Enabling Demand-Controlled Ventilation for Retrofit Applications with Wireless CO2 Sensors

Overview
Demand-controlled ventilation (DCV) using carbon dioxide (CO2) sensing is a combination of two technologies: CO2 sensors that monitor CO2 levels in the air inside a building, and an air-handling system that uses data from the sensors to regulate the amount of ventilation air admitted. DCV saves energy and cost by dynamically adjusting intake air to maintain acceptable indoor air quality (IAQ).

Either too little or too much fresh air in a building can be a problem. Over-ventilation results in higher energy usage and costs than are necessary with appropriate ventilation while potentially increasing IAQ problems in warm, humid climates. Inadequate ventilation leads to poor air quality that can cause occupant discomfort and health problems. To ensure adequate air quality in buildings, ASHRAE Standard 62 recommends a per-person ventilation rate. To meet the standard, many ventilation systems are designed to admit air at the maximum level whenever a building is occupied, as if every area were always at full occupancy. The result, in many cases, has been buildings that are highly over-ventilated and building owners pay significantly more for energy than is needed. Implementing DCV can result in investment payback of 2 years or less.

**DCV using CO2 sensors has the most energy-saving potential in buildings where occupancy fluctuates during a 24-hour period, is unpredictable, and peaks at a high level – for example, office buildings, government facilities, retail stores and shopping malls, movie theaters, auditoriums, schools, entertainment clubs and nightclubs.**

U.S. Department of Energy

Powercast DCV Retrofit Solution
The Powercast Lifetime Power® Wireless Sensor System enables flexible and convenient implementation of DCV using reliable wireless technology in conjunction with a network-based control system.

While CO2 has typically been a high-power technology that required a wired power source, Powercast’s low-power wireless CO2 sensor can operate on batteries for up to 15 years. The self-calibration feature also ensures long-term performance with minimal maintenance. The related temperature and humidity sensors can operate for 25+ years on a single battery.

The system is comprised of battery-powered sensors and a wireless receiver (gateway) for connecting to the BAS network.

**Wireless Solution Components:**
- WSN-1102  CO2 transmitter
- WSN-1101  Temp/Humidity transmitter
- WSG-101   BAS Gateway / Repeater
  (up to 100 devices per gateway)

**System Benefits**
With increasing energy costs and government regulations, DCV is smart control strategy for energy-efficient building operation. The Powercast wireless solution for DCV retrofit provides the following benefits:

- Reduced energy cost
- Avoidance of over-ventilation
- Improved IAQ and humidity control
- Minimized moisture intake
- Reduced installation cost
- No/low maintenance with ultra-long battery life and self-calibration
- Add to any BAS network using BACnet, Modbus, LonWorks, MetasysN2, and more
- Qualifies for LEED rating points
- Data-logging of air quality data
- Reduced operational running times for major HVAC equipment

Source: