CASE STUDY

FRONTIER energy

The All-Electric Kitchen of the Future

Corporate Cafeteria, Northern California

As California takes strides toward a decarbonized and electrified future, the commercial foodservice (CFS) industry is often overlooked as a major generator of carbon pollution.

There are many barriers to electrification in CFS. Kitchen operators have long thought of natural gas cooking appliances as the superior performance option over their electric counterparts. This perception is especially true with the open flames in range top burners and underfired broilers. With ovens, griddles, fryers, and combination ovens, where fuel source is not usually a cooking consideration, the lower operating cost of natural gas equipment in many regions is a driving factor in their specification. While designing an all-electric commercial cookline is certainly achievable, it is only possible when preconceptions are overcome and high-production, highly-energy efficient equipment is selected.

Funded by PG&E, this study documents the Frontier Energy Food Service Technology Center's (FSTC) design review recommendations for a major technology company building a new employee dining facility. Serving 3,000 meals per day, the café's initial kitchen equipment schedule was comprised of traditional natural gas cooking equipment. However, during the design phase, management decided to take bold steps to reduce the company's carbon footprint.

For the café project, one-for-one natural gas-to-electric options were easy to specify, but FSTC analysts recognized the opportunity to consolidate multiple traditional electric appliances into a smaller, more efficient and productive all-electric "Kitchen of the Future" (KOF).

The KOF reduces the overall appliance energy footprint, which in turn lowers the total exhaust volume required to ventilate the smaller cookline. The KOF relies heavily on the advanced design and multi-functional capabilities of combination ovens to take on the production tasks of multiple pieces removed from the equipment schedule (like a tilt skillet and rack oven), and fully eliminate the need for traditional steamers, convection ovens, and underfired broilers. Additionally, induction hot top selection makes for a cooler cookline and eliminates any potential for standby energy use when the equipment is not actively being used.

The table below summarizes the total rated input and standby energy rates of the traditional natural gas and electric equipment schedules as well as the FSTC's proposed electric "KOF" schedule. The FSTC's design review demonstrated that operators will need to rethink kitchen operations to be smaller, faster, and more flexible for electrification in CFS to not only be possible, but practical.

	Traditional Natural Gas Kitchen	Traditional Electric Kitchen	Electric "Kitchen of the Future"
Total Connected Load	3,370 Btu/h	508 kW	547 kW
Total Hourly Standby Energy Rate	428 kBtu/h	105 kW	44 kW
Hourly Equipment Standby Operating Cost*	$5.14	$20.00	$8.40
Total Combined Hood Length	66 feet	66 feet	56 feet
Exhaust System Annual Operating Cost*	$15,000	$15,000	$12,000

* Operating cost estimates based on natural gas and electric utility rates of $1.20/therm and $0.19/kWh, respectively, and an estimated $1/exhaust cfm.