

CalPlug California Plug Load Research Center Workshop

CEC Plug-load Project

Wednesday, November 9, 2016



Plug-Load Project Team

- Fishnick
 - David Zabrowski - Project Manager
 - Mark Finck - Principal Investigator.
- Opinion Dynamics
 - Isabelle Gecils – Project Manager site survey
- Fisher Consultants
 - Don Fisher – Technical Support
- Davis Energy Group
 - Third Party Measurement and Verification.



Energy Reduction Potential

- The objectives of this project are to identify the top energy using appliances with the greatest potential to implement a reduced energy mode during periods of minimal activity and to demonstrate the potential to reduce the appliance's overall energy consumption without hindering overall kitchen production.
- This study will assess the energy load and energy reduction potential of unventilated commercial plug load foodservice equipment, characterize equipment usage through field monitoring at five different commercial kitchens in Northern California (PG&E service territory), and demonstrate reduced energy consumption through the use of pre-commercial appliance designs and control technologies, and behavior operation changes.

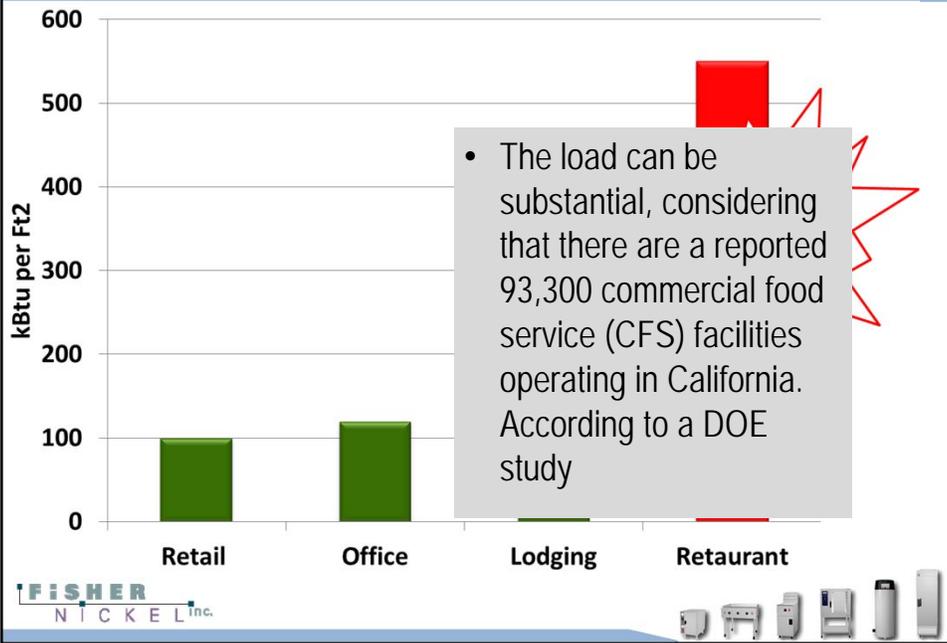


Market Assessment

- The specific goals are to characterize the type and quantity of unventilated commercial electric cooking and warming equipment, to assess the energy savings potential that new technologies and advanced appliance controls can achieve within commercial kitchens, and to demonstrate the potential impact of behavior modification on the adoption and implementation of these technologies.
- The result will be a business case that supports the specification and usage of practical energy-saving measures during non-peak production periods.



Commercial Foodservice Kitchen Equipment Operating at Peak Energy Demand for the Full Day-Part
CEC Plug-Load Project:



Commercial Foodservice Kitchen Equipment Operating at Peak Energy Demand for the Full Day-Part
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Typical Commercial kitchen Prep-line



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Commercial Foodservice Kitchen Equipment Operating at Peak Energy Demand for the Full Day-Part CEC Plug-Load Project:

Table 2. Estimated CCFS Plug Load Energy Consumption and Savings Potential for Select Appliance Categories

Appliance Category	Avg Power During Typical Use (W)	Avg Power During Standby (W)	Est. Production Hours	Est. Standby Hours	Est. Energy Use/day (kWh)	Est. Energy Reduction/day (kWh)	Est. Energy Reduction/year (MWh)
Toaster Vertical	2,600	800	8	6	36	11	2.9
Toaster Conveyor Radiant	1,800	800	4	4	14	4	1.1
Food Warmers Top Heat	1,000	100	11	5	16	5	1.2
Hot Plate/btm Heat Holding	1,000	700	6	6	12	2	0.5
Rice Cooker	1,550	81	5	7	12	10	2.7
Soup Warmer	800	400	8	8	8	3	0.8
Coffee Brewers / Hot Water Dispensers	800	125	6	18	19	12	3.2
Espresso Machines	2,200	200	12	12	53	24	6.3

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Table 3. Estimated CCFS Plug Load Energy Consumption and Savings Potential for Select Appliance Categories

Appliance Category	Est. Inventory in CA	Total Energy Use (GWh)	Total Power Reduction during Standby (MW)	Total Energy Reduction (GWh)	Penetration Rate (%)	Adjusted Power Reduction (MW)	Adjusted Energy Reduction (GWh)
Toaster Vertical	45,000	597.9	81.0	177.4	10%	8.1	17.7
Toaster Conveyor Radiant	38,000	199.7	38.0	55.5	15%	5.7	8.3
Food Warmers Top Heat	46,000	268.6	41.4	75.6	15%	6.2	11.3
Hot Plate/btm Heat Holding	25,000	109.5	7.5	16.4	10%	0.8	1.6
Rice Cooker	11,000	49.8	16.2	41.3	15%	2.4	6.2
Soup Warmer	43,000	125.6	17.2	50.2	15%	2.6	7.5
Coffee Brewers / Hot Water Dispensers	200,000	1,401.6	135.0	887.0	30%	40.5	266.1
Espresso Machines	50,000	963.6	100.0	438.0	10%	10.0	43.8
TOTALS						76.3	362.6

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Commercial Foodservice Kitchen Equipment Operating at Peak Energy Demand for the Full Day-Part CEC Plug-Load Project:

Conveyor Toasters



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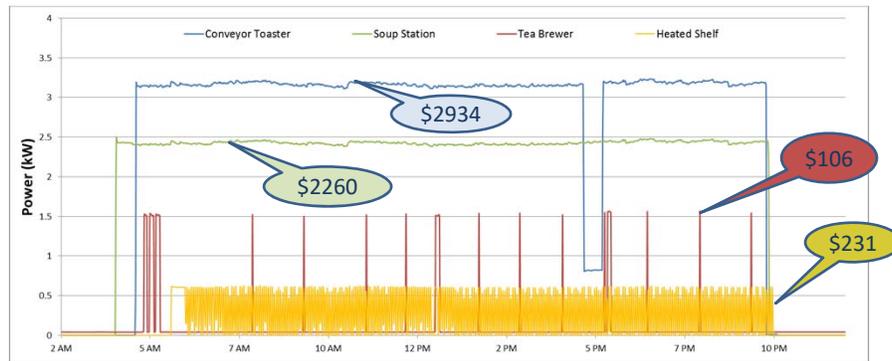
Common 1500 to 2500 watts



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Daily profile of Plug-Load Appliances



Intelligent Toast-Qwik conveyor



The built-in Spot-On technology senses when a product is placed on the conveyor and automatically activates the set toast cycle, and the ColorGuard sensing system monitors and adjusts conveyor speed and temperature to toast food consistently. For energy efficiency, a power saver mode automatically kicks on after a set amount of time



Commercial Foodservice Kitchen Equipment Operating at Peak Energy Demand for the Full Day-Part
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Energy Data Collection



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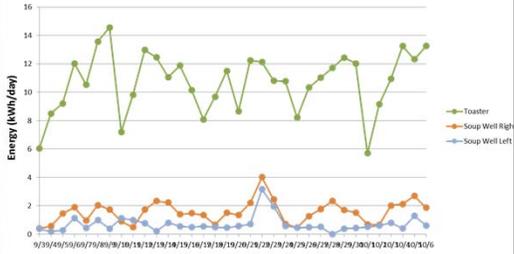
Energy Data collection



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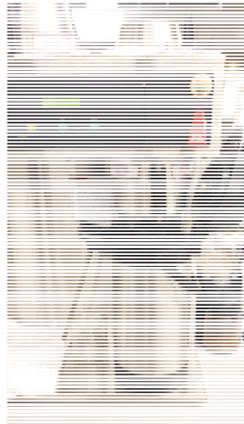
Soup Warmer



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Coffee Machines



- Machines have built-in logic for set back. After 4 Hrs. of done brewing the thermostat heater for water reduce temperature set-point.

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