

## Garage DCV System Case Study: Grace Cathedral Parking Garage

### The Property

Located on Nob Hill in San Francisco, Grace Cathedral is a soaring neo-Gothic edifice that hosts an active Episcopalian congregation and shelters many notable works of medieval-style art.

The structure possesses an enclosed, two-story parking facility housing approximately 150 vehicles. The garage is operated by Ampco System Parking, and it is open Sunday through Thursday from 6:30 AM to midnight on and on Friday and Saturday from 6:30 AM to 2 AM.

### The Savings Opportunity

The Grace Cathedral garage is ventilated by two (2), 20-horsepower exhaust fans, which property management runs on an alternating basis to what amounts to approximately 126 hours per week. Pre-installation power measurements showed the garage fans' combined energy consumption to be 60,179 Kilowatt hours (kWh) per year. Based on the property's electric utility rate, the annual cost to ventilate the garage added up to approximately \$9,025.



Grace Cathedral, San Francisco

*Garage Energy Consumption Reduced by 93%*

### The NES Solution

The carbon monoxide (CO) sensor-based, demand-control ventilation (DCV) system deployed by Nagle Energy Solutions (NES) is commonly known as a "variable flow" DCV system. It utilizes a proprietary, smart-control logic that detects and measures vehicle fumes and then modulates garage fan speeds to prevent CO levels from exceeding 10 parts per million (ppm) for extended periods of time. The result is to enable us to achieve consistently greater energy savings – up to 97% – than "on/off" CO sensor ventilation strategies while better ensuring the health and safety of garage employees and visitors by providing continuous ventilation.



NES installed the garage DCV system in late November 2009 and set it to run in conjunction with Grace Cathedral's garage operation schedule system. It's worth noting that the Pacific Gas & Electric (PG&E) engineer who conducted a pre-installation inspection (tied to the rebate) estimated the system would provide only an 80% savings in kWh consumption and a 79% decrease in peak demand. NES made the case at the time that our project design, ventilation strategy and controller's smart-control logic, as well as the use of variable frequency drives (VFDs) to modulate garage fan speed(s), would result in kWh savings amounting to at least 90% while achieving peak demand savings of no less than 85%.

### The Results

In November 2010 – one full year from the time of installation – NES collaborated with engineers for PG&E to conduct post-installation measurement and verification (M&V). Two weeks' worth of data logging results showed we easily surpassed the initial energy savings estimate. *Our DCV-based CO system actually reduced the kWh consumption of Grace Cathedral's garage fan motors by more than 55,900 kWh – 93% – reducing the cost of energy to ventilate the garage by \$8,395 – to just \$632 per year. Peak demand consumption, which in 2009 registered at 9.16 kW, was reduced by 95%, to less than .5 kW.*

Factoring in the actual (versus estimated) savings, as well as a \$5,040 rebate from PG&E, the payback period for the NES retrofit was 36 months.

***About Nagle Energy Solutions (NES)***

Nagle Energy Solutions, LLC ([www.nagle-energy.com](http://www.nagle-energy.com)) is a manufacturer, distributor and installer of an innovative demand-control ventilation (DCV) system for commercial garages that reduces energy consumption by an average of 93%.

Our sales and service capabilities extend nationally and internationally.

NES digital controllers and peripherals are scalable and conform to several building management system (BMS) and energy management system (EMS) communication platforms, as well as monitor / report on energy consumption/savings.

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