

Garage DCV System Case Study: Main Street Cupertino Development

Digital Variable Flow System Achieves 97% Energy Savings for New, Mixed-use Development

The Property

A new construction project in the heart of Silicon Valley with several sectors currently at completion phase and/or open/occupied, Main Street Cupertino is an innovative, mixed-use neighborhood, providing loft-style apartments, a business-oriented hotel, class-A office space and top-rated restaurants, cafés and boutiques.

The development includes a large parking garage capable of accommodating 1,370 vehicles. The garage contains two, below-grade levels requiring mechanical ventilation.

The Operational Challenge / Savings Opportunity

In an effort to fully incorporate building automation / management technology on a campus-wide basis, the developer, Sand Hill Property Company (www.shpco.com), and its partners wanted to include cutting-edge garage ventilation control technology. The developer understood some means of control was necessary to offset energy consumption, since in order to adhere to code requirements for maximum ventilation rates, the enclosed portion of the garage required a sizable ventilation system. Indeed, in this instance, it meant installing a total of 20 exhaust and supply fan-motor units possessing a combined 83 horsepower.



Main Street Cupertino Development

The net present value (NPV) on a project price of \$117,232 exceeds \$1.18 million (net of investment), and the minimum cash inflow it will generate (from energy savings) surpasses \$1.4 million throughout the life of the NES system.

Pre-installation calculations by NES showed that, without any means of control in place and running on a predetermined 24/7 operating schedule, the Main Street Cupertino garage ventilation would consume approximately 527,000 kilowatt hours (kWh) per year, with a correlating peak kilowatt (kW) demand greater than of 60 kW. Accordingly, at a utility rate of \$0.205/kWh, property management's annual cost to ventilate the garage would amount to slightly more than \$108,000.

The NES Solution –

NES collaborated closely with Sand Hill Property Co., Acies Engineering (www.acies.net), the mechanical design firm, and South Bay Construction, Inc. (www.sbcinc.com), the general contractor, to design in and install the digital NES demand-control ventilation (DCV) system. In this instance, the appropriate choice was the NES TR50 system, which is built on Tridium's powerful and durable JACE controller utilizing Niagara programming.

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.

Lastly, the NES system distinguishes itself by its ability to interface with variable frequency drive (VFD) technology to track real-time energy consumption / savings, which is a valuable asset in today's energy conscious environment.

Based on our analysis of the physical design of the Main Street Cupertino garage, as well as occupancy / traffic trends, NES relied on a “benchmark” of 95% for calculating the **obtainable** kWh and peak kW savings – all while maintaining a 24/7 garage-fan operating schedule.

The Results

In the summer of 2015, NES installed its TR50 system, in this instance deploying a Modbus® communication protocol. We fully commissioned the system later that fall, when the garage was officially opened to Main Street Cupertino tenants and visitors.

Detailed post-installation energy consumption monitoring / data logging – via the NES TR50 system – showed our initial savings estimates to be short. In fact, the data logs show our garage DCV system consumes just 2.6% of the combined fan motors' full-speed power draw, which equated to a 97.4% in both kWh and peak kW demand.

Consumption	Without Controls	With NES TR50 System	\$ Savings	% Savings
Total kWh	526,904	26,345	500,559	97.4%
Total Cost @ \$0.205/kWh	\$ 108,015	\$ 5,401	\$ 102,615	97.4%
Total kW Demand	60.15	1.56	58.59	97.4%

Moving forward, property management's cost to ventilate its garage will amount to just \$450 a month – versus \$9,000 a month without the NES system – providing minimum cash inflow (from the savings) in excess of \$1.5 million throughout the 15-year lifespan of our system.

The NES system pays for itself in just 13.7 months.

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 – all while leaving your garage fan motors running. Our sales and service capabilities extend nationally.

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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