CASE STUDY

Replacement Four-Hob Induction Countertop Range.

Induction Cooktop Retrofit:
Validating Savings & Performance
Sonoma, California

Induction cooking technologies continue to proliferate the commercial foodservice market, driven by consumer interest in electrification and government regulations that have curtailed or eliminated natural gas service for newly constructed buildings. Partnering with Frontier Energy's Food Service Technology Center (FSTC), PG&E promotes induction cooking technology through an induction cooktop lending program, live cooking demos, classes, laboratory testing, and energy use modeling for customers considering induction equipment for their kitchens. The next step in promoting induction cooking technology is field replacement projects to validate energy use estimates and further assess real world user experiences.

As part of a Sonoma Clean Power "Lead Locally" project, funded through the California Energy Commission (CEC), Frontier Energy conducted a natural gas-to-electric induction cooktop field replacement retrofit. This work was part of a larger project to evaluate the practical application of advanced technologies that may assist California in meeting its goal of doubling the efficiency of existing buildings by 2030. Frontier Energy identified an upscale, tavern-style restaurant in Sonoma, CA as a candidate for the retrofit and initiated a three-month energy monitoring of their existing six open burner range to establish the baseline natural gas use of the equipment. Once completed, two countertop induction units, one four hob and one two hob, replaced the natural gas range and their energy use was monitored for another three months.

The baseline natural gas range's seven standing pilot lights exemplify one of natural gas cooktop's inherent energy wasting features. While critical to a burner's flame ignition, standing pilots operate constantly regardless of whether cooking or not. Metering data showed the six burner pilots alone contributed 72 kBtu per day to the range's energy use. Additionally, natural gas cooktops require users to manually shut off the burner between cooking tasks, leading to delays in shutoff or even the burner being left on intentionally to expedite the next cooking task. Couple the standing pilots' constant operation, poor energy conscious operational practices, and a low energy-to-food transfer efficiency of 30%, the baseline range's burners had an average measured total energy use **460 kBtu per day**. By comparison, the replacement induction ranges had no standing pilots, no standby energy use, and immediately shut off between cooking events. With tested energy efficiencies of nearly 90%, the induction ranges demonstrated an average energy use of 29 kWh per day, or a normalized **99 kBtu per day**.

Two major concerns were addressed in this retrofit: induction cooking performance and operating cost impacts. The restaurant owners had a positive experience with the induction cooktop and were impressed with the equipment's ability to heat pans quickly. They also liked the cooler working conditions as the induction ranges emitted far less heat than the original gas range. The operating cost economics also proved encouraging as the restaurant did not incur a substantive increase in equipment operating cost, which is atypical when changing from natural gas to electric cooking equipment.

Performance Comparison: Original Natural Gas Range vs. Electric Induction Range Top

	Original Gas Range	Replacement Induction Ranges
Pilot Energy Use	72 kBtu/day	0
Total Energy Use	460 kBtu/day	29 kWh/day
Energy Cost	$9.20	$9.86
Annual Energy Cost	$2,150*	$2,160**
Cooling Requirements	1.2 tons	0.0 tons

*Assumes a PG&E 2024 calendar year projected Natural Gas utility rate of $1.87/therm.
**Assumes a PG&E B-19 TOU average secondary bundled rate of $0.298/kWh.