

Lean and Green: Control HVAC Costs with Demand-Controlled Ventilation

📅 March 27, 2009 / 👤 By John Scaggs

Ever feel like you're coming down with a cold after attending an event in a hotel meeting room? Or have you noticed that the air feels stuffy in a hotel meeting room? That's because most hotels don't effectively use demand-controlled ventilation (DCV), a technique that conducts real-time measurements of the amount of carbon dioxide in the air and increases the amount of freshly ventilated air brought into a building based on the that measurement. This technique not only increases guest comfort, and the effectiveness of their events, but also reduces utility costs.

Around the globe, all types of facilities in the hospitality industry, such as hotels, restaurants, casinos, theaters, and convention centers, are open for long hours every day, and although they may have relatively high occupancy during a few hours per day or week, at other times they operate far below design occupancy. Occupancy fluctuations offer these facilities an outstanding opportunity for annual energy savings that can amount to as much as \$1.00 per square foot. Instead of continuously ventilating these spaces at a constant rate designed to accommodate full occupancy, building operators can implement a technique known as demand-controlled ventilation (DCV), in which the amount of outside air drawn in for ventilation depends on the actual occupancy of a space at any given time. This strategy results in energy savings because it reduces the amount of air that needs to be conditioned.

Because the average amount of carbon dioxide a person will exhale in a fixed time period is a known quantity, the concentration of carbon dioxide in the air inside a building is a good indicator of the number of people in a space and the rate at which the air in the space is being diluted with outdoor air. Simply, the more occupants a building has at any given time, the higher the level of carbon dioxide in the air. DCV exploits this fact to adjust the amount of fresh ventilation air brought into a building based on the measured concentration of carbon dioxide. So as panelists pontificate, and the carbon dioxide concentration increases, the amount of fresh air brought into the room is also increased. This ensures that the air in a hotel meeting room stays fresh, allowing meeting attendees to feel more alert, while also drastically reducing the chances that the person with the hacking cough will get everyone sick.

DCV is not a new concept, but it has grown in popularity in recent years as the cost of implementation has declined substantially, and the performance of carbon dioxide sensors has improved. The main cost reduction has come from carbon dioxide sensors, some of which are now priced below \$200 (compared to over \$500 a decade ago). Today's sensors can also self-calibrate, so they need far less maintenance than their predecessors. Also, several HVAC equipment manufacturers now offer DCV-ready rooftop units and variable air volume (VAV) boxes. This equipment arrives at your hotel with terminals for the carbon dioxide sensor wires and controls that are preprogrammed to implement a DCV strategy. By limiting installation costs to the cost of mounting the sensor and running wires to the rooftop unit or VAV box (wireless models are available), DCV-ready HVAC equipment substantially reduces the cost of implementing DCV. Rebates and incentives from your utility provider may also help to lower initial costs, and thus reduce the payback period.

DCV provides multiple benefits to hospitality operators and building occupants. It can:

- Reduce utility costs. DCV systems save energy, and thus reduce utility costs, by reducing the need to condition outside air when large spaces such as meeting rooms are not fully occupied. The only system change is the ratio of recirculated air to outside air—fan power is usually unaffected. DCV systems can save from \$0.05 to \$1.00 per square foot, depending on the occupancy schedule and climate in which the property operates. Due

Summary

Ever feel like you're coming down with a cold after attending an event in a hotel meeting room? That's because most hotels don't effectively use demand-controlled ventilation, a technique that ensures that ventilation air contains enough fresh air.

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to the fact that occupancy levels are highly variable, particularly in large meeting rooms, and the fact that they're designed for very high occupant densities, many hospitality operations are excellent candidates for DCV, with economic paybacks of less than two years in most climates, and well under one year in many.

- Provide proper ventilation. If a building is not drawing in enough outside air, a DCV system may actually increase energy use, but it will also bring the building into compliance with ventilation codes and do so more efficiently than a simple increase in the constant ventilation rate. Because DCV provides the proper amount of ventilation for building occupants, it prevents under ventilation, which, as noted, can make buildings seem stuffy and increase the chances that occupants will get sick.
- Show that buildings are in compliance with building codes. It is relatively easy to prove that buildings are properly ventilated when you can simply check to see that carbon dioxide sensors read at or below the maximum allowable carbon dioxide concentration. If the DCV system is working properly, this will always be the case.

Finally, after implementing a DCV system, be sure to update your hotel's marketing collateral to reflect this positive addition to your green meetings program. In a fiercely competitive meetings market, the quality of a hotel's green meetings program can mean the difference between winning and losing valuable business. Properly messaging DCV benefits to potential clients, namely the fact that it reduces energy usage and creates a more productive meeting environment, can give your hotel a strong competitive advantage that will allow it to survive in these challenging economic times.

The best candidates for DCV have long operating hours, highly variable occupancy, and are located in climates with moderate to extreme heating and/or cooling loads. To learn more about DCV and other energy saving retrofits, contact HVS Eco Services at 301-301-1128, or visit us on the web at www.hvseco.com.