

## Garage DCV System Case Study: Sutter Stockton Garage, San Francisco

### **NES Digital Ventilation Control System Reduces Energy Consumption by 96% at S.F. City Garage**

#### **The Property**

Constructed in the late 1950s and expanded in 1976, the Sutter Stockton Garage is a multi-level, 858,300-square-foot, parking facility capable of accommodating 1,865 vehicles. It is owned and operated by the City & County of San Francisco, and it serves both the Union Square and Downtown districts of the City.

Sutter Stockton is the second of three San Francisco-municipal garages at which the Nagle Energy Solutions (NES) digital, demand-control ventilation (DCV) system was installed to control mechanical ventilation. The Golden Gateway and Japan Center garages were the other two City & County garages to undergo substantial renovations in 2016 and early 2017.

Sutter Stockton's physical design ensures it benefits from a good amount of natural ventilation, however, it does possess a number of enclosed areas requiring mechanical ventilation.

To that end, retrofit plans developed by San Francisco Public Works Department engineers combined the deployment of innovative Huntair Fanwall® technology in conjunction with ABB variable frequency drive (VFD) technology. The NES System, which City engineers selected as the "basis of design" for controlling garage ventilation, ties together each component, managing primary motor / VFD functions based on carbon monoxide (CO) concentrations in the garage.



**Sutter Stockton Garage, San Francisco**

#### **The Operational Challenge / Energy Savings Opportunity**

As was the case with each of the three City garages, San Francisco Public Works administrators and design engineers balanced adherence to the California Energy Code (Title 24) requirement to provide continuous, mechanical-ventilation during garage-occupied hours against the need to minimize the energy consumed by the considerable fan-motor horsepower (HP) required at Sutter Stockton to achieve maximum ventilation rates, when necessary.

City engineers designed in five (5), new Fanwall® units, along with nine (9), new stand-alone garage ventilation motors possessing a combined 150 HP. Sutter Stockton is open 24/7, so according to code, the garage fans also are required to run 24/7, which equates to 8,760 hours of runtime per year for each garage-fan motor / Huntair Fanwall® unit.

Consumption	Without NES Controls	With NES TR100	\$ Savings	% Savings
<b>Total kWh</b>	802,538	32,102	770,437	96.0%
<b>Total Cost @ \$0.15/kWh</b>	\$ 120,748	\$ 4,830	\$ 115,918	96.0%
<b>Total kW Demand</b>	92.04	3.68	88.36	96.0%

Pre-installation calculations showed Sutter Stockton's new mechanical ventilation system consuming more than 802,000 kilowatt-hours (kWh) per calendar year, with a correlating annual peak kilowatt (kW) demand of more than 92 kW. The electric utility rate for the garage is \$0.15/kWh, so with no means of ventilation control in place and at the calculated rate of kWh consumption, the annual cost to ventilate the garage amounts to more than \$120,500 – not including or factoring in future utility rate increases.

### **The NES Solution –**

S.F. Public Works mechanical design engineers selected the NES Digital TR100 Series garage DCV system, noting its ability to optimize operational efficiencies while minimizing energy consumption.

At Sutter Stockton, 40 BACnet-communicating carbon monoxide (CO) sensors installed throughout enclosed portions of the garage provide instantaneous feedback to a single NES TR100 controller. The NES controller then relays speed commands – via the VFDs – to the garage's exhaust and supply fan motors, increasing and decreasing motor speeds in proportion to CO levels. This approach, when deployed with proprietary NES controller sequencing, routinely captures kWh and peak kW demand savings in the range of 95% – and, in some instances, greater.

### **The Results**

NES TR Series controllers provide the standard capability to monitor energy consumption on a real-time basis. Since commissioning the NES system in August 2016, data logging at the Sutter Stockton Garage shows the NES Garage DCV System is limiting the power (kW) consumption of the fan motors to just 4% of their combined full-speed power (kW) draw. Indeed, the rate or percentage of savings at the garage – both for kWh consumption and peak kW demand – has remained at or fallen on the plus side of 96%.



The NES System also slashes – by 96% – energy costs which otherwise would have been incurred. Moving forward, the cost to ventilate the garage will amount to approximately \$400 a month – versus \$10,000 a month without the NES system – providing minimum cash inflow (from energy savings) in excess of \$1.7 million throughout the 15-year lifespan of the system.

### **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 95% – with quantifiable savings as high as 97% achieved – all while leaving your garage fan motors running. Our sales and service capabilities extend nationally.

The NES TR product line of controllers is designed to provide optimum functionality and system features, including scalability – custom designed according to customer requirements – and an “open” communications platform that comports with many BMS and/or EMS communication protocols. Moreover, NES TR controllers integrate a web server that enables building owners / managers to conduct system status checks and adjust operational parameters – from anywhere in the world.

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