

HARVESTING UNTAPPED HVAC ENERGY SAVINGS IN UNOCCUPIED ROOMS

By Steve Campbell

Hotel operation and management is a competitive and price-sensitive industry, with consumers shopping and comparing prices constantly to find the best value. Since room rates cannot be raised very easily in such a competitive environment, cost reduction is often the primary means of increasing margins and profits. After labor costs, HVAC expenses represent the most significant portion of the annual operating budget for hotels, motels and residential suites.

In fact, lights, television sets and HVAC systems operating unnecessarily in unoccupied rooms represent a significant untapped area of cost reduction for hotels – and could be as much as 20% of the building's annual electricity budget. Spiraling energy costs, compounded by seasonal traffic and guests who often leave appliances and lights on, put significant pressure on the hotel's energy management budget – and profit margins. In addition, given the social need to reduce energy consumption globally, many building owners are searching for ways to reduce the environmental "footprint" and impact of their buildings.

The management of the award-winning 162-room Holiday Inn Hotel & Suites in North Vancouver, B.C. spent three years searching for an appropriate energy management system that would reduce their HVAC energy consumption and overall environmental impact without negatively affecting guest comfort. In 2004, four years after the hotel was opened, Energen's energy management software system was installed to monitor and manage hotel HVAC energy consumption. The new system included the installation of occupancy-sensing hardware in each guest room. The hardware in all 162 rooms was networked with the main EMS to deliver real-time monitoring and control capability over each room's energy consumption.

The new energy management system became fully operational in November 2004, with an evaluation conducted over the subsequent twelve-month period. Installation was relatively simple, with



contractors using the existing in-room thermostat to connect to the EMS in the building manager's office. Occupancy sensors (one RK410 sensing device per room) were installed. No major contracting work was required to install the system and installation took place over eight days. Monitoring is conducted on a PC platform and no upgrade is required.

Once installed, the Energen EMS operates continuously to monitor occupancy of all rooms on an ongoing basis. The system automatically reacts to an unoccupied room by adjusting the heating or AC according to pre-programmed parameters set by the building manager. For example, when the sensor detects

that no guest is present in the room after 15 to 30 minutes, the system will lower the room temperature to "economy" mode and then back to the most comfortable temperature immediately upon sensing an occupant.

Since the system is enabled for continuous monitoring and reporting, it was relatively easy to compare it month-by-month to the previous year's energy consumption patterns. Reports can also be triggered at any time for individual rooms and floors, and by season or day of the week – opportunities for additional detailed analysis that can lead to further harvesting of energy savings.

With energy conservation an important mandate of the local utility provider, BC Hydro personnel were closely involved in the study during the set-up phase, and monitored and analyzed all study results to ensure accuracy and evaluate the EMS's suitability for use by other utility customers.

In addition to the direct energy cost savings, the hotel can achieve other long-term cost benefits, in the form of lower maintenance and repair costs in HVAC equipment, reduced wear and tear, and decreased noise build-up and room humidity. While no cost estimate was conducted for these factors, the EMS staff believe the system can help extend the life of HVAC equipment by up to three years through the reduction in routine system wear and tear alone.

The study also found that the Energen system has the ability to use the sensors to report each room's occupancy status to hotel staff members – in real

Continued on Page 28



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Energy Savings

Continued from Page 26

time – via wireless handhelds. For example, by using a handheld wireless unit outside a room door to contact the EMS, housekeepers and maintenance personnel can quickly detect internal occupancy without having to knock on doors and disturb guests unnecessarily. In

addition, the units can be used to direct workflow around guests' comings and goings much more efficiently.

An unexpected bonus of the system implementation, according to the hotel management team, was the virtual elimination of guest complaints relating to room temperatures; previously, these had meant dispatching staff to solve a variety of problems. Since the system was installed, the hotel has had virtually no complaints about rooms being too hot or too cold when people arrive or return after being out all day. Given that 60% of



guests are repeat customers, and 70% of new guests come through recommendations from existing customers, an important strategic business consideration is ensuring that customers enjoy their stay; providing a high level of comfort in each room is a valuable step toward achieving this end.

The in-room sensors can also be used to alert hotels to unusual or fraudulent occupancy, as well as facilitate a quicker evacuation during an emergency or safety situation by identifying to fire marshalls, staff and hotel security personnel those rooms that are occupied.

STUDY CONFIRMS UNTAPPED HVAC SAVINGS CAN BE HARVESTED

The study confirmed that unoccupied hotel rooms and offices represent an unrealized opportunity to utilize programmable networked energy management software programs and occupancy sen-

sors to reduce the energy consumption used for HVAC. These systems also deliver additional benefits in terms of hotel staff productivity and fire/emergency safety, and all without impacting occupant comfort.

Overall, the study found that the new EMS at the Holiday Inn North Vancouver reduced the hotel's annual energy consumption by more than one-quarter (28%) – a savings of \$16,000 – over the previous twelve months. The analysis was adjusted to take into account variations in occupancy levels and temperature between the before-and-after energy consumption monitoring periods.

Furthermore, because the system helps to reduce the building's environmental impact, the hotel was qualified to receive rebates from the Canadian government (through Natural Resources Canada) for the installation's initial cost outlay. Overall, the analysis showed that the system paid for itself within 14 months and has already delivered an 83% return on investment.

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