

Clearing the Air in Commercial Kitchens

New Ventilation Technology Saves Energy, Ensures Air Quality

Whether it's a high-end restaurant with an open kitchen, or a mass-market fast food chain, removing steam, heat, and other emissions from commercial kitchens is vital for both cooks and restaurant patrons.

Long recognized as much an art as a science, commercial kitchen ventilation (CKV) can represent as much as ten percent of the energy use in what is an energy-intensive environment. This Emerging Technology project has proven that variable speed exhaust fans paired with sophisticated controls can ensure good air quality and lower utility costs.

Variable Fan Speed

Lowering the speed of a fan dramatically reduces energy use, so two-speed exhaust fans have been available for commercial kitchen hoods for some time. And, as equipment prices have dropped, variable speed drives are available from most hood manufacturers, or can be added to existing hoods as a retrofit.

While these options can save kitchen operators money, industry experience shows that cooks do not rigorously turn the fan down when kitchen equipment use is low.

Automatic Controls Key To Savings

The Emerging Technologies demonstration project has revealed that the key to delivering energy savings for kitchen ventilation systems is a control package that senses the need for ventilation and in turn determines the correct fan speed. The control system uses two data points: the temperature in the hood, and the amount of vapor or smoke passing through a light beam and sensor package.

The Mark Hopkins Hotel on Nob Hill in San Francisco served as a demonstration site for the CKV Emerging Technologies project, which was conducted by PG&E's Food Service Technology Center (FSTC).

Results from the project indicated a decrease in average electrical demand of 8.7 kW, and a decrease in fan energy use of 209 kWh per day. Combined with savings from reduced heating of makeup air, the system has projected annual savings of \$14,900, yielding a one-year payback.

Commissioning the System, and Technology Transfer

In performing the data acquisition portion of the demonstration project, Charles Bohlig, an engineer for the FSTC, found that one of three hood fans at the Mark Hopkins operated constantly at full speed. "I discovered that there was a bad wiring harness connecting a temperature sensor to the control system" he explains.

From this experience, and anecdotal evidence that these types of problems are not uncommon, the final project report indicates that commissioning a new system is necessary to ensure field performance.

The report also addresses technology transfer – how to encourage food service operators, commercial kitchen designers, and ventilation hood manufacturers to specify variable speed fans with automated control packages as a standard practice.



The "front line" of the Mark Hopkins kitchen includes forty feet of heavy-duty equipment.



The kitchen handles major events with hundreds of guests, as well as room service for the hotel.



Probes measure amperage in one of three variable speed drive units for the kitchen hood fans.



Charles Bohlig from the FSTC downloads energy use data on the rooftop of the kitchen.