Garage DCV System Case Study: 600 California Street, S.F.

94% Savings After Quadrupling the Garage Fan Runtimes

600 California Street, S.F.

"I was impressed with the due diligence process, project analysis and calculation methodologies. Best of all, NES delivered exceptional energy savings."

Alfred Scaramelli, SVP,
Beacon Capital Partners

The Property

600 California Street is a high-rise commercial property in the heart of downtown San Francisco. It's owned by Beacon Capital Partners, and its tenants include the Federal Home Loan Bank of San Francisco, Merrill Lynch, Wells Fargo and Burr Pilger & Mayer. The building possesses a three-story, below-grade parking garage that houses approximately 220 vehicles. The garage is open to the public Monday through Friday and only to tenants on weekends.

The Savings Opportunity

The 600 California Street garage is ventilated by five (5) exhaust fans totaling 130 horsepower (HP). As a means to avoid peak demand electricity charges, property management ran four of the five garage fans an average of less than 3.5 hours per day, with the fifth running continuously to ventilate condensers in a tenant's computer server room. Notwithstanding the aggressive efforts to curb garage fan energy consumption, combined, they consumed 241,655-kilowatt hours (kWh) and 91.62 peak kilowatts (kW) per year[1] at an annual cost of $25,100. Management thought peak demand hours were from noon to 3 p.m. Nagle Energy Solutions (NES) determined that four of 600 California Street's five garage fans actually ran during the peak demand hours, since, in fact, the peak period for the property was from 2 to 5 p.m.

The NES Solution

NES convinced property ownership/management to install an innovative, sensor-based, demand-control ventilation (DCV) system based on the attainable energy savings it provides. However, management was skeptical of our assertion that we could substantially increase the fan run times – from an average of 3.5 hours to 12 hours per day on four garage fans, leaving the fifth running 24/7 – yet reduce kWh and peak kW demand consumption by a minimum of 80%. At the increased runtime capacity, NES was confident our garage DCV system, which modulates garage fan speed(s) utilizing variable frequency drives (VFDs), would pay for itself in less than 23 months and provide more than $21,100 in energy savings within the first year.

The Results

NES worked closely with engineers for Pacific Gas & Electric (PG&E) to conduct pre- and post-installation measurement and verification (M&V); first establishing the baseline energy consumption and determining the potential energy savings, and then verifying the actual savings captured by our CO sensor system.

Energy Use	Pre Installation	Post Installation	Savings	% Savings
Total kWh	241,655	14,757	226,898	93.9%
Total Cost @ $0.10/kWh	$ 25,100	$ 1,533	$ 23,567	93.9%
Total kW Demand	91.6	3.9	87.7	95.7%

Three (3) weeks of post-installation data logging showed extraordinary results. The system, along with our project design and ventilation strategy, ***provided an actual, annual energy savings amounting to 226,899 kWh and 87.7 kW in demand reduction. That represents a 93.9% reduction in kWh consumption and a 95.7% decrease in peak kW demand*** when operated on the recommended time schedule.

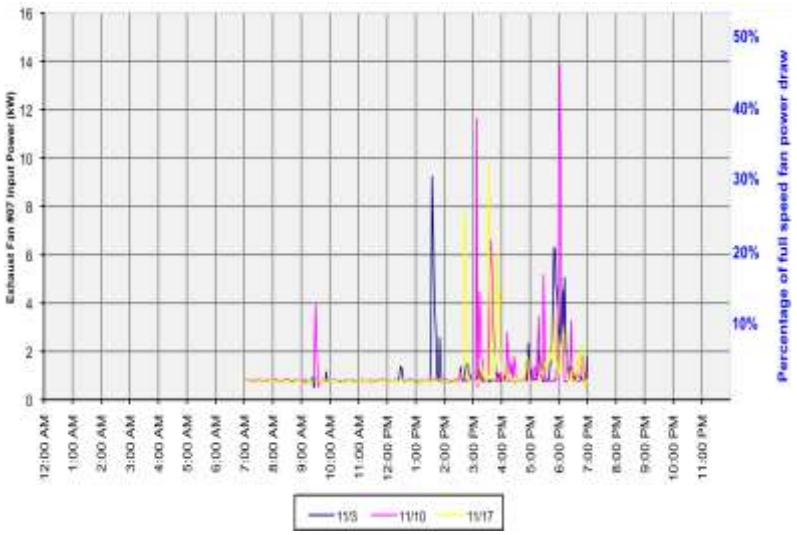
Interestingly, when kW was measured with all five (5) garage fans running on a 24/7 basis, the annual energy savings amounted to 214,671 kWh – an 88.8% decrease – demonstrating our system can assume additional operating hours with minimal impact on energy costs. The peak demand reduction remained at 87.7 kW or 95.7%.

The DCV system ***reduced garage-operating costs by $23,600 – $2,500 more than the $21,100 in savings NES promised to deliver*.** Property ownership now pays just $1,500 per year to ventilate its parking garage.

PG&E rebated $21,588 for the energy savings captured by the system, which paid for itself in just 22 months.

Proven Methodology for Capturing Savings

In contrast to "on/off" CO sensor ventilation strategies used in many garages, a "variable flow" DCV system (as the one deployed by NES is more commonly know) utilizes a proprietary, smart-control logic that detects and measures vehicle fumes in the space and then modulates fan speeds to prevent CO levels from exceeding 10 parts per million (ppm) for extended periods of time. In doing so, the variable flow system better ensures (vs. "on/off") the health and safety of building occupants and visitors by continually ventilating the garage while maximizing energy savings – by 85% to 95%.



Even at low fan motor speeds, the variable flow system ensures the garage fans provide a reservoir of fresh air sufficient to handle moderate peaks of vehicle activity. During this time, the energy consumed averages less than 3% of the full-speed power draw of the fan motors. Upon detecting rising CO levels due to increased vehicle operation, the garage fans promptly ramp to reduce CO concentrations and then just as quickly return to baseline operation – typically within two (2) minutes.

To demonstrate the point, the accompanying chart provides a look at the post-installation performance of the largest (40 HP) of the five exhaust fan motors ventilating the 600 California Street garage. Pre-installation measurements showed the fan motor consumed 30.6 kW at full speed. Three weeks of post-installation data logging by PG&E showed it now consumes an average of 1.21 kW – a 96% reduction.

Note: At peak fan operation, the power consumed by our system was less than 14 kW – which represents less than 50% of the highest, pre-installation power draw at full speed (30.6 kW). The chart further illustrates how our smart-control logic enables kW consumption to return to baseline levels in just a few minutes.

About Nagle Energy Solutions (NES)

Nagle Energy Solutions, LLC (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.

Nagle Energy Solutions Contact: Frank Nagle (650) 854-1992 or frank@nagle-energy.com.

1 *NES utilizes a Summit Technology PowerSight 3000 Energy Analyzer/Meter to measure the baseline energy consumption. We monitored the voltage, current, true power and power factor for each phase of the fan motor. The PS 3000 readings/measurements are typically taken at 10-second intervals for approximately 12 to 15 minutes per fan motor.*

kWh = Power Demand (based on actual measurements utilizing the PowerSight 3000 Analyzer/Meter) X operating hours per year.