



Commercial Cooking Equipment and Kitchen Ventilation System Baseline & Replacement Characterization Study – Initial Fact Sheet

Frontier Energy, Inc. is a professional services firm with deep expertise in commercial kitchen energy efficiency and appliance performance testing. They are a dedicated team of engineers, technicians, culinary arts experts, educators, and energy specialists who use their expertise to encourage the commercial foodservice industry to become more sustainable in their purchasing decisions and operations.

Comprehensive Commercial Kitchen Equipment Retrofit Project

Frontier Energy, operator of Pacific Gas & Electric Company's (PG&E) Food Service Technology Center (FSTC) was recently awarded a Building Natural Gas Technology (BNGT) grant for its *Demonstration of High-Efficiency Commercial Cooking Equipment and Kitchen Ventilation System Optimization in Commercial Foodservice* project.

Demonstrate and Characterize Energy Savings Potential

The primary goal of this project is to demonstrate and characterize the energy savings potential, cost effectiveness, and cooking performance of high-efficiency equipment as compared to baseline equipment at five different Commercial Food Service (CFS) sites. The project will also measure the emissions of nitrogen oxides (NO_x) from both baseline and replacement cooking equipment.

Participants

Five CFS sites have been selected, representing various facets of the foodservice industry: Moffitt Café at the University of California-San Francisco (UCSF) Medical Center and DoubleTree Pleasanton by Hilton in PG&E service territory, Gate Gourmet and Versailles Cuban in SoCalGas service territory, and Werewolf Bar & Grill in San Diego Gas & Electric service territory.

Replacing the Standard Cookline

Baseline energy consumption will be established through sub-metering of the existing cookline and CKV system using commercial-grade gas and electric meters.

The standard-efficiency cookline will then be replaced with best-in-class, advanced-technology gas cooking equipment. The CKV system will be re-balanced and optimized utilizing laboratory proven techniques and, if feasible, a demand controlled kitchen ventilation (DCKV) system will be installed after the cookline is replaced.

In addition to replacing the primary cooking equipment, the demonstration will investigate the benefits of overlaying a communication network that will report the cookline "operating status" and track energy consumption of each appliance in real-time to an energy information system (EIS) or display dashboard.

Evaluating User Behavior

Frontier Energy will evaluate the efficacy of the interactive platform on user behavior to determine if additional energy savings can be achieved from this “intelligent” cookline. User interviews will be conducted at three different intervals of the demonstration: during the initial baseline equipment monitoring, after the replacement equipment is installed, and after the EIS system is activated.

Qualitative attributes such as cooking performance, safety, ease-of-use, and thermal comfort will be assessed through these interviews, which will also be used to evaluate the feasibility of adopting energy-efficient equipment.

Innovative High-Efficiency Equipment

Innovative and high-efficiency appliances used in the retrofit will include convection ovens, fryers, broilers, griddles, and finned-bottom stock pots. The kitchen exhaust system, which is directly tied to the facility’s HVAC system, will be optimized using best practices identified in FSTC’s CKV Design Guides.

Why Commercial Foodservice?

Foodservice facilities are the largest energy users in the commercial building sector, consuming as much as five times more energy per square foot than any other type of commercial building type. These facilities can be found in several commercial building types: large office, restaurant, retail, food store, school, college, health, and lodging.

With an estimated 93,300 CFS facilities operating in California, the total gas load of these establishments approaches 40% of the overall commercial gas consumption in the state (Zabrowski, 2010). Across all California’s foodservice establishments, there are roughly 560,000 major commercial gas-fired cooking appliances, accounting for 475 million therms consumed annually (Zabrowski, 2010). Frontier Energy estimates that the market penetration of high-efficiency ENERGY STAR® commercial gas cooking appliances is only 10% of the market in California.

Benefits for California

If the 93,300 CFS sites across California were to adopt high-efficiency equipment, an estimated 98 million therms could be saved (Zabrowski). This equates to annual reductions of \$66 million in operating costs, 573,000 tons of CO₂ emissions (California Air Resource Board), and 451 tons of NO_x emission (NO_x Calculator, 2008). NO_x emissions were calculated at 0.00921 lb of NO_x per therm of natural gas burned using the calculator.

Education

The project team also aims to bridge the knowledge gap by educating the market sector on total cookline energy consumption and potential energy savings.

Data collected from the demonstration sites will be used to support existing utilities’ energy-efficiency programs and widen emerging technology programs. These programs ultimately drive energy savings and emission reduction in California.

Project Team

Frontier Energy will lead a highly technical, primarily California-based team experienced in Energy Efficiency (EE) for the commercial foodservice industry. For 30 years, Frontier Energy has operated the FSTC in San Ramon, CA for PG&E—a program that directly targets Energy Efficiency in this large industry sector. Frontier Energy’s David Zabrowski will be the Project Manager and Denis Livchak will be the Principal Investigator. Frontier Energy will be relying on support from: Gas Technology Institute – Project Management; California Institute for Energy and the Environment – Site Liaison for UCSF; and Fisher Consultants – Technical.

Projected Completion Date: 2017 Year-End

Full Report

For the project’s Scope of Work, visit:

http://www.energy.ca.gov/business_meetings/2014_packs/2014-09-10/Item_09g_PIR-14-008_Fisher-Nickel.pdf

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