Garage DCV System Case Study: Oceanview Village, S.F.

Garage Energy Savings in Excess of 95% Cuts Developments' Total Annual Energy Bill 30%

The Property

Constructed in 2002 and located in San Francisco's Excelsior District, Oceanview Village is an expansive, mixed-used development consisting of condominiums, apartments and retail shops. The property houses a two-level, 126,500-square-foot, enclosed parking garage for its residents and visitors, as well as an adjacent, single-level, 18,000-square-foot, enclosed garage serving visitors to the various retail shops on site. Total garage square footage amounts to 144,500 square feet, accommodating 450-plus automobiles.

Oceanview Village, San Francisco

"The garage ventilation system retrofit was an important component of our sustainability efforts, and we were confident in Nagle Energy Solutions' due diligence and overall approach. We appreciated Frank Nagle's straightforward manner, his hands-on approach and his service-driven ethic. Best of all, NES delivered better than promised energy savings."

Michael Gollnick, Board of Directors, Oceanview Village Homeowners Association

The Savings Opportunity

The retrofit of Oceanview Village's garage ventilation system presented Nagle Energy Solutions (NES) the opportunity to capture a significant amount of energy savings – in excess of 350,000 kilowatt-hours (kWh) a year – thus providing a minimum cash inflow of roughly $830,000 throughout the 15-year lifespan of our innovative, carbon monoxide (CO) sensor-based, demand-control ventilation (DCV) system for garages.

The garage ventilation system at Oceanview Village is comprised of four (4), 10-horsepower (HP) exhaust fans and two (2), 7.5-HP supply fans, which ventilate the "residential" garage, and two (2), 3-HP exhaust fans supplying fresh air to the adjacent, 18,000-square-foot "retail" garage. To establish an accurate baseline of energy consumption, NES measured each garage fan motor's true power (kW) consumption, as well as the voltage and current (amperage) output and the actual power factor (PF) and motor load of each motor.

In the 12 months prior to retrofit by NES, property management ran the residential garage fans on a 24/7 basis, while running the two (2), 3-HP exhaust motors in the retail garage intermittently. One of the two (2), 7.5-HP supply motors in the residential garage had seized due to exposure to harsh weather conditions and not been operable for five (5) years. NES recommended replacing the motor with a "marine duty" motor capable of withstanding severe weather conditions, and we were subsequently retained to do so.

Baseline Energy Findings & Calculations

Our measurements revealed the garage fans' combined energy consumption to be 399,620 kilowatt-hours (kWh) per year, with a correlating power demand of 46.76 kilowatts (kW). Based on a utility rate of $0.1556/kWh and taking into account additional charges incurred by running the garage fans during peak demand periods each day, the annual cost to ventilate Oceanview Village's garage amounted to $62,168.

NES calculated that our garage DCV system would achieve a 95% savings in annual energy (kWh) consumption and reduce peak kW demand by 95% or greater. Our calculations factored in daily traffic patterns in the garage(s), as well as physical design and layout.

The Results

NES retrofitted the Oceanview Village garage ventilation system in February 2013 and then immediately installed energy analyzers/data loggers at each garage fan motor-control panel. We monitored each motor's kW consumption, voltage and current (amperage) output and PF for nine (9) days, setting our measurement intervals at one (1) per minute, 24 hours per day.

Post-installation measurements showed our garage DCV system reduced the garage fan motors' combined kWh consumption by 381,066 kWh – a 95.4% savings. Peak kW demand was reduced by 44.65 kW, which equates to a 95.5% savings. (Our calculation to determine the energy consumed by the 7.5-HP, marine duty replacement motor, which had not been installed by the time of the CO system commissioning, was accepted and approved by the inspecting engineer for PG&E.)

Energy Use	Pre Installation	Post Installation	Savings	% Savings
Total kWh	399,620	18,554	381,066	95.4%
Total Cost @ $0.155/kWh	$ 62,168	$ 2,783	$ 59,384	95.5%
Total kW Demand	46.8	2.1	44.7	95.5%

The annual cost savings amounts to 95.5%, with our system lowering Oceanview Village's cost to ventilate its garage by more than $59,400 a year – from $5,200-plus per month to just $230 per month. Notably, according to PG&E's final inspection report, our system will reduce the annual energy bill for the ***entire*** property by 30%.

The system and our ventilation strategy resulted in the project paid for itself at Oceanview Village in **12 months** – not including a $30,500-plus rebate from PG&E. NES collaborated with engineers for PG&E throughout the entire retrofit process, sharing pre- and post-installation measurement and verification (M&V) data. PG&E issued its formal approval of the project within weeks after receiving post-retrofit M&V data.

Convergence with Stricter Standards

Often overlooked by property owners/managers is the considerable cost to ventilate enclosed parking garages. Furthermore, a growing number of states and municipalities are adopting stricter energy efficiency and operational standards for CO sensor systems.

That's important, because the revised standards no longer permit the deployment of carbon monoxide (CO) sensor systems that switch on garage fans only when elevated CO levels require, which is commonly referred to as an "on/off" or "start/stop" ventilation strategy. Plus, an industry trick of the trade – simply shutting off garage fans to avoid energy costs/fees – is expressly prohibited in an increasing number of cities and states. The International Mechanical Code has adopted similar, stricter code language. The NES sensor-based garage DCV system provides property owners a cost-effective means to minimize garage ventilation costs while adhering to the new, stricter standards.

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% – with quantifiable savings as high as 97% achieved.

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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