

Garage DCV System Case Study: Westin St. Francis Hotel, S.F.

94.7% Energy Savings Achieved at San Francisco Landmark

The Property

Opened in 1904 and overlooking San Francisco's historic Union Square, **The Westin St. Francis Hotel** is a northern California landmark. World-class shopping, restaurants and theatres surround the hotel, and it is a short walk from San Francisco's Chinatown, Financial District and Moscone Convention Center. The hotel's valet-service garage – a three-level, below-grade structure with a 250-plus-vehicle capacity – serves hotel guests, business professionals and tourists alike.



Westin St. Francis Hotel, San Francisco

"NES's measurement and verification process accurately calculated the energy savings opportunity and then validated it – independent of PG&E's inspection process."

The Savings Opportunity

The Westin St. Francis garage is open 24 hours a day, seven days a week. Its garage ventilation system is powered by one (1), 25-horsepower (HP) and one (1) 15-HP exhaust fan motor, each of which runs continuously, i.e., 24/7 or 8,760 hours per year.

Nagle Energy Solutions (NES) relied on detailed energy measurements and analysis to establish a baseline of energy consumption of the garage fan motors, calculating the true power (kW) consumption, voltage and current (amperage) output and the actual power factor (PF) and motor load of each.

Our measurements confirmed the garage fans' combined energy consumption to be 235,441 kilowatt-hours (kWh) per year, with a correlating power demand of 26.9 kilowatts (kW). Based on the Westin St. Francis Hotel's electric utility rate of \$0.143/kWh – and accounting for costly peak demand charges the hotel regularly incurred as a result of its fan runtime schedule – the annual cost to ventilate its garage amounted to \$33,668.

Factoring for daily traffic patterns in the garage, as well as its physical design and layout, NES calculated that our innovative, carbon monoxide (CO) sensor-based, demand control ventilation (DCV) system for garages would achieve nothing less than a 90% savings in annual energy (kWh) consumption and reduce peak kW demand by 90% or greater.

The Results

NES retrofitted the hotel's garage ventilation system in October 2012, installing a "variable flow" garage DCV system. Upon the system's commissioning, we installed energy analyzers/data loggers (on loan from Pacific Gas & Electric's [PG&E] Tool Lending Library) at each garage fan motor control panel. NES then monitored each motor's power (kW) consumption, voltage and current (amperage) output and PF for two (2), successive weeks. We set our measurement intervals at one (1) per minute, 24 hours per day.

Energy Use	Pre Installation	Post Installation	Savings	% Savings
Total kWh	235,441	12,442	222,999	94.7%
Total Cost @ \$0.143/kWh	\$ 33,668	\$ 1,779	\$ 31,889	94.7%
Total kW Demand	26.9	1.4	25.5	94.7%

Post-installation measurements showed the garage DCV system actually reduced the garage fan motors' combined kWh consumption by 222,999 kWh – a 94.7% savings. Peak kW demand was reduced by 25.5 kW, which also equates to a 94.7% savings. Our system lowered the Hotel's cost to ventilate its garage by more than \$31,800 a year – from \$2,800-plus per month to just \$148 per month or less than \$5 a day.

The NES Solution

The project paid for itself in **14.85 months**, not including a \$19,700-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.

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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