



Energy



Transportation



Buildings



Industrial



Agriculture



Sequestration

Optimizing High-Performance Cooking and Ventilation in Commercial Kitchens

Client: California Energy Commission PIER program
2010–2018

Typical commercial kitchen cooklines consist of 10 to 15 appliances and consume on average 18,500 therms per year. Frontier Energy collaborated with California utilities to replace the equipment in five commercial cooklines with high-efficiency cooking equipment. Frontier Energy sub-metered existing cooking equipment and ventilation systems to identify the most energy-intensive appliances: underfired broilers, steamers, ovens and fryers.

We replaced the equipment with new technologies we already tested in our Food Service Technology Center lab. Gas appliances were easy to replace, but other equipment required additional electrical connections or upgraded water filtration. Many pieces of equipment required multiple training sessions with cookline staff.

By replacing appliances with energy efficient models and optimizing ventilation systems, each site saved thousands of dollars in energy and water costs. Beyond the monetary savings, advanced controls allowed cooks to see fryer oil temperatures in real time and set cooking timers. Thermostatic griddles had a consistent temperature control that improved food quality. Energy-efficient ovens resulted in uniform cooking and replacement combi ovens allowed restaurants to expand their menu with additional dishes. Energy-efficient appliances reduced the heat load and demand-control ventilation reduced fan noise, which made the kitchen more comfortable for staff.

This study demonstrated that strategic appliance replacement and ventilation optimization can reduce a cookline’s gas energy use by about 35%.

	EQUIPMENT UPDATE	ENERGY SAVINGS	BENEFITS
OPTIMIZED KITCHEN HOODS	Removed 6' hood	15.5 kWh	Reduced unnecessary energy consumption
	Added DCKV to two 8' hoods	31.4 kWh 1,200 therms	Energy reduction for exhaust and supply fans Space Heating (Improved kitchen comfort)
MAXIMIZED COOKLINE	Replaced convection oven with a combi-oven	51%	Increased flexibility and allowed for menu expansion, self-cleaning
	Replaced 3' griddle with two 2' ENERGY STAR griddles	33% per/sqft	Increase in cooking surface area, dedicated grill for vegetarian customers
	Replaced entry level fryer with an ENERGY STAR fryer	31%	Improved performance, decreased cook-time, faster recovery
	Replaced pots and pans with high-efficiency Turbo Pots	22%	Improved heat transfer to pots and pans
	Replaced 2' broiler with an energy-efficient 2' broiler	33% per/sqft	Increased cooking area, improved performance, innovative technology

FRONTIER ENERGY:

- Identified foodservice facilities to participate in the evaluation and installed data loggers on their existing cookline to create a baseline energy use by appliance at each facility
- Replaced each piece of baseline appliance with a new technology, collected energy data again, and worked with restaurants to understand the effect on food quality or cook time
- Worked with the equipment manufacturers so they could use project findings to promote sales of energy-efficient equipment
- Conducted a cost-benefit analysis to identify equipment that may need rebates to overcome the increased up-front cost to the operator
- Provided detailed data to utilities to support their existing energy-efficiency programs and widen emerging technology programs



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