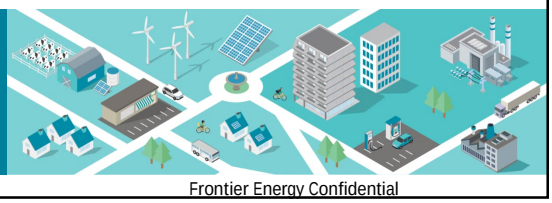
FRONTIER energy

Pioneering possibilities for a resilient tomorrow.

ESC Blue Flame Alliance

History of CFS equipment research and development: Resources to immediately provide better service to your CFS customers

October 20th, 2026



Frontier Energy Confidential

FRONTIER energy

Food Service Tech Center

FrontierFSTC.com



Presentation by:
Richard Young
Director
ryoung@frontierenergy.com

FRONTIER energy

☞ Now should be the Golden Age of High Efficiency Gas Cooking Equipment!

Intro Discussion:

Why do we need
scientific data
for food service equipment?

Restaurants Support Your Economy*

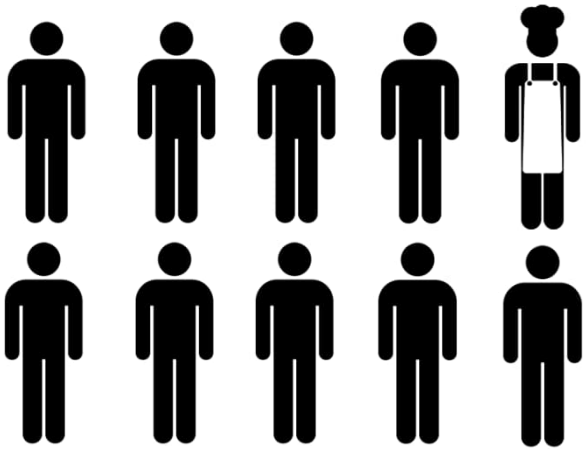
- Number one employer of first-time workers
- Number one generator of sales tax - Fire, Police, and Education
- 60% of restaurants are owned by people of color
- Number one promoter of minority and women into management
- Central to urban renewal and revitalization
- One of the top industries for hiring formerly incarcerated

*California Restaurant Association

Restaurants Support Your Utility

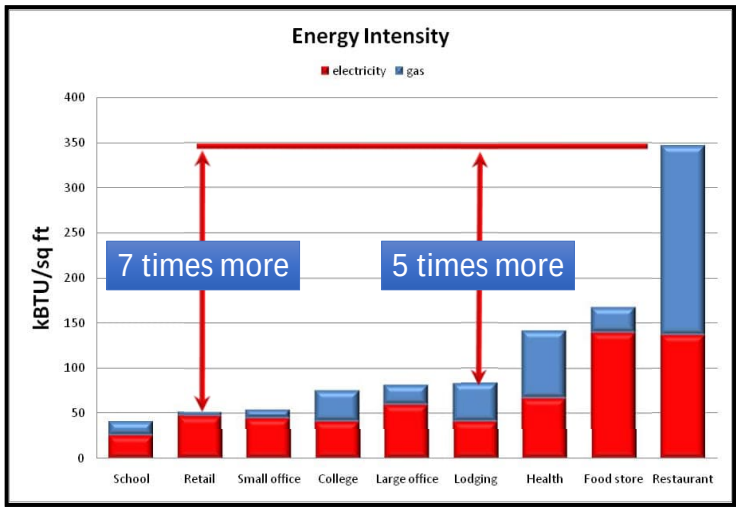
10 to 15% of utility revenue!!

"The foodservice industry is the United States' second-largest private-sector employer. ...10 percent of the U.S. workforce."



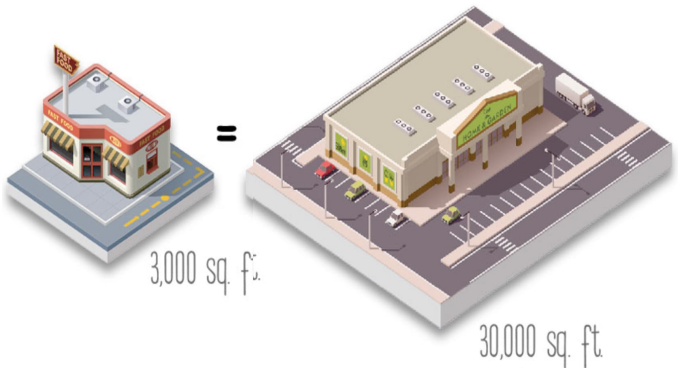
Source: National Restaurant Association

Food Service is Energy Intensive!



Source: www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF

That means that a 3000 sq. ft. restaurant can have the same energy bill as a 30,000 sq. ft. retail store



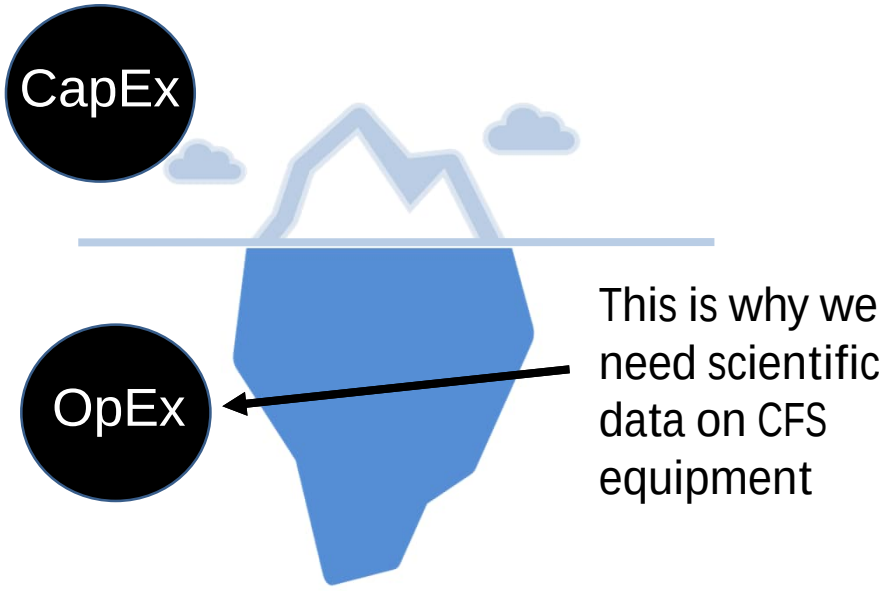
How much energy does the food service industry buy?



Source: Based on 5% of NRA 2026 Industry Revenue*

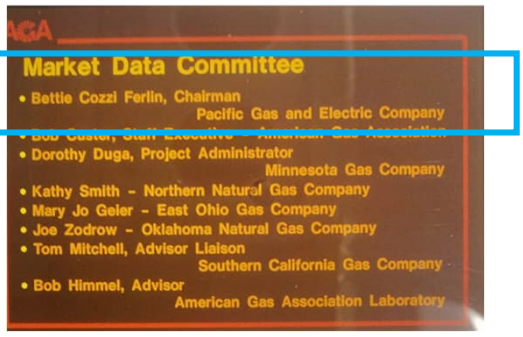
**Source: MAFSI 2022

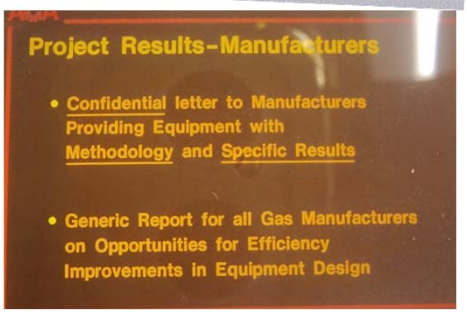
Important Knowledge: OpEx > CapEx

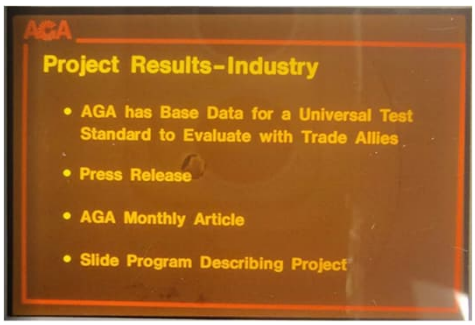


A brief history of appliance testing









Slides Courtesy of Ann Lovcik – CenterPoint Energy







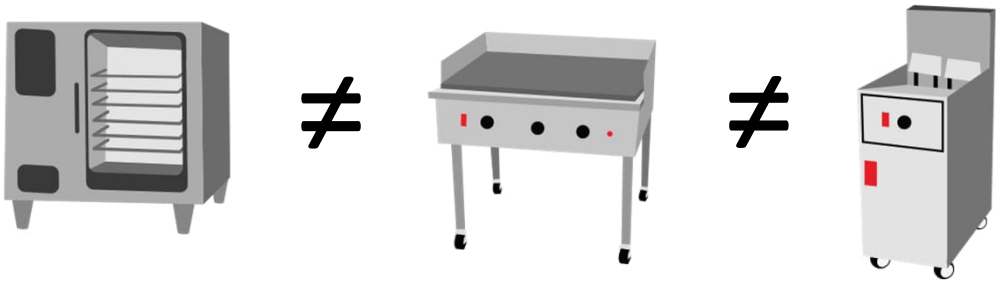
Slides Courtesy of Ann Lovcik – CenterPoint Energy



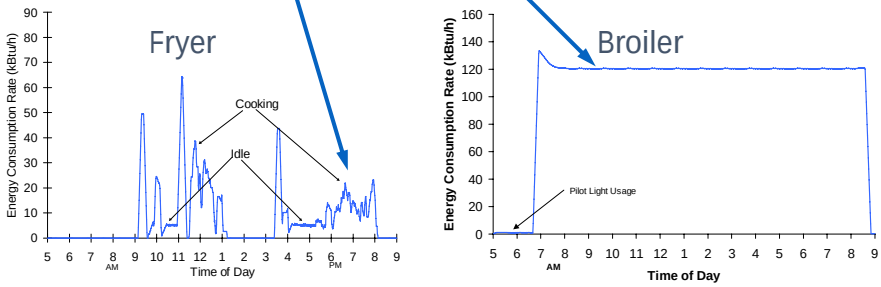
In 1986 PG&E's Bettie Davis started the Production Test Kitchen project that evolved into the Food Service Tech Center

PG&E OPENS PRODUCTION-TEST KITCHEN

Lesson Learned: There was a huge difference in the energy use of different equipment categories







Industry Call to Action: Create Standard Test Methods for Equipment Categories



The Food Service Tech Center Lab and Standard Test Methods (STM)





STMs generate “MPG” numbers for food service equipment

Before Standard Test Methods:

Marketing drove equipment design and operators were ill-informed

After Standard Test Methods:

Engineering drives equipment design and operators make informed decisions

What we learned?

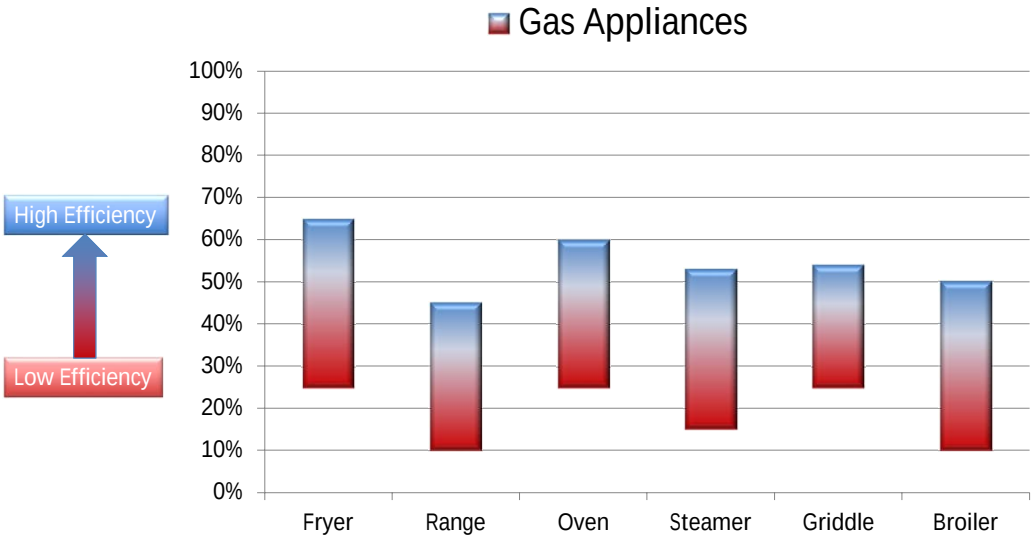
Appliances are NOT created equal!

High Efficiency



Low Efficiency

Big Range in Efficiency!



40 Years Later…
The Frontier Energy Qualifying Products List (QPL) is the foundation for all CFS programs

Qualified Combination Ovens

Updated 9/15/2026

Qualifying gas combination oven/steamer models must have a tested steam mode cooking-energy efficiency of ≥ 41% and convection mode cooking energy efficiency of ≥ 57% utilizing ASTM F2861, and meet the idle rate requirements in Table 1. Qualifying electric combination oven/steamer models must have a tested steam mode cooking energy efficiency of ≥ 55% and convection mode cooking energy efficiency of ≥ 78% utilizing ASTM F2861, and meet the idle rate requirements in Table 1.

NOTE: Program criteria are subject to change.

CALIFORNIA FOODSERVICE instant rebates.

					Convection Mode				Steam Mode					
Company	Model Number	Size (Steam Pans)	Fuel Type	Preheat Energy (Btu or kWh)	Idle Rate (Btu/h or kW)	Energy Efficiency (%)	Production Capacity (lbs/h)	Cooking Water Use (gph)	Idle Rate (Btu/h or kW)	Energy Efficiency (%)	Production Capacity (lbs/h)	Cooking Water Use (gph)	Rebate (per cavity)	Measure Code
Alto-Shaam	10-10G PRO	11	Gas	10,476	4,818	60%	130	0	6,266	43%	182	3.0	$700	530538
Alto-Shaam	10-20G PRO	22	Gas	11,640	6,355	64%	239	1	9,059	51%	312	5.4	$1,000	540250
Alto-Shaam	20-10G PRO	20	Gas	18,278	6,552	64%	241	0.4	8,460	55%	323	13.2	$1,000	540250
Alto-Shaam	20-20G PRO	40	Gas	23,377	9,397	63%	445	0.8	9,215	57%	542	4.8	$1,200	540249
Alto-Shaam	6-10G PRO	7	Gas	6,933	4,725	58%	64	1.2	4,898	41%	113	6.1	$700	530538
Alto-Shaam	CTP10-10G	11	Gas	10,476	4,818	60%	130	0	6,266	43%	182	3.0	$700	530538
Alto-Shaam	CTP10-20G	22	Gas	11,640	6,355	64%	239	1	9,059	51%	312	5.4	$1,000	540250
Alto-Shaam	CTP20-10G	20	Gas	18,278	6,552	64%	241	0.4	8,460	55%	323	13.2	$1,000	540250
Alto-Shaam	CTP20-20G	40	Gas	23,377	9,397	63%	445	0.8	9,215	57%	542	4.8	$1,200	540249
Alto-Shaam	CTP6-10G	7	Gas	6,933	4,725	58%	64	1.2	4,898	41%	113	6.1	$700	530538
Angelo Po	FX12/G3**	24	Gas	9,304	7,693	63%	216	1.8	8,696	55%	223	2.6	$1,000	540250
Angelo Po	FX82/G3**	16	Gas	7,387	6,550	60%	145	2	7,334	54%	191	3.7	$1,000	540250
Blodgett	INVOQ 61BG	7	Gas	4,549	3,053	62%	69	0.1	3,831	48%	106	2.3	$700	530538
Blodgett	INVOQ 61BLG	7	Gas	4,761	3,151	59%	63	0.1	2,497	52%	104	9.3	$700	530538
Blodgett	INVOQ 62BG	14	Gas	6,090	3,414	62%	104	0.4	3,811	54%	167	3.4	$700	530538
Blodgett	INVOQ 62BLG	14	Gas	5,895	3,924	62%	124	0.2	2,872	54%	153	10.4	$700	530538
Convotherm	C4e* 10.20GB-N	22	Gas	12,110	6,874	57%	195	0.1	10,717	50%	257	25.6	$1,000	540250
Convotherm	C4e* 10.20GS-N	22	Gas	8,377	6,444	57%	199	0.2	6,899	56%	236	0.1	$1,000	540250
Convotherm	C4e* 6.20GB	14	Gas	5,187	5,438	62%	132	0	7,439	51%	167	4.3	$700	530538
Convotherm	C4e* 6.20GS	14	Gas	4,977	5,101	62%	141	0	5,003	58%	204	2.5	$700	530538
Electrolux	219680	6	Gas	2,830	3,173	58%	66	0	6,819	50%	122	3.4	$700	530538
Electrolux	219681	12	Gas	4,668	4,062	62%	121	0	3,552	53%	173	3.0	$700	530538
Electrolux	219683	20	Gas	7,929	4,491	59%	195	0	7,390	53%	254	2.1	$1,000	540250
Electrolux	COG61C30	6	Gas	2,830	3,173	58%	66	0	6,819	50%	122	3.4	$700	530538
Electrolux	ECOG102K3O0	20	Gas	7,929	4,491	59%	195	0	7,390	53%	254	2.1	$1,000	540250
Electrolux	ECOG61K3O0	6	Gas	2,830	3,173	58%	66	0	6,819	50%	122	3.4	$700	530538
Electrolux	ECOG62K3O0	12	Gas	4,668	4,062	62%	121	0	3,552	53%	173	3.0	$700	530538
Giorik	SETG062W	12	Gas	5,499	4,550	57%	123	0	4,000	45%	186	10.6	$700	530538
Giorik	SETG102W	20	Gas	10,670	6,706	64%	168	-	5,324	45%	170	-	$1,000	540250
Henny Penny	FPG115	10	Gas	4,960	3,755	61%	104	0	8,081	53%	168	9.2	$700	530538
Henny Penny	GSC115	10	Gas	5,234	5,531	57%	90	0	8,467	46%	140	6.1	$700	530538
Lainox	NAGB101	10	Gas	5,440	5,387	58%	95	0	6,748	44%	158	8.3	$700	530538
Lainox	NAGV01	7	Gas	3,750	4,650	57%	64	2.3	4,861	50%	93	1.0	$700	530538
Lainox	NAGV101	10	Gas	5,440	5,387	59%	95	0	6,421	46%	107	6.0	$700	530538
RATIONAL	ICC 10-FULL NG (LM200EG)	20	Gas	6,524	6,859	57%	207	0	6,764	53%	402	9.6	$1,000	540250



CAEnergyWise.com

FRONTIER energy

Exercise: Testing a Conveyor Oven

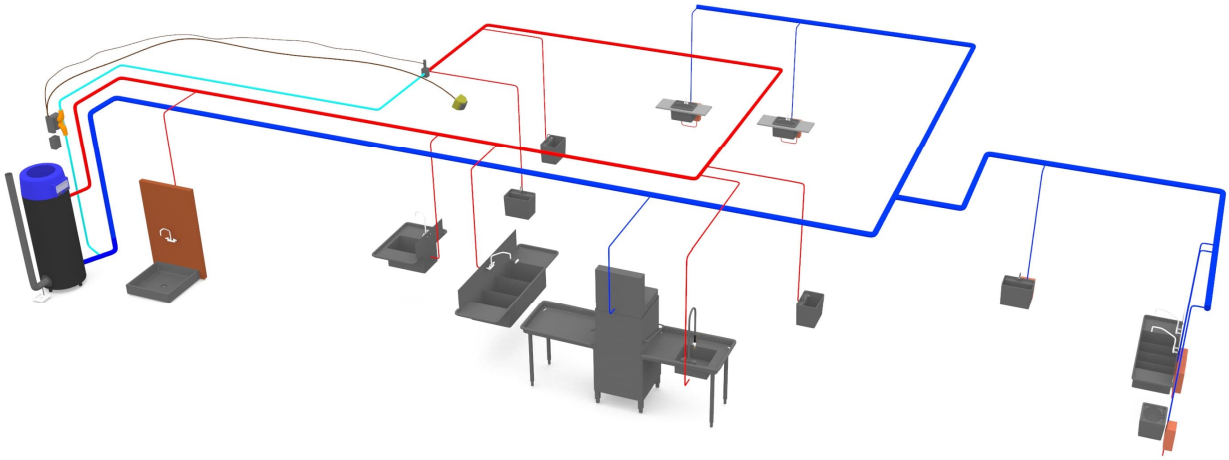
- What food product?
- How to define doneness?
- How much food?
- How to tell when it's done?
- What are the variables?
- How to use that food to test the oven for max efficiency?
- What needs to be measured and recorded?
- How many tests are required for accuracy?



Commercial Kitchen Ventilation (CKV) Testing



Dishmachine and Hot Water System Testing



Using These Resources

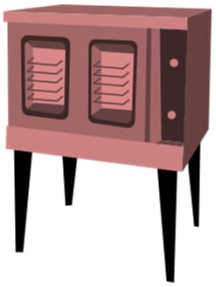
Three Challenges that Commercial Food Service Operators Face:

1. Decarbonization
2. Energy Bills, Real Estate, and Labor Costs
3. Kitchen Comfort and IAQ
4. Water conservation & sanitation performance

Challenge	Solution
Decarbonization	High Efficiency Gas Equipment
Operating Costs (Bills + Labor)	High Tech, High Efficiency Gas Equipment
Kitchen Comfort and IAQ	High Tech, High Efficiency Gas Equipment + Optimized Kitchen Ventilation

FRONTIER energy

Solving Decarbonization with High Efficiency Cooking Equipment

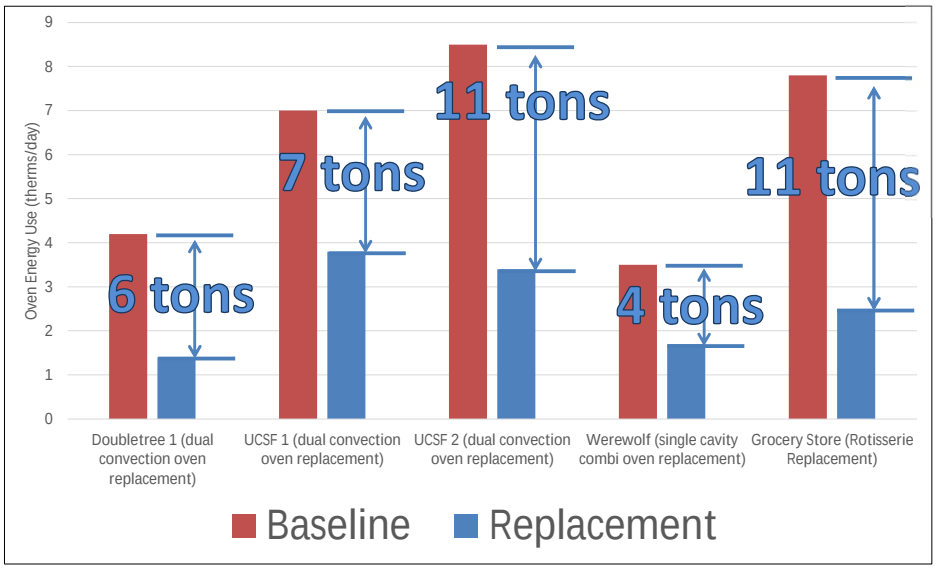


Baseline Efficiency – What most operators purchase



High Efficiency – Cooks more food with less energy

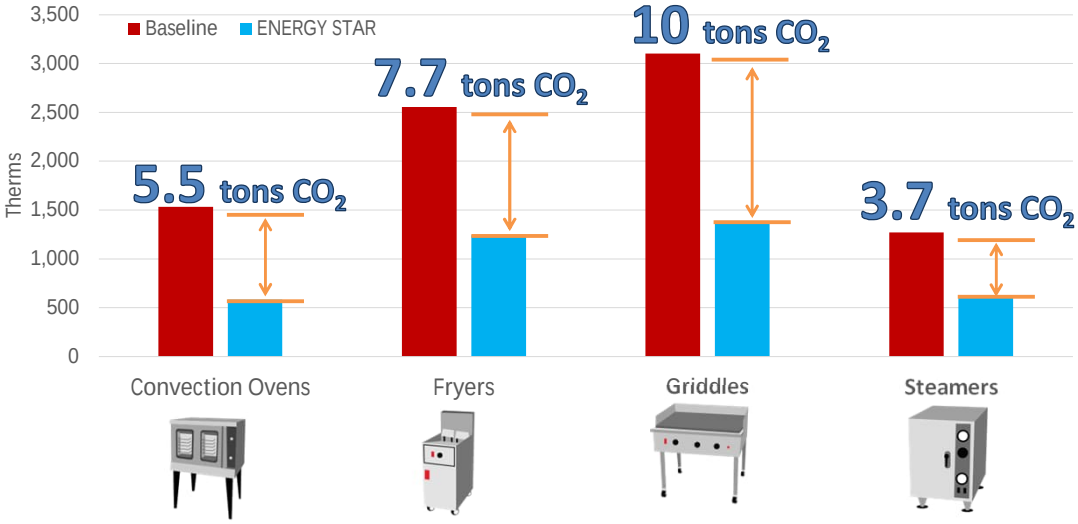
Annual CO_2 Reduction by Upgrading to an Efficient Gas Oven





Copyright 2019: Frontier Energy. All Rights Reserved

Annual CO_2 Reduction by Upgrading to Efficient Gas



*Based on an average of 30 days monitoring

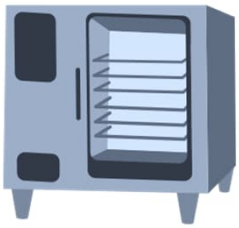
High-efficiency gas cooking equipment can cut source and site carbon in half.

Gas equipment is a cost-effective strategy for immediate and guaranteed decarbonization.

Solving Energy, Real Estate, and Labor Costs with High Tech, High Efficiency Cooking Equipment

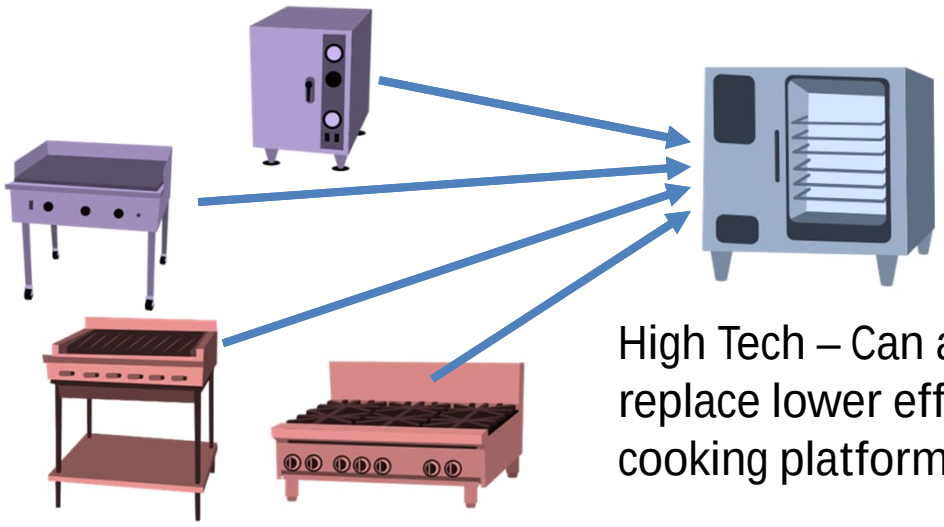


High Efficiency – Cooks more food with less energy



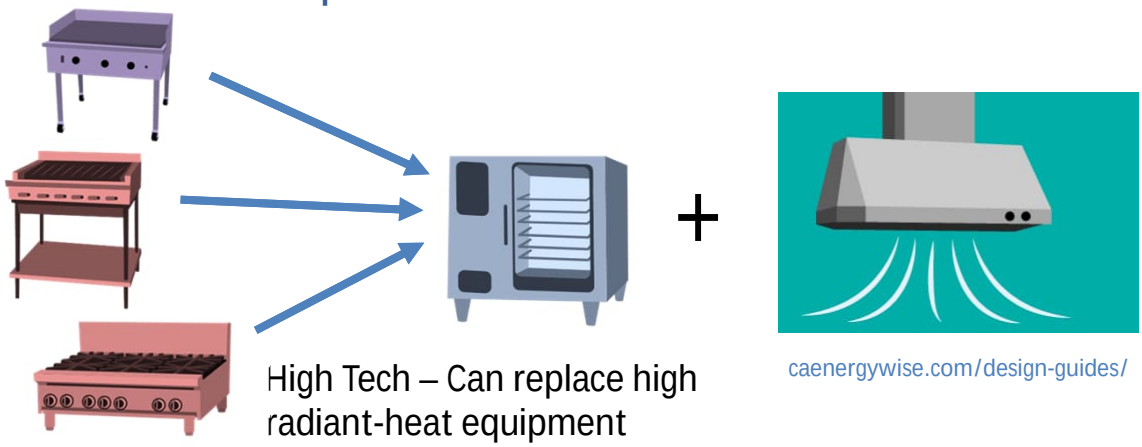
High Tech – Includes advanced controls and technologies that increase quality and reduce labor

Solving Energy, Real Estate, and Labor Costs with High Tech, High Efficiency Cooking Equipment



High Tech – Can also replace lower efficiency cooking platforms

Solving Kitchen Comfort and IAQ with High Tech, High Efficiency Cooking Equipment + Optimized Kitchen Ventilation

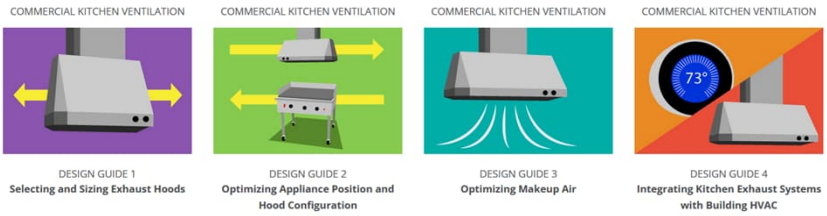


High Tech – Can replace high radiant-heat equipment

caenergywise.com/design-guides/

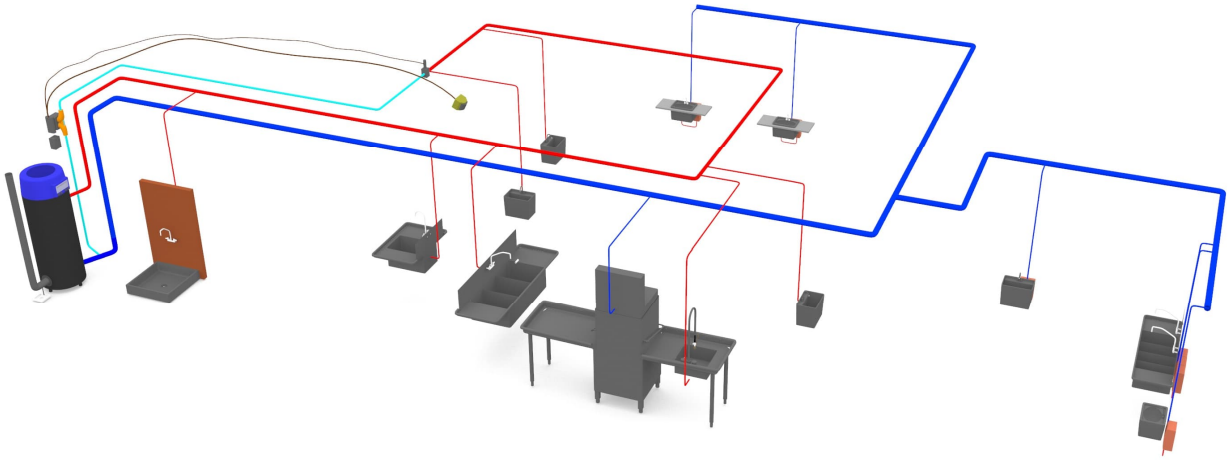
CaEnergyWise.com/design-guides

Four Design Guides cover Kitchen Ventilation
These are very useful for plan checkers



There are also classes that explain how to use these Guides

Solving Water Conservation and Sanitation Performance



CaEnergyWise.com/design-guides

Three of the Guides cover Dishrooms, Dishmachines, and Water Heating

COMMERCIAL KITCHEN VENTILATION



DESIGN GUIDE
Sizing Dishroom Ventilation

HOT WATER SYSTEMS



OPERATOR'S GUIDE
Operating Guidelines for Advanced Water Heating within the Foodservice Industry

HOT WATER SYSTEMS



DESIGN GUIDE
Technical Design Guide for Advanced Water Heating within the Foodservice Industry

Energy costs, labor, real estate, comfort, IAQ, decarbonization, water, sanitation?

☞ High-efficiency, high-tech, hybrid-fuel kitchens are the most effective way to meet these CFS industry challenges!

Utilities Can and Should Participate!

1. Support equipment research and test method development
2. Promote efficient equipment with customer incentives
3. Participate in the ESC Blue Flame Alliance
4. Develop localized Food Service Centers

BLUE FLAME ALLIANCE EST. 1999

ENERGY SOLUTIONS CENTER

The Frontier Energy Food Service Tech Center has 40 years of experience researching energy and performance, solving real-world problems, and creating CFS resources.

Please take advantage of that experience!

FRONTIER energy

Food Service Tech Center

FRONTIER energy

Pioneering possibilities for a resilient tomorrow.

ESC | Blue Flame Alliance

Thank you!

Richard Young
Director
RYoung@frontierenergy.com

FRONTIER energy