California Energy Commission

Cookline Replacement Study

Versailles Cuban

Los Angeles, CA

Ventilation on Demand…

As a family-owned restaurant in an increasingly competitive Los Angeles food scene, Versailles Cuban was looking for a business edge. Tucked between Downtown LA and Hollywood, the Versailles kitchen serves up classic Cuban dishes from yuca frita and lechon asado to mojo chicken and oxtail stew. With two diverse cooklines consisting of ovens, ranges, fryers, and griddles operating for long hours, Versailles ran a double-island canopy hood at constant speeds throughout each service day. Like many restaurant operations, Versailles was not aware of the substantial "hidden" energy costs of their ventilation system, which was beginning to hurt their bottome line.

Versailles' diverse cookline and high ventilation rates made their kitchen a perfect candidate for the *Commercial Cooking Equipment and Kitchen Ventilation System Baseline & Replacement Characterization Study,* which researched existing kitchen energy use and demonstrated energy savings through strategic equipment replacement. Frontier Energy, Inc., working in conjunction with SoCalGas performed the technical study for the California Energy Commission's (CEC) Natural Gas Research and Developement Program. Frontier Energy researchers performed a "capture-and-containment" evaluation of Versailles' ventilation system and recommended a Demand-Controlled Kitchen Ventilation (DCKV) system upgrade.

Three rooftop exhaust fans controlled by the DCKV system at Versailles.

BEFORE:

- The two cooklines consisted of mixed-duty appliances (mainly ranges and fryers) exhausted by a 16-foot double-island canopy ventilation hood.
- The ventilation system included three single-phase exhaust fans: two with 2 HP motors and one with a 3 HP motor. The system's makeup air was generated by a 5 HP evaporative cooler.
- The constant volume system was estimated to operate at an average 11,200 cfm.
- The Versailles Cuban ventilation system was estimated to consume 101 kWh/day for exhaust & supply fan energy and makeup air conditioning.

Annual Operating Costs[1]

Pre-Makeover Costs	$5,515
Post-Makeover Costs	$2,840

[1] Based on 364-day operation and $0.15/kWh cost. Excludes heating cost savings.

Operating Savings[1]

Annual Energy Savings	$2,675
Rebate Savings[2]	$4,900

[1] Based on 364-day operation and $0.15/kWh cost. Excludes heating cost savings.
[2] Rebate = $700 per exhaust fan motor HP. For more details, visit fishnick.com/saveenergy/rebates.

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Versailles rooftop swamp cooler.

AFTER:

- The single-phase fan motors were upgraded to three-phase motors.
- Variable Frequency Drives (VFDs) were installed on the exhaust and makeup air fans.
- A Demand-Controlled Kitchen Ventilation (DCKV) system with temperature and optic opacity control was installed on the double-island canopy hood.
- After the DCKV upgrade, the average air flow rate was reduced to 8,700 cfm without compromising cooking effluent "capture-and-containment".
- The Versailles Cuban ventilation system is now estimated to consume 52 kWh/day for exhaust & supply fan energy and makeup air conditioning, a 49% energy reduction.

Variable Frequency Drives (VFDs) work most optimally with 3-phase motors. The newly installed DCKV system communicated with the VFDs to modulate both exhaust and supply fan speed.

DCKV control interface showing individual exhaust and makeup air fan speeds.

The DCKV system uses sensors to detect temperature and air opacity levels in the hood and adjust fan speed accordingly. For example, during a lull in service between lunch and dinner at Versailles, the DCKV system could sense lower temperatures/opacity and ramp the system down to operate as low as 30% fan power; whereas, before the upgrade, the standard ventilation system would continue to exhaust at 100% fan power even in a slow cooking condition. The adoption of the DCKV system resulted in Versailles saving $2,675 in annual ventilation energy costs with an additional California utility DCKV rebate of $4,900 ($700 per exhaust fan motor HP). Additionally, the estimated 2,500 cfm reduction in exhaust air flow resulted in a $1,300 annual gas heating makeup air savings.

Restaurant operators usually see ventilation as a necessary fixed cost. By embracing smarter, demand-based technologies, restaurants could realize greater energy and utility savings while maintaining a pleasant working atmosphere for their cooking staff.

DCKV in-hood air opacity sensor.

Exhaust and supply fan power modulation during various cooking conditions throughout a typical service day at Versailles.