California Statewide Gas Emerging Technologies

Research and Analyze Commercial Foodservice Technologies

March 29, 2024

3/29/2024

Agenda

- Project Goals

- Project Findings

- Project Recommendations

- Task Overviews and Tasks

- Customer Interviews

- Advantages/Disadvantages

- Conclusions and Future Recommendations

Project Goals – ETO3

ET22SWG0003: Research and Analyze Commercial Foodservice Technologies

Project Goal: Gather EE program participation and market data on energy efficient commercial foodservice technologies to provide an understanding of programmatic uptake and related drivers and barriers for these technologies.

Technologies: Analyzed all CFS related EE measures with measure packages. Selected the following (4) high-priority technologies for deeper study:

1) Griddles
2) Underfired Broilers
3) Automatic Conveyor Broilers
4) Steam Tables

ETO3 – Project Findings

- Potential Griddle Tier I/Tier II measure package
  - Lack of cost data for Underfired Broiler Tier I/Tier II measure package
- Identified several non-EE benefits as market drivers
- Complex controls found as market barriers
- Underfired Broiler/Griddles alternatives to Conveyor Broilers
- Large variation in existing steam table market
- Steam Table operating hours similar to prior reports

ETO3 – Project Recommendations

- Tier I/Tier II measure package revision for Griddles
- Quantify/understand non-EE benefits via field studies
- Compare energy use & cost of cooking foods
- Separate steam table market assessment

Task Overviews and Tasks

Task Overview

ETSWG22OOO3 – Research and Analyze Commercial Foodservice Technologies

1) Project Initiation Meeting

2) Market Barrier Literature Review

3) Select High Priority EE CFS Measures

4) Develop Measure Offer Recommendations for Energy Efficient Steam Tables

5) Determine Market Potential of Selected EE CFS Measures

6) Interview Subject Matter Experts

7) Interview Customers that Installed High–Priority EE CFS Equipment

Background/Motivation

- Highest natural gas use intensity

- 3rd highest Incremental Achievable Potential

- Incremental Achievable Potential lower than Technical Potential

- Effects of COVID19 pandemic
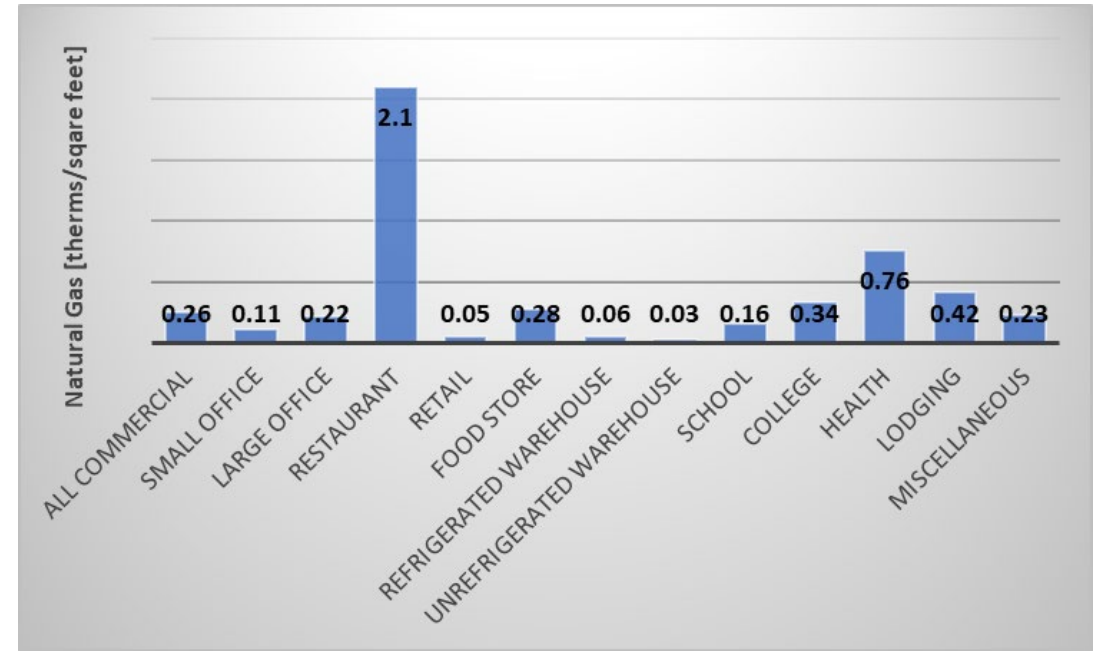
Task 2: Market Barrier Literature Overview – Market Studies

- CFS equipment market study from PG&E in 2012 (shown to right)

- ENERGY STAR publication (2013):
  - Common market barriers
  - "Market Actor Overview"

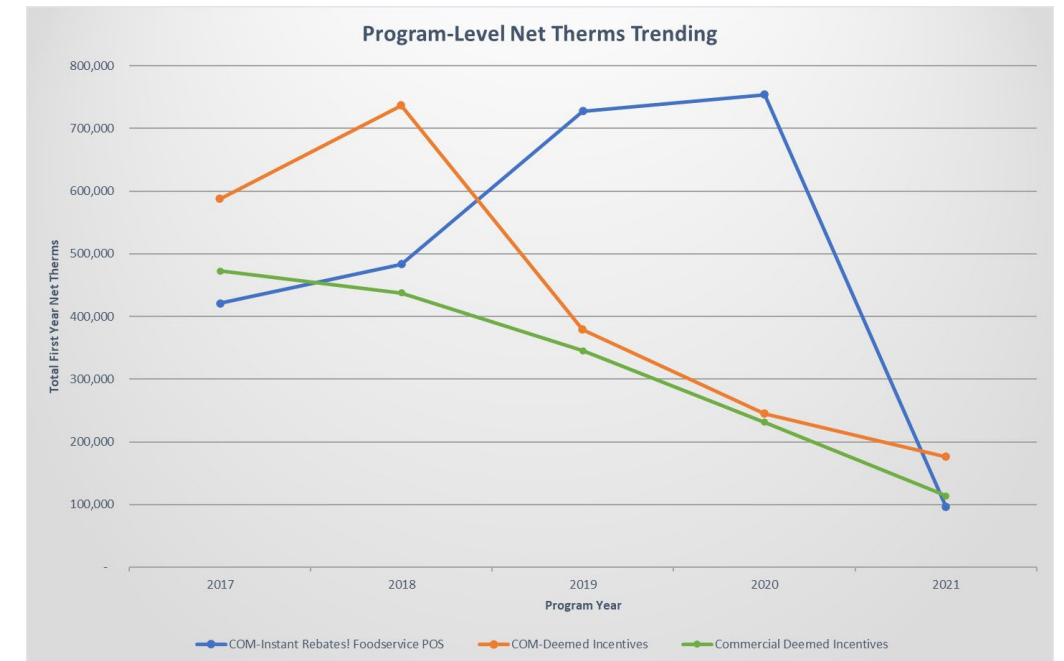- Distribution of various restaurants in Los Angeles County
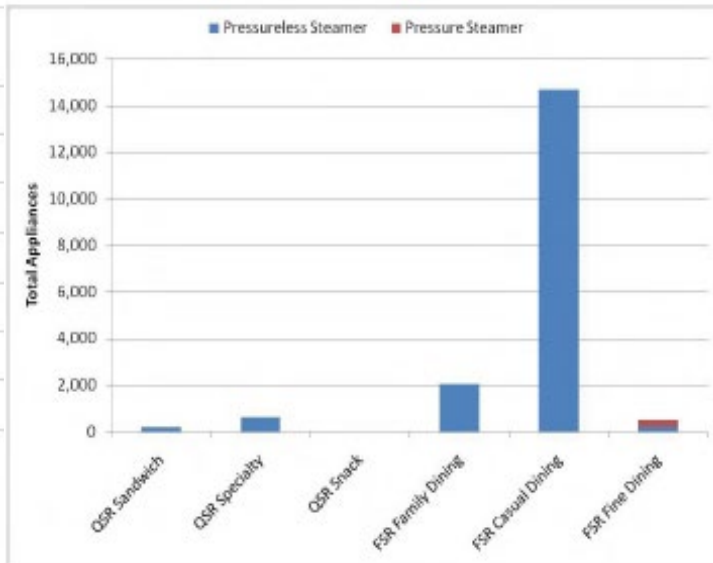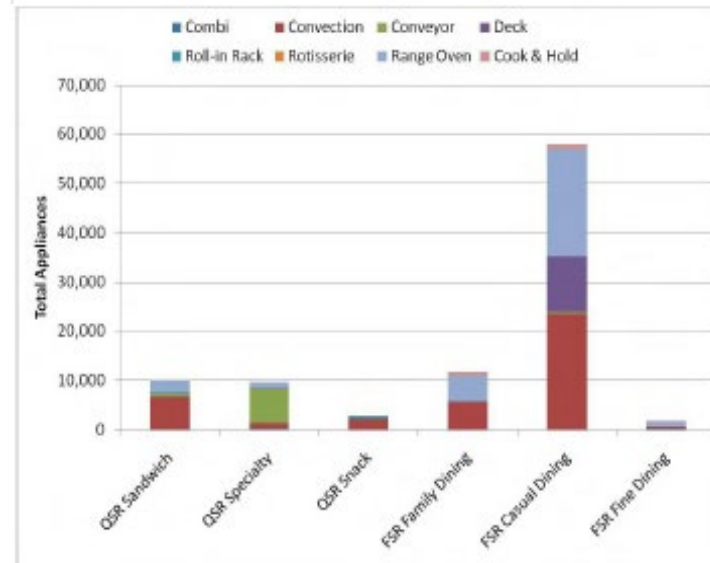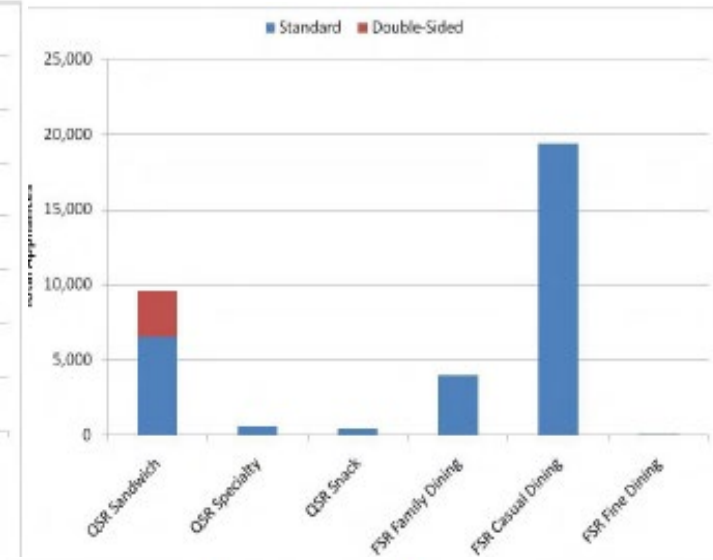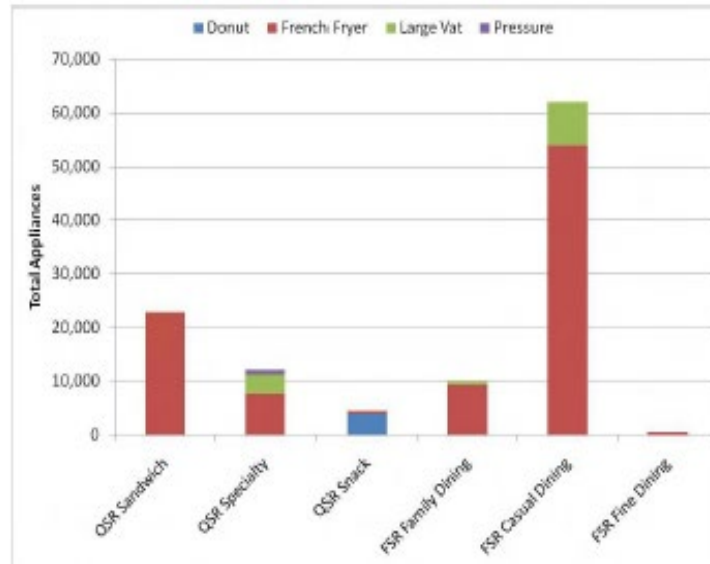
Task 2: Market Barrier Literature Overview – Tech Studies

- Shortlisted technologies based on available info:

    1. **Griddles** – PG&E Study 2012

    2. **Convection Ovens** – CEE Program Guide 2015

    3. **Steam Cooker** – CEC Study 2021 & CEE Program Guide 2010

    4. **Steam Table** – SCG and SDG&E Study 2020

    5. **Rack Ovens** – CEE Program Guide 2015

Task 3: High Priority Measures – Existing Measures

- Historical Participation Data

  - Program level vs Measure level analysis
    - Convection Oven, Commercial
    - Combination Oven, Commercial
    - Griddle, Commercial
    - Steamer, Commercial
    - Conveyor Oven, Gas, Commercial
    - Automatic Conveyor Broiler, Commercial
    - Underfired Broiler, Commercial

- SoCal Gas Interviews

  - Feedback on selected measures (above)

- Measure Cost Comparison

  - Gross measure cost estimate of first cost

Foodservice programs with highest net therms savings 2017–2021

Program-Level Net Therms Trending

Legend: COM-Instant Rebates! Foodservice POS, COM-Deemed Incentives, Commercial Deemed Incentives

High Priority Measures

- Task 3 and 4 were combined in the report.

- "High Priority CFS Measures":
    1. Commercial Griddle
    2. Underfired Broiler
    3. Automatic Conveyor Broiler
    4. Steam Tables

Table 6: Summary of Existing High Priority Measures

Measure	Measure Package#	TRC	TSB	Net Therms Savings (2017–2021)	Gross Measure Cost
Commercial Griddle	SWFS004	1.59	$19,022	108,945	$1,660/Length-Ft
Underfired Broiler	SWFS019	2.30	$20,293	5,307	$1,876//Length-Ft
Automatic Conveyor Broiler	SWFS017	7.80	$523,754	119,802	$10,404 – $15,210/Each

Task 4: Steam Table Recommendations

- CPUC recommendations:
  1. Determine Key Operating Parameters
  2. Determine Market Share Statistics
  3. Conduct Additional Field Monitoring
  4. Develop Testing Protocols & Conduct Lab Tests
  5. Establish ISP & Qualifying Models
  6. Revise Savings Calcs & Submit Measure Package

Task 5: Market Potential

Technology	Market Size (Number of Units)	Market Potential Ranges [Therms/year]	Low Market Penetration Value
Griddle	47,800	81,989 to 3,650,799	0.2246%
Underfired Broiler	17,914	2,616 to 956,841	0.0273%
Conveyer Broiler	1,747	78,500 to 681,089	1.1526%
Steam Table	13,335	245,484 to 490,969	5%

Task 6: Subject Matter Expert Interviews

- Experts recruited from:
  - CA Foodservice Instant Rebates Program equipment contact list
  - Statewide Midstream Foodservice Program utility reps
  - Previous professional relationships
- (10) Interviews conducted across multiple categories:
  - (4) Manufacturers
  - (3) Technical Experts
  - (2) Utility Representative
  - (1) Technology Distributor
- (34) Questions: (17) Drivers/(17) Barriers

Task 6: Subject Matter Expert Interviews – Overall Results

Key Findings:

- ## Barriers
  - High initial costs
  - Supply Chain issues
  - Lack of awareness

- ## Drivers
  - Improved performance
  - Labor Savings
  - Consolidating kitchen operations

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Manufacturers/Distributors:

- ### Barriers
  - High initial costs
  - Supply Chain issues
  - Lack of awareness

- ### Drivers
  - Improved performance
  - Consolidating kitchen operations
  - Dry-well vs wet-well steam tables

Technical Experts/Utility Representatives:

- **Barriers**
  - High initial costs
  - Added maintenance
  - Lack of awareness

- **Drivers**
  - Labor Savings
  - Improved performance
  - Easy installations

Customer Interviews

Task 7&8: Customer Interviews

- Customer feedback collected from SoCalGas customers
- Interviews conducted with:
    - Large Chains restaurants
    - Independent Operators
- (30) total interviews:
    - (24) high-priority measures
    - (6) steam tables

Advantages and Disadvantages

Advantages/Disadvantages – Conveyor Broiler

Advantages:

- Benefits of automation

- Increased food production output

- Saving on energy utility bills

- Very few issues with operation

- Less heat radiation into kitchen

Disadvantages:

- Added maintenance

- Improper operation

- Long-lead time for replacement parts

Advantages/Disadvantages – Griddles

Advantages:

- Faster cooking times

- Uniform temperature distribution

- Smaller, more efficient designs

- Ergonomic for operators

- Increased reliability

Disadvantages:

- Smaller griddle size may decrease food production output

Advantages/Disadvantages – Underfired Broiler

Advantages:

- High quality performance

- Less radiated heat into kitchen

- Ease-of-use for uniform cooking

Disadvantages:

▪ Slow cooking/starting operations

▪ Improper operation

▪ High upfront costs

Steam Table Findings

- (3) kitchen steam tables / (3) dining room (buffet) steam tables

- Off-the-Shelf vs Custom manufacturing

- Electric vs Gas steam tables

- Wet-well vs dry-well steam table configurations

https://www.fermag.com/articles/9375-equipment-comparison-dry-hot-wells/

CalNEXT

CalNEXT's vision is to identify emerging electric technologies across six priority areas and bring them to the IOU energy efficiency programs portfolio.

To learn more and sign up for our email list, please visit **calnext.com**
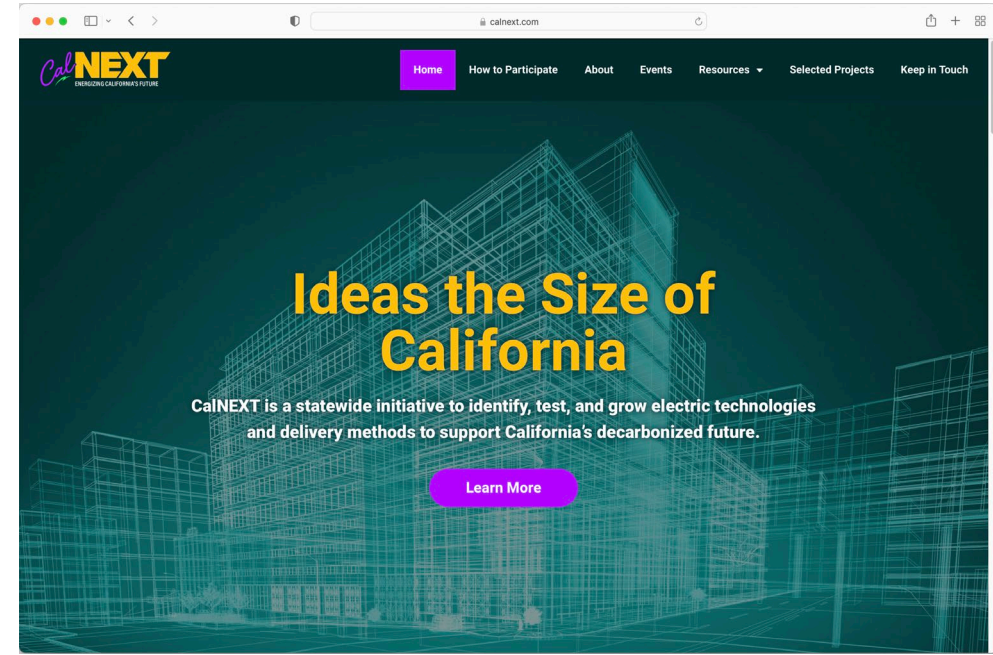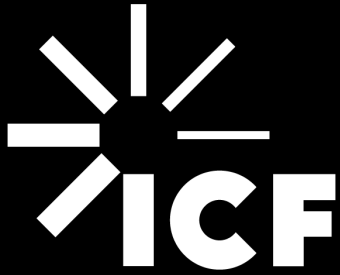

Appliances & Plug Loads

HVAC

Lighting
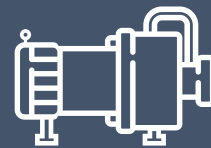
Process Loads

Water Heating

Whole Buildings

Energizing California's Future

ICF

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