Buildings That Never Sleep, Even When You Do: Energy Efficiency Solutions for Hotels and Hospitals

Monday, May 15th
3:30 PM
Panelists

- Andrew Mitchell, DOE (Moderator)
- John D’Angelo, Northwestern University
- Michael Barnes, HEI Hotels & Resorts
- Michael Dean, Hilton Worldwide
Northwestern University

Main Campuses in Evanston, Chicago and Doha

296 Acres, 214 Buildings and 13 million square feet

8,000 undergraduates and 8,000+ graduate students

$2.3B in active construction
Agenda

I. Why Lighting

II. Unplanned Benefits

III. Intentional Engagement
Why Lighting
I. Why Lighting

- Consumes about 11% of total commercial and institutional electricity\(^1\)
- Easy and cost effective to change – weekend projects
- Very visible in both public spaces and back of house spaces
- Can yield both intentional and unintentional engagement
  - Quality lighting improves safety and appearance of space
  - Energy savings, even from switching from T8 lamps, can be significant
  - Improves wayfinding
  - Reduces maintenance and maintenance mistakes

\(^1\) From US Energy Information Administration
Unplanned Benefits
II. Unplanned Benefits

- Initial cost is relatively low and paybacks are quick
  - Easy math removes mystery
  - Utility rebate programs abound
  - Maintenance savings on longer life

- Feelings are important - Lighting sets the mood
  - Feeling of safety
  - Feeling of cleanliness
  - Draws visitors toward their destination
  - Draws attention to important distractions

- Lighting and human health
  - Glare
  - Flicker
  - Mistakes
II. Unplanned Benefits

After:
• Occupancy and daylighting controls built in to units
• Cleanliness ratings improved
II. Unplanned Benefits

After:
- Occupancy and daylighting controls built in to units
- Wayfinding improved
Intentional Engagement
III. Intentional Engagement

- Community Engagement – Ryan West Parking Lot
  - Sports venue adjacent to neighborhood homes
  - Low poles with horizontal distribution
  - Normally at 10% output with ability to raise to 100% via App or motion sensor
  - Holiday fruit basket from neighbors!

- Student Engagement – West Sheridan Road Sidewalk
  - Sheridan Road bisects Evanston Campus and Aldermanic Districts
  - East side sidewalk overlit, west side sidewalk dark
  - Tasteful, contextual lighting solution
  - 1,000 student thank you notes to Alderman!

- Staff Engagement – Back of House Corridors
  - Weekend work
  - Even those that can’t figure out what we did, send us “WOW” notes!
Questions?
Michael Barnes
HEI Hotels & Resorts
Buildings That Never Sleep, Even When You Do:

Energy Efficiency Solutions for Hotels & Hospitals
$CO_2 = P \times S \times E \times C$

- **P**: People
- **S**: Services per person
- **E**: Energy per service
- **C**: $CO_2$ per unit energy
The change equation

Dissatisfaction $\times$ Vision $\times$ Capacity $\times$ First Steps $\rightarrow$ Resistance

- **dissatisfaction**: with the present situation
- **vision**: with the present situation
- **capacity**: sufficient resources
- **first steps**: an appreciation of how the change is to be implemented

If any of the elements on the left-hand side of the equation are zero, there will be insufficient impetus to overcome the resistance to change.

Adapted from Beckhard Change Model
About HEI Hotels & Resorts

Almost 75 upper-upscale, luxury and premium select serve hotels representing the world’s leading brands

Over 9,800 associates across 20 states

Total energy spend exceeds $40mm annually
HEI’s History of Energy Conservation

2005  HEI’s Energy Conservation Program formally begins
2008  First local award
2009  HEI’s modifies its Core Values
      “We promote environmentally sustainable business practices”
2010  HEI wins first Energy Star Partner of the Year Award
2011  HEI invited to join DOE’s Better Buildings Challenge
2011, 2012, 2013  HEI repeats Energy Star Partner of the Year, earns Sustained Excellence designation

December 2005
Lighting retrofits completed at 9 hotels.
Total capital spend over $500k Received nearly $100K in rebates.

2007
HEI ramps up DSM programs - Lighting & HVAC.
KBTU/SF @ 112.6.
Capital investment in energy-related projects nears $4mm.

January 2009
HEI begins 2009 Energy Conservation Initiative Program.

November 2009
HEI receives AEE 2009 Corporate Energy Management of the Year Award.

2006
HEI becomes member of EnergyStar; various articles are published relating to the 2005 lighting upgrades.
Consumption data reports begin June 2006.

2008
HEI wins AEE national award, asked to participate in EPA energy performance rating program.
Capital investment in energy-related projects exceeds $6mm.

September 2009
HEI launches Social Responsibility “We C.A.R.E.” program.

March 2010

[Energy Star Award 2010: Partner of the Year]
Creating a Green Culture

Mission:
We promote Environmentally sustainable business practices

Social Responsibility:
Team Environment of Passion and Enthusiasm

Values:
We provide the resources and tools essential for success

Vision:

HEI Value:
HOTELS & RESORTS
Creating a Green Culture

We CARE

Communities
Associates
Relationships
Environment

HEI Value
We provide the resources and tools essential for success

Social Responsibility
We promote Environmentally sustainable business practices

“Buzz” the Energy Bee

Team Environment of Passion and Enthusiasm
Creating a Green Culture

85% of Hotel Energy Usage

- Banquets
- Kitchen & Outlets
- Housekeeping
- Engineering
- Misc. Other

Creating a Green Culture
Creating a Green Culture

The Fab Four

Chief Engineer
Executive Housekeeper
Executive Chef
Banquet Manager

Leaders in each of these four departments set the standards and led the way in energy saving actions.
Creating a Green Culture

The Energy Buddy

Someone who:
Brings new passion for the environment and energy conservation
May work PM or overnight shift
Is familiar with the property
Has or can get access to their respective areas
Creating a Green Culture

Fab Four and the Energy Buddy

**Fab Four**

“I am an example for my team”

- Sets the standard for energy savings
- Makes sure dept. has what it needs to save energy
- Weekly checklists

**Energy Buddy**

“Not on my watch”

- Makes sure standards are maintained
- Makes note of energy saving needs
- Daily checklists
Creating a Green Culture

Fab Four and the Energy Buddy

Fab Four

Energy Buddy

A weekly review confirming that the culture is in place

Train staff on correct Energy Set Points (ESPs) for dryers for each linen type

A daily review confirming that energy is not being wasted

Check dryers to see if each is properly set and labeled with the ESP for each linen type
Creating a Green Culture

Energy Set Points

Energy Set Points: Temperatures which save energy without sacrificing guest satisfaction

- Program success factors included:
  - Educating the Fab Four about set-points
  - Addressing the hotels' ability to read and adjust the targeted set-points
  - Giving the Fab Four better understanding of their respective systems'
  - Making adjustments gradual and ensuring they did not lead to guest complaints
Creating a Green Culture

CONSERVATION Incentive

2009 Roll-out Incentive

Three Winners Each Period:
One 1st Prize to Top Hotel Overall
  • One $10 gas card for each associate and one LCD TV
TWO 2nd Prizes to Top Hotel in Each Group
  • One $10 gas card for each Associate

1. Hotels broken into similar structural groups
2. Two contest terms with three winners per contest (May-Aug, Sep-Dec)
3. Property that CONSERVES the most to the same period last year wins.
Creating a Green Culture

Energy Looking Glass ®
(ELG)

The ELG Supports Behavioral Changes:
Track and monitor daily energy usage
Ability to see and quantify results
Encourages teamwork
Creating a Green Culture

Roll-out Agenda

- Top Down Focus on Energy
- The Energy 3-Step Program
  1. Energy Committee and Champion
  2. Information Collection and Reporting
     A) Data Collection
     B) Data Reporting
     C) Data Review
  3. Awareness Campaign / Incentive
- Timeline
Creating a Green Culture

Questions?
Michael Dean

Hilton Worldwide
Hilton Worldwide is the largest hotel company in the world with 4,322 hotels and 715,000 rooms in 94 countries and territories.

- Founded in 1919
- $10.5 billion in revenue (2014)
- 157,000 employees
- 44 million Hilton HHonors members
- 230,000 rooms in the pipeline – over half under construction
Corporate Responsibility – Issue Alignment

**Creating Opportunities**
- Youth Opportunity
- Learning & Development
- Diversity & Inclusion
- Team Member Wellness

**Strengthening Communities**
- Local Economic Impact
- Community Hospitality
- Disaster Support
- Human Rights

**Celebrating Cultures**
- Global Commerce
- Welcoming Diversity in Travel
- Local Experiences

**Living Sustainably**
- Energy - Carbon
- Water
- Waste - RePurpose
- Supply Chain
LightStay – Our Measurement Framework
- 4,300 Hotels reporting on sustainability measures
- Over 15,000 projects to improve performance

Enforcement – Brand Standards & QA
- Sustainability measurement and corrective action are global brand standards for all Brands
- Enforcement done through Quality Assurance at all of our hotels

ISO Certification – Our Validation
- ISO 9001 (quality) and 14001 (environment) certifications for all corporate offices and hotels globally
- One of the first in our industry and one of the largest volume certification of commercial buildings
Goals for 2014 and Beyond

In November 2015, Washington Hilton achieved DOE’s Superior Energy Performance certification for 15.9% improvement over three years.
Progress To Date

HILTON WORLDWIDE

CHALLENGE COMMITMENT

90
Million Square Feet

GOALS

5-8%
Reduction in Energy Intensity

EUI and % Improvement vs. Baseline

PROGRESS

5%
Cumulative (vs. Baseline)

2016 preliminary results are 3% year-on-year savings
New Showcase Project: Hilton Austin Convention Center

- Upgraded to
  - Occupancy-controlled thermostats and lighting in guestrooms
  - LEDs in common area and restaurants wherever possible
  - 55-watt T-5s in 5-story parking garage, replacing HID 150-watt bulbs
- Started using BAS to auto setback HVAC in occupied meeting spaces
- Installed Melink hoods in restaurant kitchen for demand-based exhaust
- Installed variable frequency drives on On-Premised Laundry exhaust system

**Energy Savings:** 31%

**Cost Savings:** $400,000
Installed highly-efficient lighting by participating a US DOE Next Generation Luminaire (NGL) Demonstration Project and installed:

- Lighting controls
- Guestroom thermostats with occupancy controls
- Advanced Building Automation System (BAS)
- Heat recovery chiller
- Heat reclamation system to heat the swimming pool
- Highly-efficient boilers and water heaters
- Variable frequency drives
- ENERGY STAR appliances
“I'm beginning to think the Department of Energy's reality show - **SWAP** - should be on cable.”

-Fast Company
Significant Energy Users and Relevant Variables

- The significant energy users at hotels
  - HVAC System
  - Lighting
  - Water heating

- The main variables affecting these significant energy users are:
  - Weather
  - Occupancy
  - Meeting room occupancy and food covers in some cases are also significant energy users
Tempassist®

- Tempassist® is a patented phase change material that can be hidden in a room via decorative or non-decorative décor to help moderate the temperature.

- **Above ~72°F:** Tempassist will absorb heat from the space.
- **Below ~72°F:** Tempassist will release stored heat to the space.
- Leverages state of the art thermodynamics.
- Maintains constant levels of comfort.
- Conserves energy and saves money.
Measurement & Verification

**CT Sensors**
Tracks amperage on low, medium and high speed fan coil motors.

**Supply/Return Temperature Sensor**
Located on the pipe for the supply water pipe & return water pipe for the cooling coil.

**In room Temp / Humidity Sensor**
Located in the middle of the room, this tracks temp. & humidity.

**4 Channel Data Collectors**
Collects data from the sensors
- Above the ceiling product, 65% area coverage

- Results show an immediate comparative impact in reducing HVAC run times during the first day of the installation.
Average 35% reduction in HVAC energy usage.

As a result of successful pilot tests, all retail locations for this company are set for product installation.
Full Service Hotel / Unoccupied - 4 pipe fan coil
8/17/15 - 8/24/15
Full Service Hotel / Unoccupied - 4 pipe fan coil

8/17/15 - 8/24/15

OUTSIDE TEMP

DAILY RUNTIME HRS

RUNTIME REDUCTION 93%

85 - 93%
Full Service Suites Hotel / Unoccupied - 4 pipe fan coil

9/18/15 – 9/25/15
Full Service Suites Hotel / Unoccupied - 4 pipe fan coil
9/18/15 – 9/25/15

EMBASSY SUITES CRYSTAL CITY COMPARISONS

OUTSIDE TEMP

DAILY RUNTIME HRS

OUTSIDE TEMP


0 1 2 3 4
runtime hrs

SAVINGS

0 1 2 3 4
runtime hrs

100% RUNTIME REDUCTION

unoccupied

216 CONTROL
9:25 HRS

217 Tempassist
0:00 HRS

TEMPASSIST
TRANSITION POINT

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Atlanta Full Service Hotel / Occupied - 4 pipe fan coil
11/19/15– 12/16/15

RM 830 vs. 1624
55.8 ft2 °

RED indicates retro fit decor
GREEN indicates completely new decor
Atlanta Full Service Hotel / Occupied - 4 pipe fan coil
11/19/15– 12/16/15

HILTON ATLANTA AIRPORT RUNTIME COMPARISONS

OUTSIDE TEMP

49% RUNTIME REDUCTION

1624 CONTROL 347.0 HRS

830 tempassist 176.9 HRS

DAILY RUNTIME HRS

occupied

HILTON ATLANTA AIRPORT RUNTIME COMPARISONS

OUTSIDE TEMP

66% RUNTIME REDUCTION

701 CONTROL 158.2 HRS

1601 tempassist 54.4 HRS

DAILY RUNTIME HRS

occupied
Atlanta Full Service Hotel / Occupied - 4 pipe fan coil
11/19/15– 12/16/15

HILTON ATLANTA AIRPORT RUNTIME COMPARISONS

OUTSIDE TEMP

DAILY RUNTIME HRS

504 CONTROL 195.07 HRS

704 tempassist 78.14 HRS

60% RUNTIME REDUCTION

occupied

HILTON ATLANTA AIRPORT RUNTIME COMPARISONS

OUTSIDE TEMP

DAILY RUNTIME HRS

1616 CONTROL 178.48 HRS

816 tempassist 83.31 HRS

53% RUNTIME REDUCTION

occupied
Thank You

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Thank You

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