Energy Management System in Hospitality: A Case Study

The King’s Daughters Inn
204 N Buchanan Blvd
Durham, NC
Who are we

17-room luxury Inn in Durham, NC
20,000 sq ft building built in 1925 and 1956
Fully restored in 2009

Our philosophy:
Implementing sustainable technologies doesn’t limit function or design

Awards
Triangle Business Journal Green Renovation of the Year
NC Urban Conservationist of the Year
Green Plus N.A. Sustainable Enterprise of the Year
NC Historic Preservation Award
Best of the Triangle Bed & Breakfast
Environmental Technologies We Use:

- 10,000 gallon rain water cistern
- Grey water system for toilets
- Rain garden
- Pervious Concrete parking lot
- EPA Water-sense fixtures
- 1.28 gal flapperless low-flow toilets
- Locally sourced products (including bath amenities)
- Using CFLs, converting to LEDs
- Recycling
- Total Energy Management System
Energy Management: How does it work?

• Passive Infrared sensor on the Thermostat
• Door contactor to monitor door open/close
• Server to monitor and control all rooms

Why Infrared?

• Key card controlled
easily foiled by guests
• Motion sensors
  more likely to turn off on sleeping guests
Server Sees:
- IR = heat
- Door closed

Server Does:
- Occupied
- Power On
- HVAC at Set Temp
- All normal

If the server loses IR, but the door hasn’t opened, it assumes the room is still occupied.
Snapshot of the Energy Management Readout

Room 207

- Occupied
- Not Occupied
- Expanded HVAC
- Narrow HVAC band while occupied
- HVAC Fan On
- AC or Heat On
- Heat detected
- Change from Occupied to Empty
- Door Open/Closed

Floor

PIR

Light

ZB

Ren
ed

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AC

Peak

Door

Window
What makes our system unique:

• When the system switches to Unoccupied, the electricity is turned off to the room.

To maintain a quality guest experience:

• There is a light switch that controls one bedside lamp that is not cut off when unoccupied.

• There is one outlet at the desk that is always energized, to allow a guest to charge phones and laptops while away.
What do we measure?

- Length of time a guest room is occupied
- Length of time power is off
- Track temperatures in real-time

The server sets one thermostat to “dummy” (i.e., not cutting power or floating the thermostat) so we can internally track our own power savings.
Costs & Savings

• The complete system cost $20,000 installed

• We are saving between $700-$1000 per month in electricity because of the system

• That’s approx 2 year payback period
Future Directions

Using the data collected over the past year:

• Analysis to determine if Duke Power time-of-day billing would be desirable.

• Analysis of payback period of complete conversion from CFLs to LEDs (using length of time lights are on/off).