



# Energy

by Phil Sprague

## An example of how an energy audit saves a hotel company big \$\$\$\$

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For the past several years, TRC has long been a proponent of energy conservation, urging hotel managers to minimize their energy consumption and energy expense, thus contributing to a healthier bottom line. Probably no single action a hotel manager can take will likely have more long-lasting and potentially cost-minimizing results than having an energy audit conducted. This article will highlight the result of a classic hotel energy audit in action. The following review of the audit will highlight the major energy saving projects identified and perhaps provide other hotel operators with ideas that can be implemented in their own property.

### Preliminary analysis

The Park Lodge Hotel Group is located in Waltham, Massachusetts, which has some of the highest gas, electricity and water rates in the country. The company consists of three hotels located at the same intersection, a Courtyard by Marriott, a Holiday Inn Express and a Home Suites Inn. The three hotels have a total of approximately 400 guestrooms. The Courtyard property is about three years old and the Holiday Inn Express and Home Suites Inn were recently completely renovated.

As with all energy audits, a preliminary utility data analysis was conducted prior to the on-site analysis. To our surprise, the Courtyard by Marriott was consuming twice as much energy per square foot as the other two hotels, and the Holiday Inn Express and Home Suites Inn were operating about 10% to 15% above average. The three hotels cumulatively spend more than \$636,000 per year on energy and water. The preliminary data analysis indicated that the energy audit should reveal in excess of \$100,000 per year in savings.

### The heat is on...

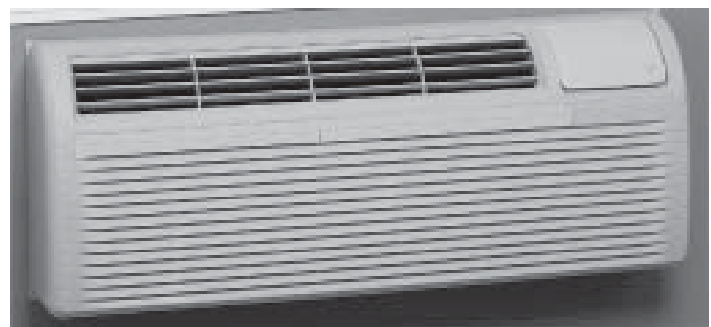
All three hotels utilize hot water from water heating boilers to heat the entire hotel. The guest rooms in all three properties have PTAC units with hot water coils and self-contained air conditioning compressors. During our on-site inspection, which was conducted this past Fall with temperatures at about 65 degrees, it was revealed that the water heating boilers for space heat had been on all summer in the Courtyard. This is a very common problem frequently noted during our on-site analysis. The water heaters serving the heating loop in the Courtyard were set at 190 degrees and in full operation.

For the record, space heat water heaters should be turned completely off during non-heating season, even if the circulating pumps are turned off. A problem occurs when the hot water from the water heaters naturally rises and migrates through the piping system and ultimately through the PTAC units. This significantly increases the load on the air conditioning system during extremely warm days, and wastes a considerable amount of gas energy for heating water at the same time.

Be sure your property's engineering department or service company turns all water heaters and pumps off as you enter the air conditioning season. There are short periods during the Spring and Fall when both heating and cooling may be required and, therefore, the system must be left on for guest comfort during these short periods.

Another important item to check on is your hydronic heating system to verify that the temperature of the water in the heating loop is set correctly. This is a problem which has been observed in almost every hotel with hydronic heating that has been audited. A daily engineering log

Pictured below: Through-the-wall heating/cooling units, such as this PTAC, collectively account for an average of 70% to 80% of the total energy consumed in the hotels that use them.



should be kept to monitor temperatures in this system. As the outside temperature goes up, the temperature of the water in the heating system should be turned down. The range of temperatures for space heating water is 120 degrees to 190 degrees. 190 degrees should only be maintained during extremely cold periods.

This water temperature can be set manually at the water heaters. There are also automatic controllers available from companies, such as Honeywell, that can perform automatic outside air reset on the hydronic heating system. The cost is around \$500, and typically will pay for itself in much less than two heating seasons.

### **Interior design vs. energy conservation**

Guestroom bathrooms in the newly constructed Courtyard by Marriott and the renovated Home Suites Inn were provided with a very attractive light fixture over the bathroom mirror that utilized four 100-watt quartz incandescent lights. These light fixtures created very attractive shadows in the guest bathroom, while providing outstanding light levels with good color. These light fixtures however, are the least efficient of any fixtures available.

The heat produced by these light fixtures increased the air conditioning load by about 13 tons in each of the hotels. This heat was also slightly scorching the ceiling paint above the fixtures. This, of course, is an additional maintenance task. The life of these quartz lamps is less than 1,000 hours and they are very expensive lamps, in excess of \$12 each.

The audit recommends completely removing these new light fixtures and replacing them with a two-lamp, four-foot fluorescent fixture, which utilizes two energy efficient "T-8" lamps, with a 2700 Calvin color rating. The new fixtures will utilize electronic ballasts, which virtually consume no energy. Each fixture will reduce the total wattage from 400 watts to 58 watts, while providing the same level of light on the bathroom vanity.

The only challenge remaining is to find a decorative fixture that will satisfy the desires of interior designers. There are several very attractive fluorescent fixtures of this nature that are utilized in many of the best hotels throughout the country. Please note that this project alone will reduce the electric load about 20% for the entire facility and save in excess of \$10,000 per year for electrical expenses in each hotel.

### **Guestroom energy controls**

Two of the three Park Lodge Hotel Group's utilized through-the-wall heating/cooling units for all guestrooms. Therefore, energy consumed in the guestrooms represents about 70% to 80% of the total energy consumed in these hotels. Because these are hotels that primarily cater to traveling business people, we noted that the majority of the guests leave in the morning to conduct business and return late in the afternoon. There is limited conference space and food service; therefore, daytime activity is very low. This type of property is the best type for a guestroom energy management system.

Four proposals were obtained for a guestroom energy management system that would automatically set back heating and cooling when the room is unoccupied. The four companies were Energy Eye, Energex, Lodging Technology and InnCom. Typically, these systems use a switch in the entrance door that tells an infrared motion sensor to activate when the door opens and closes. If motion is sensed in the guest room, the energy control system does absolutely nothing and lets the guest control the thermostat. If the guest is leaving through the entrance door, the system will note there is no motion in the guest room and automatically turns off the heating and cooling to an adjustable setback point.

It was estimated that it costs roughly \$700 to \$800 per year to heat and cool each guestroom. These guestroom energy management systems can reduce that average cost by about 25%. The four proposals we received indicated these systems cost in the range of \$250 to \$350 per room. In the case of this project, ownership leaned in the direction of the InnCom system, because it was the only one of the four which was wireless. This means that the door switch, the motion sensor and the thermostat communicate with each other via radio frequency.

The advantage of a wireless system is that carpeting does not have to be lifted up and walls do not have to be drilled to install wiring to each component. The components of the system were more expensive, but the labor to install it was considerably less. It is roughly estimated that the system will have about a two year return on investment in the Courtyard and the Holiday Inn Express. Due to the type of heating/cooling system in the Home Suites Inn, the system was not recommended. This is an important reason why management should retain professional help when evaluating expensive projects of this type.

### **Lighting motion sensors**

The application of lighting motion sensors in all types of hotels is about as good as it gets. As with almost every hotel we have audited over the past fifteen years, it is difficult to find unoccupied rooms with lights turned off. Lighting motion sensors are the perfect cost effective product to eliminate this problem.

There are three types of lighting motion sensors that apply to hotels. They are the light switch type, the ceiling mounted type, and the light switch type with a nightlight for guestrooms. The light switch type cost about \$25, the ceiling type \$200 and the guestroom bathroom type \$40 each. The cost effectiveness of a lighting motion sensor directly depends upon the amount of light that is being controlled and the estimated time the lights will automatically be turned off. The audit mathematically calculates each specific application to give the customer a list of ideas and their potential payback.

We have learned that housekeepers' closets, storerooms, offices and meeting rooms almost always have under a two-year return on investment. The lighting motion sensor with a nightlight for the guestroom bathroom can provide a payback in the range of less than one year up to five years. The aforementioned guestroom bathroom lighting project is a good example of how this can vary. If the owner of these hotels chooses to keep the attractive interior design of the existing lighting system, the guestroom bathroom motion sensor will have under a one year return on investment. If the bathroom lighting is converted to energy efficient fluorescent, the payback will increase to over five years.

We learned that the local electric utility in the Boston area will provide rebates of 15% to 30% on lighting controls, depending on the amount of light they automatically turn off. Before a hotel implements this or any other energy saving project, be sure to first contact the local gas and electric utility to examine all applicable rebates.

### **Lighting savings**

As with all full service energy audits, a detailed Lighting Inventory almost always reveals cost effective lighting retrofits. The use of compact fluorescents will someday be standard operational procedure in guestrooms. These properties typically use 30-watt spiral-type, screw-in compact fluorescents, which provide excellent light levels, good color and significant energy savings.

The two older hotels also used a considerable amount of old style "T-12" non-energy efficient fluorescent fixtures. As discussed in other TRC articles, these fixtures can easily be converted to new, energy-efficient "T-8" type lighting systems, frequently using in-house staff.

Again, interior design came into play at the Home Suites Inn where the corridors were lighted with beautiful brass sconces that use 60-watt incandescent, flame-tip lamps. A light meter indicated that light levels in the corridors were in excess of thirty foot candles, which is somewhat high. In this case, we experimented with reducing these fixtures to 40-watt lamps, with a return on investment of .1 years, without adversely affecting guest comfort. Almost all energy efficient lighting retrofit projects are eligible for a significant utility rebate, further enhancing the economics of the project.

### **Executive summary**

This article highlights the major energy saving projects that were identified as a result of the energy audit. There were many other less significant projects that were outlined in the audit, such as motors, low-flow showerheads and time clocks. As a follow-up to this audit, Park Lodge Hotels ownership is actively in the process of either implementing or closely scrutinizing all of these suggestions. There were also many low cost/no cost suggestions offered, particularly in the area of preventive maintenance, which undoubtedly will also provide improvement in the quality of the product and energy savings.

In conclusion, the specific suggestions in the audit for all three properties result in a projected future savings in excess of \$105,000 per year. This is equal to an overall reduction in the cost of energy and water of 17%. So, to quote a recent television advertisement, "What's in your wallet?" An energy audit may reveal more than you think. ✧

*(Phil Sprague is president of PSA Hotel Energy Consultants. Based in Minneapolis, they assist lodging companies and individual properties to develop effective, cost-saving energy strategies by auditing and assessing all energy consuming devices and appliances, and delivering comprehensive, customized recommendations in an actionable format. They can be reached at 952-472-6900.)*