

Demand Controlled Ventilation for Commercial HVAC Systems

Description

Air conditioning demand drives the peak for summer-peaking utilities, particularly in warmer regions. Demand Controlled Ventilation (DCV) is a new and emerging energy-efficiency measure that can save significantly on both peak load demand as well as energy usage from commercial HVAC systems.

A variety of ventilation strategies and methods are used to regulate the amount of outside air brought into buildings. Typically, buildings are considerably over-ventilated, with the amount of outside air set to the level required for maximum occupancy levels. All this outside air must be cooled in the summer and heated in the winter. This ventilation strategy wastes significant amounts of energy because occupancy rates vary during the day and are normally well below maximum occupancy levels. By matching the ventilation rates to actual occupancy levels in real time, the amount of outside air brought into the building can be reduced significantly while still maintaining indoor air quality and comfort.

DCV is the name given to the strategy of matching ventilation rates to actual occupancy in real time. Carbon dioxide (CO₂) sensing has emerged as an effective and affordable technology for measuring real-time occupancy and adjusting ventilation rates to maintain proper ventilation levels required under building codes to maintain indoor air quality. CO₂ sensing technologies on the market today comply with ASHRAE Standard 62.1-2007, "Ventilation for Acceptable Indoor Air Quality."

DCV with CO₂ sensing can be installed on most existing commercial HVAC systems. For nearly 10 years commercial HVAC systems of 7.5 tons and over have been required to have the capability to vary outside air ventilation rates. The CO₂ sensors take advantage of this capability and integrate easily into most existing ventilation control systems, allowing savings to be realized immediately and at low cost. The greatest savings are obtained in buildings with variable occupancy rates, such as meeting facilities and convention centers, theaters, shopping malls, and schools.

As a new and emerging technology the penetration of DCV with CO₂ sensing is very low. Recent breakthroughs in sensor technology enable permanent low-cost sensors to be installed that do not require calibration or maintenance for over 5 years. Market analyses indicate that DCV with CO₂ sensing has the potential to be installed in a cost-effective manner in a very large number of commercial applications.

Savings and cost

The peak savings (kW) and energy savings (kWh) vary significantly depending on the building type, occupancy pattern, and climate zone. Installation costs are relatively low, on the order of \$1,000 to \$5,000 per occupied zone. Experience indicates that typical energy cost savings produce payback periods of less than three years, and less than one year in many cases. Annual air conditioning energy savings on the order of 20 to 45 percent are not uncommon.