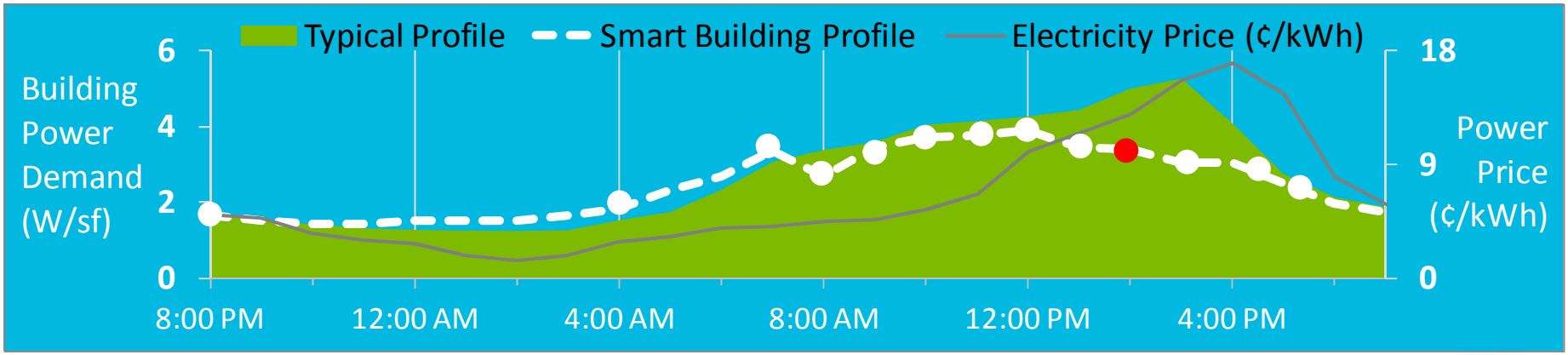


Johnson Controls

2:00 pm

Automated demand reductions leverage IT system integration

•System alerts employees via email or text message to unplug their laptops and run on battery power from 2-4pm



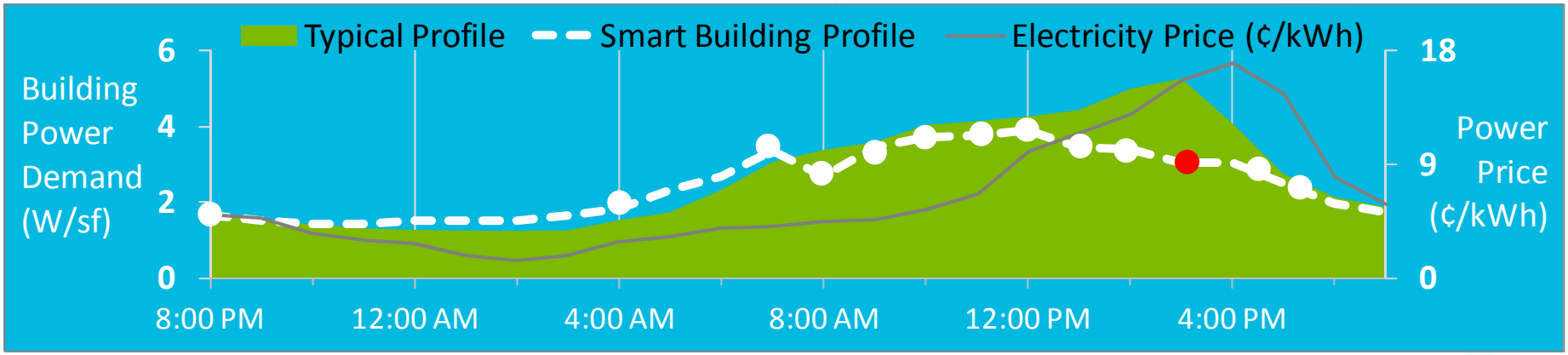
Johnson Controls

3:00 pm

Cloud cover causes solar photovoltaic generation to drop

- Building receives a demand limiting signal from utility during the 2pm - 5pm period

- When cloud cover causes solar production to drop, system uses on-site electric storage to meet demand reduction goal

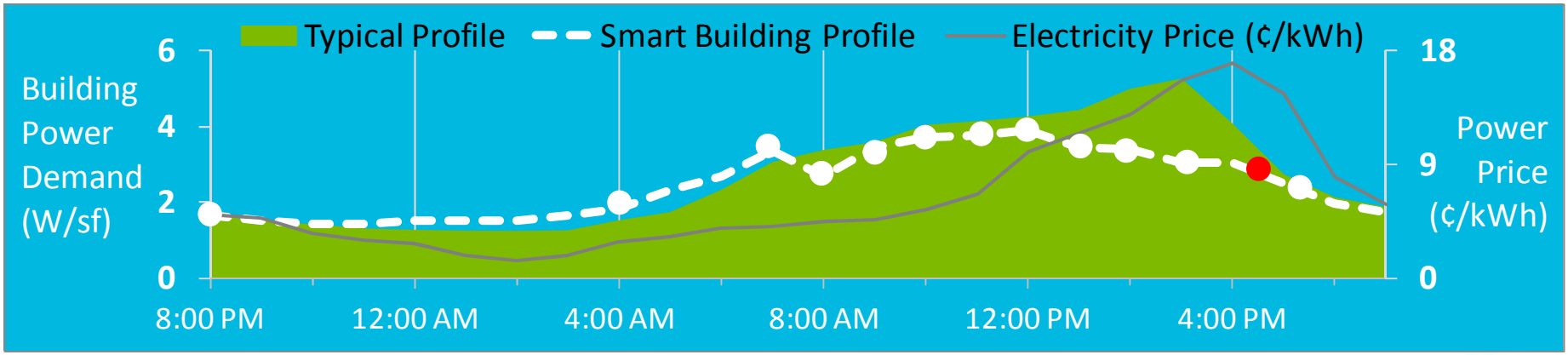


Johnson Controls

5:30 pm
Leaving the office

•As employee badges out, the system automatically turns off the lights and puts the computer into stand-by

•When he arrives to parking deck, his plug-in electric vehicle has been charged just enough for him to get home

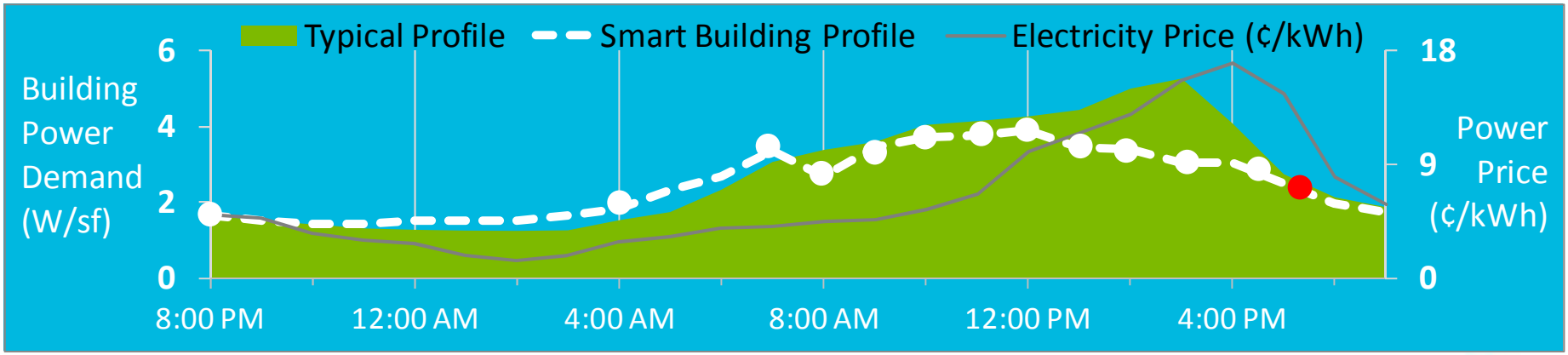


Johnson Controls

6:30 pm
End of the workday

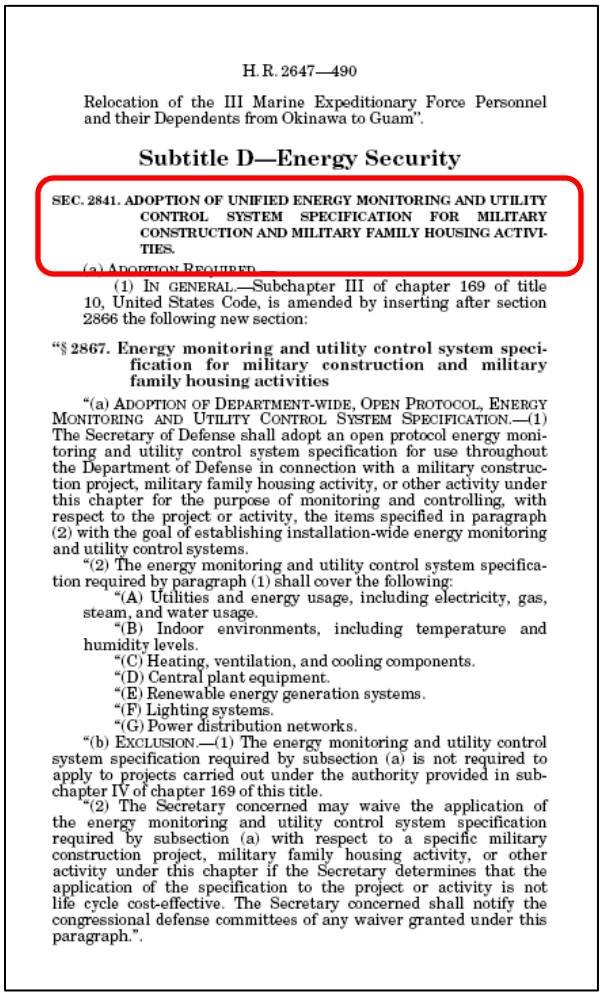
- System controls lighting and HVAC to follow the janitorial staff throughout the building

- Video surveillance system counts occupants remaining after hours and adjusts temperature points and lighting



Johnson Controls

The 2010 Defense Authorization Act added a future goal for installation-wide energy monitoring and control systems…



H. R. 2647—490

Relocation of the III Marine Expeditionary Force Personnel and their Dependents from Okinawa to Guam".

Subtitle D—Energy Security

SEC. 2841. ADOPTION OF UNIFIED ENERGY MONITORING AND UTILITY CONTROL SYSTEM SPECIFICATION FOR MILITARY CONSTRUCTION AND MILITARY FAMILY HOUSING ACTIVITIES.

(a) ADOPTION REQUIRED.—

(1) IN GENERAL.—Subchapter III of chapter 169 of title 10, United States Code, is amended by inserting after section 2866 the following new section:

"§ 2867. Energy monitoring and utility control system specification for military construction and military family housing activities

"(a) ADOPTION OF DEPARTMENT-WIDE, OPEN PROTOCOL, ENERGY MONITORING AND UTILITY CONTROL SYSTEM SPECIFICATION.—(1) The Secretary of Defense shall adopt an open protocol energy monitoring and utility control system specification for use throughout the Department of Defense in connection with a military construction project, military family housing activity, or other activity under this chapter for the purpose of monitoring and controlling, with respect to the project or activity, the items specified in paragraph (2) with the goal of establishing installation-wide energy monitoring and utility control systems.

"(2) The energy monitoring and utility control system specification required by paragraph (1) shall cover the following:

"(A) Utilities and energy usage, including electricity, gas, steam, and water usage.

"(B) Indoor environments, including temperature and humidity levels.

"(C) Heating, ventilation, and cooling components.

"(D) Central plant equipment.

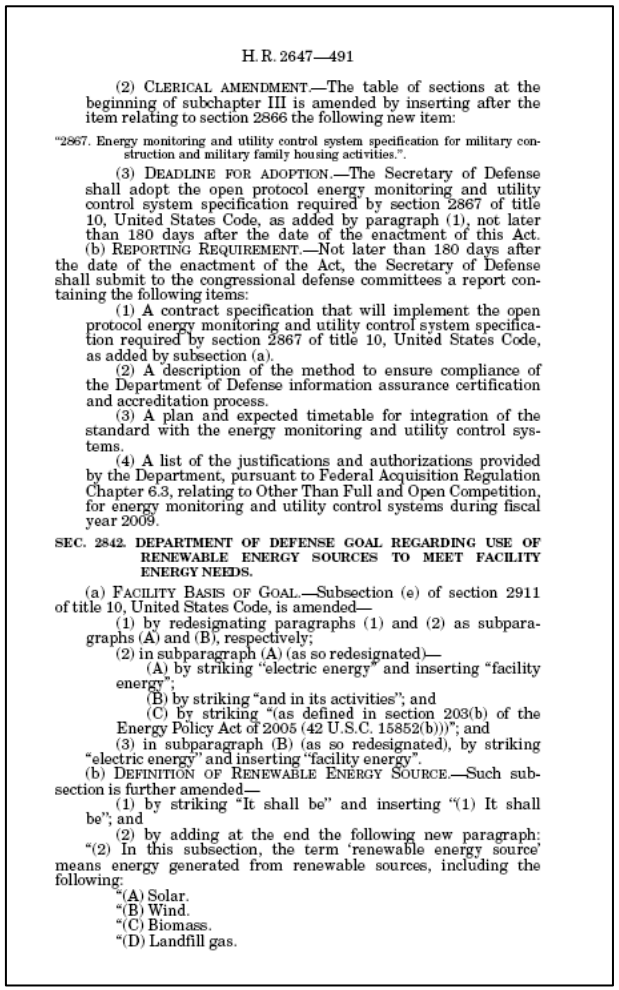
"(E) Renewable energy generation systems.

"(F) Lighting systems.

"(G) Power distribution networks.

"(b) EXCLUSION.—(1) The energy monitoring and utility control system specification required by subsection (a) is not required to apply to projects carried out under the authority provided in subchapter IV of chapter 169 of this title.

"(2) The Secretary concerned may waive the application of the energy monitoring and utility control system specification required by subsection (a) with respect to a specific military construction project, military family housing activity, or other activity under this chapter if the Secretary determines that the application of the specification to the project or activity is not life cycle cost-effective. The Secretary concerned shall notify the congressional defense committees of any waiver granted under this paragraph.".



H. R. 2647—491

(2) CLERICAL AMENDMENT.—The table of sections at the beginning of subchapter III is amended by inserting after the item relating to section 2866 the following new item:

"2867. Energy monitoring and utility control system specification for military construction and military family housing activities.".

(3) DEADLINE FOR ADOPTION.—The Secretary of Defense shall adopt the open protocol energy monitoring and utility control system specification required by section 2867 of title 10, United States Code, as added by paragraph (1), not later than 180 days after the date of the enactment of this Act.

(b) REPORTING REQUIREMENT.—Not later than 180 days after the date of the enactment of the Act, the Secretary of Defense shall submit to the congressional defense committees a report containing the following items:

(1) A contract specification that will implement the open protocol energy monitoring and utility control system specification required by section 2867 of title 10, United States Code, as added by subsection (a).

(2) A description of the method to ensure compliance of the Department of Defense information assurance certification and accreditation process.

(3) A plan and expected timetable for integration of the standard with the energy monitoring and utility control systems.

(4) A list of the justifications and authorizations provided by the Department, pursuant to Federal Acquisition Regulation Chapter 6.3, relating to Other Than Full and Open Competition, for energy monitoring and utility control systems during fiscal year 2009.

SEC. 2842. DEPARTMENT OF DEFENSE GOAL REGARDING USE OF RENEWABLE ENERGY SOURCES TO MEET FACILITY ENERGY NEEDS.

(a) FACILITY BASIS OF GOAL.—Subsection (e) of section 2911 of title 10, United States Code, is amended—

(1) by redesignating paragraphs (1) and (2) as subparagraphs (A) and (B), respectively;

(2) in subparagraph (A) (as so redesignated)—

(A) by striking "electric energy" and inserting "facility energy";

(B) by striking "and in its activities"; and

(C) by striking "(as defined in section 203(b) of the Energy Policy Act of 2005 (42 U.S.C. 15852(b)))"; and

(3) in subparagraph (B) (as so redesignated), by striking "electric energy" and inserting "facility energy".

(b) DEFINITION OF RENEWABLE ENERGY SOURCE.—Such subsection is further amended—

(1) by striking "It shall be" and inserting "(1) It shall be"; and

(2) by adding at the end the following new paragraph:

"(2) In this subsection, the term 'renewable energy source' means energy generated from renewable sources, including the following:

"(A) Solar.

"(B) Wind.

"(C) Biomass.

"(D) Landfill gas.

Section 2841
Unified Energy Monitoring and Utility Control System Specification

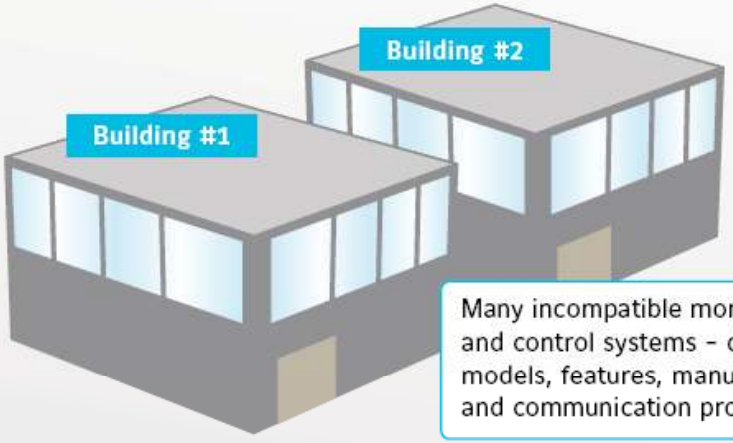
Adopt an energy and utility monitoring control system specification for use throughout DOD for the purpose of monitoring and controlling:

A) **Utilities and energy use**
B) **Indoor environments**
C) **HVAC components**
D) **Central plant equipment**
E) **Renewable energy generation systems**
F) **Lighting**
G) **Power distribution networks**

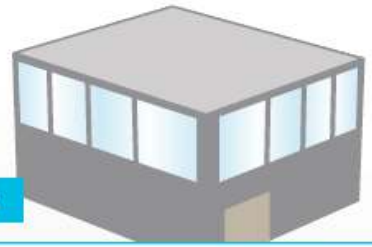
With the goal of establishing installation-wide energy monitoring and utility control systems.

Today's Installations

Lack Installation-wide Energy Monitoring and Utility Control Systems

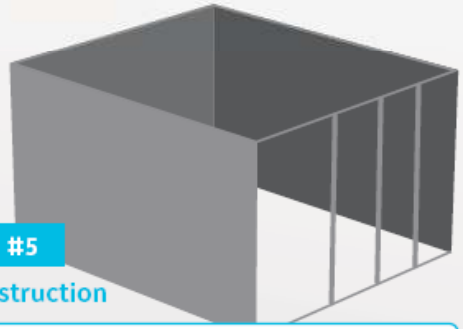


Many incompatible monitoring and control systems - different models, features, manufacturers, and communication protocols.



Building #3

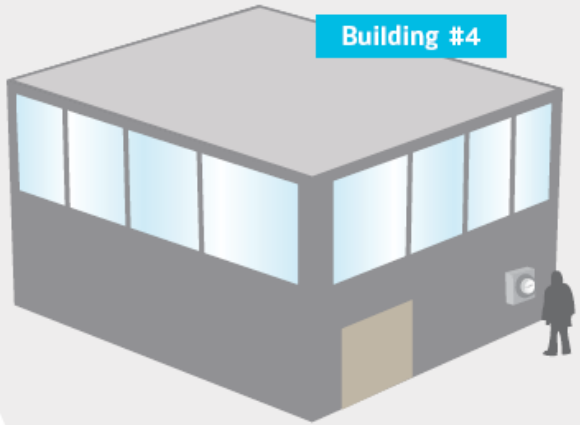
- Lacks energy efficient control
- Old direct digital controls (DDC) or pneumatic controls (analog)
- Unable to integrate to installation-wide system



Building #5

Under construction

Does not comply with upcoming specifications. Will become just like buildings #1 and #2.



- Newly metered building may lack automated data collection
- Unable to take required control action to reduce energy consumption

Vision for Tomorrow

Installation-wide Energy Monitoring and Utility Control System