



CNP Upstream Commercial Food Service Pilot Program: Task 1 Final Report

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Executive Summary

Commonwealth Edison, Nicor Gas, and Peoples Gas & Light/North Shore Gas (referred to as “CNP” or “Utilities” hereafter, depending on context) have contracted with the Gas Technology Institute (GTI) to develop an upstream commercial food service (CFS) energy efficiency incentive program.

The Utilities each have downstream CFS incentive and rebate programs. There are over 25,000 food service facilities in the aggregate service areas, but adoption of the program measures by food service operators has been low. The Utilities are interested in a program upgrade to include an Upstream Food Service Incentive Program (UFSIP) component that will increase incentive adoption and provide deep and lasting energy efficiency improvements to support the Utilities’ energy efficiency goals.

The Utilities are seeking to initiate a comprehensive upstream pilot program across their service areas to increase the use of high efficiency electric and gas food service equipment. “Upstream” in the context of this proposal means incentives paid to entities other than end-use customers, which includes CFS equipment dealers and distributors, considered “midstream” actors by the industry. The major elements of the upstream program will include a point-of-sale rebate at the dealer level, as well as an incentive for industry sales influencers, such as food service design consultants, independent manufacturer’s representatives, and repair service firms.

The first task of the project is assessing the existing CFS market in Illinois, providing an estimate of the energy consumption on a sector-wide and on an appliance-by-appliance basis, and identifying the overall CFS energy efficiency potential within the combined utility service areas. This will include evaluating the existing catalog of CFS energy efficiency measures by: (a) analyzing the viability of the incentive amounts to drive sales of energy-efficient food service equipment, (b) adding additional appliances that have high efficiency potential but are not currently included in the ENERGY STAR® program, and (c) aligning the incentives across the Utilities to provide greater consistency.

The work was divided into five subtasks:

- 1A: provide an estimated inventory of commercial and non-commercial food service facilities in the combined service areas of the Utilities;
- 1B: provide an estimated inventory of major natural gas and electric commercial cooking and reach-in refrigeration appliances in the CNP service area;
- 1C: summarize the potential energy savings that can be achieved by replacing standard-efficiency appliances with high-efficiency appliances in the CNP service areas;
- 1D: analyze the downstream food service rebate programs and recommend changes to be adopted in the UFSIP; and
- 1E: assess the market structure within the CNP service areas and provide rebate levels for use in the Pilot Program.

The NAICS data for Code 722, Food Services and Drinking Places, was the primary source for data on the CFS sector. CNP non-commercial customer counts by zip code were used to define the service area boundaries and filter the NAICS data to estimate the number and type of commercial facilities by zip code. This information was supplemented by information published by the National Restaurant Association (NRA), The North American Food Equipment Manufacturers (NAFEM), The Food Service Technology Center (FSTC), and US Census data. The number of non-commercial (institutional) facilities was estimated using data from state of Illinois online databases and other online sources. The number of commercial and institutional facilities the combined CNP territory are estimated to be 25,750, consisting of 19,265 commercial sites and 6,485 institutional sites.

In 2010, FNI completed a pair of California Energy Commission (CEC) Public Interest Energy Research (PIER) Studies focused on estimating the energy load and energy efficiency potential associated with inventory commercial cooking and hot heating equipment in California. The studies formulated population demographics using census data to establish different categories of commercial and non-commercial (institutional) food service facilities, then applied typical equipment lineups to each category of facility to estimate an overall equipment population. The resulting estimates were adjusted using information provided by the North American Food Equipment Manufacturers (NAFEM) to fine-tune the overall estimates and to determine the relative populations of gas and electric equipment. The same methodology was applied to CNP services areas to estimate the number of appliances, by category and fuel source, that are installed in food service facilities.

The total population of commercial cooking appliances are estimated to be 264,800; 159,700 gas-fired appliances and 105,100 electric appliances. Refrigeration appliances (reach-in refrigerators, freezers and ice makers) are estimated to total 216,000 units. Commercial dishwashers account for 16,249 units. There are also an estimated 52,000 Commercial Kitchen Ventilation (CKV) exhaust systems.

The potential energy savings was determined by estimating the existing populations of standard-efficiency appliances that can be replaced with high-efficiency alternatives. Many appliance categories do not currently have high efficiency alternatives. The overall savings potential was estimated based on available high-efficiency appliance alternatives for the existing equipment in the electric and gas accounts that CNP has among the estimated 25,750 commercial and non-commercial food service facilities within its service areas. Table ES-1 presents a summary of electric and gas potential annual savings assuming that all standard efficiency equipment is replaced with high efficiency equipment.

Table ES-1 Summary of Key Food Service Energy Savings Potential

Category	Number of Rebate Eligible Appliances or Systems	Potential Electric Savings, kWh/yr	Potential Gas Savings, Therms/yr
Cooking Appliances, Electric	45,748	193,498,037	
Cooking Appliances, Gas	96,676		21,562,162
Reach-in Refrigeration	76,972	76,085,112	
Ice Machines	27,169	62,108,334	
Handwrap Machines	4,200	6,489,000	
Dishwashers	9,837	33,182,613	4,062,183
Pre-Rinse Spray Valves	27,775	7,852,993	1,299,911
Commercial Kitchen Ventilation	10,804	126,603,999	31,533,729
Total Appliances & Potential Savings	299,181	505,820,088	58,457,985

The CNP downstream incentive levels were tabulated and compared to the California Investor-Owned Utility (CAIOU) incentives for CFS equipment. The comparison shows that the CNP incentive values for gas and electric cooking equipment are generally lower than those set by the CAIOUs. In general, California’s incentive amounts were selected based on value of the first-year-energy cost savings for a given appliance. But even at that level, the financial incentive often falls short of attracting the purchase of rebated appliances by restaurant operators. The GTI team’s experience with the CFS incentive programs in California and other regions has shown that higher incentives can have a significant impact on program participation. This experience is reflected in the increased recommended incentive amounts for many of the appliance categories.

The market structure for the CFS industry is extremely complex, including thousands of companies nationwide that build, distribute, promote, sell, install, and service commercial and non-commercial food service equipment. It involves many market actors at each market level. In addition, the procurement channels that are used can vary depending on customer size. CFS equipment is primarily sold through a dealer network, which interfaces with the food service operators on the commercial side and with food service consultants on the non-commercial side of the business. Manufacturers frequently sell direct to large (multi-unit chain) end-users, whose corporate procurement departments are staffed by architects, engineers and operations specialists focused on designing chain-specific specifications for primary equipment purchases. Some of the larger franchised restaurant chains utilize a contracted Kitchen Equipment Supplier (KES) to ensure consistency among both franchised and corporate-owned locations. Independent “mom-and-pop” types of operations frequently purchase used equipment from local refurbishment dealers. If buying new, they get it from their local food service equipment and supplies dealer (retail restaurant supply store).

Market barriers to a successful Food service Incentive Program (FSIP) promoting high-efficiency new appliances include (1) the size of the used equipment resale market, (2) perceived high first cost for new high-efficiency appliances, (3) hard-to-reach customers who, as small independent restaurant owners, do not have the time and financial resources to investigate and select high-efficiency appliances, (4) operator perceptions that high-efficiency equipment may not be as reliable or have enough production capacity compared to standard models, (5) customers who may speak a primary language other than English, (6) larger enterprises (e.g., multi-unit operators and institutional facilities) where the utility bill is paid by a different group than capital investments, and (7) administrative expenses related to reaching restaurant operators in low-density population areas. A FSIP will need to deal with these barriers and be attractive to all of these market participants.

In addition to explaining the market structure and barriers in general terms, this report summarizes the large and small corporate chain restaurant firms that are prevalent in the CNP service areas. Independent restaurants make up over 70% of the Full-Service Restaurant category, and 40% of Quick-Service Restaurants in CNP service territory.

Research on CFS equipment dealers, independent manufacturer’s reps, and food service design firms in the CNP service areas has identified over 25 firms of interest for the program, as well as a few manufacturers who make ENERGY STAR certified appliance models that are located in the CNP service areas.

The section on Recommended Appliance Rebates and Market Actor Incentives includes summary tables of gas and electric recommended rebates along with anticipated rebate uptake amounts and estimated energy savings. Tables ES-2 and ES-3 summarize the costs and energy savings potential for the Pilot Upstream Food Service Incentive Program.

Table ES-2. Estimated Pilot FSIP Gas Program Impact Potential and Cost

Optimal Gas Rebate Plan	Number of Gas Rebates	Average Gas Rebate Cost	Total Gas Rebate Cost	Dealer Incentive Totals	Gas Savings, Therms	Cost per Therm
Nicor	149	\$680	\$94,250	\$7,090	53,548	\$1.893
PGL/NSG	76	\$716	\$50,750	\$3,670	27,932	\$1.948
Totals	225	\$692	\$145,000	\$10,760	81,480	\$1.912

Table ES-3. Estimated Pilot FSIP Electric Program Impact Potential and Cost

Optimal Electric Rebate Plan	Number of Electric Rebates	Average Electric Rebate Cost	Total Electric Rebate Cost	Dealer Incentive Totals	Electric Savings, kWh	Cost per kWh
ComEd	260	\$361	\$93,965	\$8,015	632,761	\$0.161

Contents

Executive Summary.....	i
Subtask 1A Food Service Population Estimate	1
Zip Codes Served.....	1
Commercial Food Service Facilities.....	4
Non-Commercial (Institutional) Food Service Facilities.....	6
K-12 Schools	7
Colleges.....	7
Healthcare.....	7
Hotels	8
Military.....	8
Correctional Facilities.....	8
Amusement Parks	9
Country Clubs and Golf Courses	9
Casinos and Stadiums	9
Grocery/Retail Services.....	9
Large Private Employers	9
Subtask 1B Appliance Inventory Estimate	11
Appliance Fuel Type and Estimated Energy Efficiency Distribution	13
Reach-in Refrigeration	14
Ice Machines	15
Prerinse Spray Valves.....	15
Heated Handwrap Machines	15
Commercial Dishwashers.....	16
Ventilation Systems	17
Subtask 1C Appliance Potential Energy Savings	19
Eligible Facilities	19
Appliance Energy Use	19
Calculation Methodology.....	20
Cooking Appliances	22
Reach-in Refrigeration	26
Ice Machines	30
Heated Hand Wrap Machines.....	32
Sanitation	32

Table of Contents

Dishwashers	32
Pre-Rinse Spray Valves.....	35
Commercial Kitchen Ventilation	37
Summary	39
Subtask 1D Downstream Incentive Analysis	40
Gas Food Service Measures	40
Gas Cooking Appliances	40
Sanitation	50
Kitchen Ventilation, Gas Incentives	53
Electric Food Service Measures	56
Electric Cooking Appliances	56
Reach-in Refrigeration and Ice Makers.....	61
Kitchen Ventilation, Electric Incentives	66
Summary	68
Subtask 1E Market Structure.....	69
Common Distribution Channels.....	70
Large Chains:	72
Small Chains and Independents:.....	72
Non-Commercial (Institutional) Facilities:	73
Installation, Maintenance, and Repair Channels	73
Market Barriers to Promoting Energy-Efficient Cooking Appliances.....	74
Used Equipment Market.....	75
First-Cost Economics	76
Hard-to-Reach Customers.....	77
User Perceptions.....	78
Language	78
Split Incentives	78
Geography.....	79
Commercial Food Service in CNP Service Areas	79
Large Corporate Chains.....	79
Small Corporate Chains.....	80
Independent Restaurants	81
Non-Commercial Food Service in CNP Service Areas	81
CFS Equipment Dealers and Influencing Actors.....	82
Recommended Appliance Rebates and Market Actor Incentives	85

Projected Pilot Program Uptake	98
Incentives for Dealers and Other Market Actors	100
Appendix A, Allocation of CFS Customers in Zip Codes Common to Nicor, PGL, and NSG.....	103

Figures

Figure 1	CNP Service Area Overlay Map	2
Figure 2	Detail Map of ComEd, Nicor, PGL, and NSG Overlapping Service Area Zip Codes	3
Figure 3	Food Service Industry Map.	71
Figure 4	UFSIP Pilot Cumulative Electric and Gas Rebate Uptake	99

Tables

Table 1	ComEd Service Area Overlap with Nicor, PGL, and NSG	1
Table 2	CFS Facility Count by NAICS Raw Data Sub-codes for CNP Service Areas.....	4
Table 3	Adjusted 2018 NAICS Data for Food Service and Drinking Places in CNP Zip Codes	5
Table 4	Allocation of CFS Customers among Nicor, PGL, and NSG.....	6
Table 5	Estimated Non-commercial Facilities with Food Service Kitchens	10
Table 6	Gas and Electric Commercial Cooking Appliance Inventory in CNP Service Areas	12
Table 7	Appliance Inventory by Fuel Type and Energy Efficiency	13
Table 8	Estimated Refrigeration Appliance Inventory.....	14
Table 9	Estimated Commercial Dish Machine Inventory.....	16
Table 10	Exhaust Hood Potential Rebate Eligibility.....	18
Table 11	Estimated Utility Food Service Customers.....	19
Table 12	Appliance Energy Load Estimates for Rebate-Eligible Cooking Appliances	23
Table 13	Energy Savings Potential for Gas Cooking Appliances	24
Table 14	Energy Savings Potential for Electric Cooking Appliances	25
Table 15	Reach-in Refrigeration Energy Use Calculation Summary	27
Table 16	Estimate of Annual Energy Use for Reach-in Refrigeration Inventory.....	28
Table 17	Summary of Reach-in Refrigeration Potential Savings	29
Table 18	Ice Production Assumptions and Energy Use	30
Table 19	ENERGY STAR Ice Machine Potential Savings	31
Table 20	CEE Advanced Ice Machine Potential Savings.....	31
Table 21	Heated Hand-Wrap Machine Deemed Energy Savings.....	32
Table 22	Dishwasher Inventory in CNP Service Areas	32
Table 23	Dishwasher Water Use by Type	33
Table 24	Dishwasher Energy Calculations by Type.....	34
Table 25	Estimated Dishwasher Energy and Water Savings Potential	34
Table 26	Technical Resource Manual Defaults for PRSV Energy and Water Savings Calculations.....	35
Table 27	Estimated Pre-Rinse Spray Valve Energy Savings Potential	36
Table 28	Estimated Inventory of Kitchen Hoods Eligible for DCKV Controls and Potential Savings	38
Table 29	Potential Energy Savings by Category.....	39
Table 30	Gas Cooking Appliance Rebates for Nicor, PGL/NSG, and CAIOU	42

Table of Contents

Table 31	Gas Cooking Appliance Specifications for Nicor, PGL/NSG, and PG&E.....	44
Table 32	Recommended Upstream Program Incentives for Gas Cooking Appliances	48
Table 33	Sanitation Appliance Rebates for Nicor, PGL/NSG, and CAIOU	50
Table 34	Sanitation Appliance Specifications for Nicor, PGL/NSG, and PG&E	51
Table 35	Recommended Upstream Program Incentives for Sanitation Equipment	52
Table 36	Kitchen Ventilation Rebates for Nicor, PGL/NSG, and CAIOU	53
Table 37	Kitchen Ventilation Measure Specifications for Nicor, PGL/NSG, and PG&E	54
Table 38	Recommended Upstream Program Gas Incentives for Kitchen Ventilation.....	55
Table 39	Electric Cooking Appliance Rebates for CNP and PG&E.....	56
Table 40	Electric Cooking Appliance Specifications.....	58
Table 41	Recommended Upstream Program Incentives for Electric Cooking Appliances	60
Table 42	Electric Refrigeration Appliance Rebates for CNP and CAIOUs	61
Table 43	Electric Refrigeration Measure Specifications	64
Table 44	Recommended Upstream Program Incentives for Commercial Refrigeration Appliances	65
Table 45	Commercial Kitchen Ventilation Rebates for CNP and CAIOUs	66
Table 46	Electric Kitchen Ventilation Measure Specifications	67
Table 47	Recommended Upstream Program Incentives for Kitchen Ventilation	67
Table 48	Large Chain FSRs in CNP Service Areas	80
Table 49	Large Chain QSRs in CNP Service Areas	80
Table 50	Small Chain FSRs in CNP Service Areas	81
Table 51	CFS Equipment Dealers in CNP Service Areas.....	82
Table 52	Major CFS Design Firms, Manufacturer’s Reps, and Design/Build Firms.....	83
Table 53	FCSI Members in CNP Service Areas	84
Table 54	CFS Manufacturers in the CNP service areas.....	84
Table 55	On-line CFS Equipment Vendors	85
Table 56	Estimated Standard Gas Rebate Level Uptake and Energy Savings.....	87
Table 57	Estimated Nicor and PGL/NSG PY1 Gas Rebate Uptake and Energy Savings	88
Table 58	Estimated Nicor and PGL/NSG PY2 Gas Rebate Uptake and Energy Savings	89
Table 59	Estimated Nicor and PGL/NSG PY3 Gas Rebate Uptake and Energy Savings	90
Table 60	Estimated Gas Rebate Costs Using Standard Rebate Level and Gas Utility Allocations	91
Table 61	Total Estimated Gas Rebate Costs Using Optimal Rebate Levels	92
Table 62	Estimated Gas Rebate Costs Using Optimal Rebate Levels and Gas Utility Allocations	93
Table 63	Estimated Electric Standard Rebate Level Uptake and Energy Savings.....	94
Table 64	Estimated Electric Optimal Rebate Level Uptake and Energy Savings	95
Table 65	Estimated Electric Rebate Costs Using Standard Rebate Levels	96
Table 66	Estimated Electric Rebate Costs Using Optimal Rebate Levels.....	97
Table 67	Projected UFSIP Gas and Electric Uptake Rates by Month	99
Table 68	UFSIP Participant Incentive Fee Schedule.....	100
Table 69	Summary of Estimated Gas Rebates and Costs for the Pilot UFSIP	101
Table 70	Summary of Estimated Electric Rebates and Costs for the Pilot UFSIP	102

Subtask 1A Food Service Population Estimate

The NAICS data for code 722 was filtered by the zip codes where the Utilities have non-residential customers. That subset was analyzed to summarize the number of firms by traditional food service categories, such as full service, limited (quick) service, caterers, and other specialty services.

Zip Codes Served

Figure 1 (on page 2) is a map showing the geographical extent of the CNP electric and gas service areas by zip code. There are 1,569 zip codes within Illinois and a few of them extend over the border into adjacent states. A notable map feature is that there is substantial overlap in the CNP service areas, but there are also many zip codes where either electric or gas is provided by other utilities. Figure 2 highlights the zip code overlap of ComEd, Nicor, PGL, and NSG in the northeastern part of the state. The four utilities provide commercial and industrial service within 714 zip codes, and of those 531 zip codes have CFS businesses within them.

Table 1 summarizes ComEd’s service area overlaps with Nicor and PGL/NSG. Note that Nicor and PGL/NSG share some zip codes as well. Consequently, the total zip codes with overlaps in Table 1 exceed the total of ComEd’s zip codes.

Table 1 ComEd Service Area Overlap with Nicor, PGL, and NSG

Utility	Number of Zip Codes
ComEd Zip Codes	545
ComEd Overlap with NICOR	450
ComEd Overlap with PGL/NSG	105
ComEd No Overlap	60

Nicor also has overlaps with PGL and NSG. There are 28 zip codes served by Nicor and PGL that have 2,239 CFS establishments within those zip codes. There are 20 zip codes served by Nicor and NSG, with 1,258 CFS locations within those zip codes. The allocation among Nicor, PGL, and NSG is discussed below.

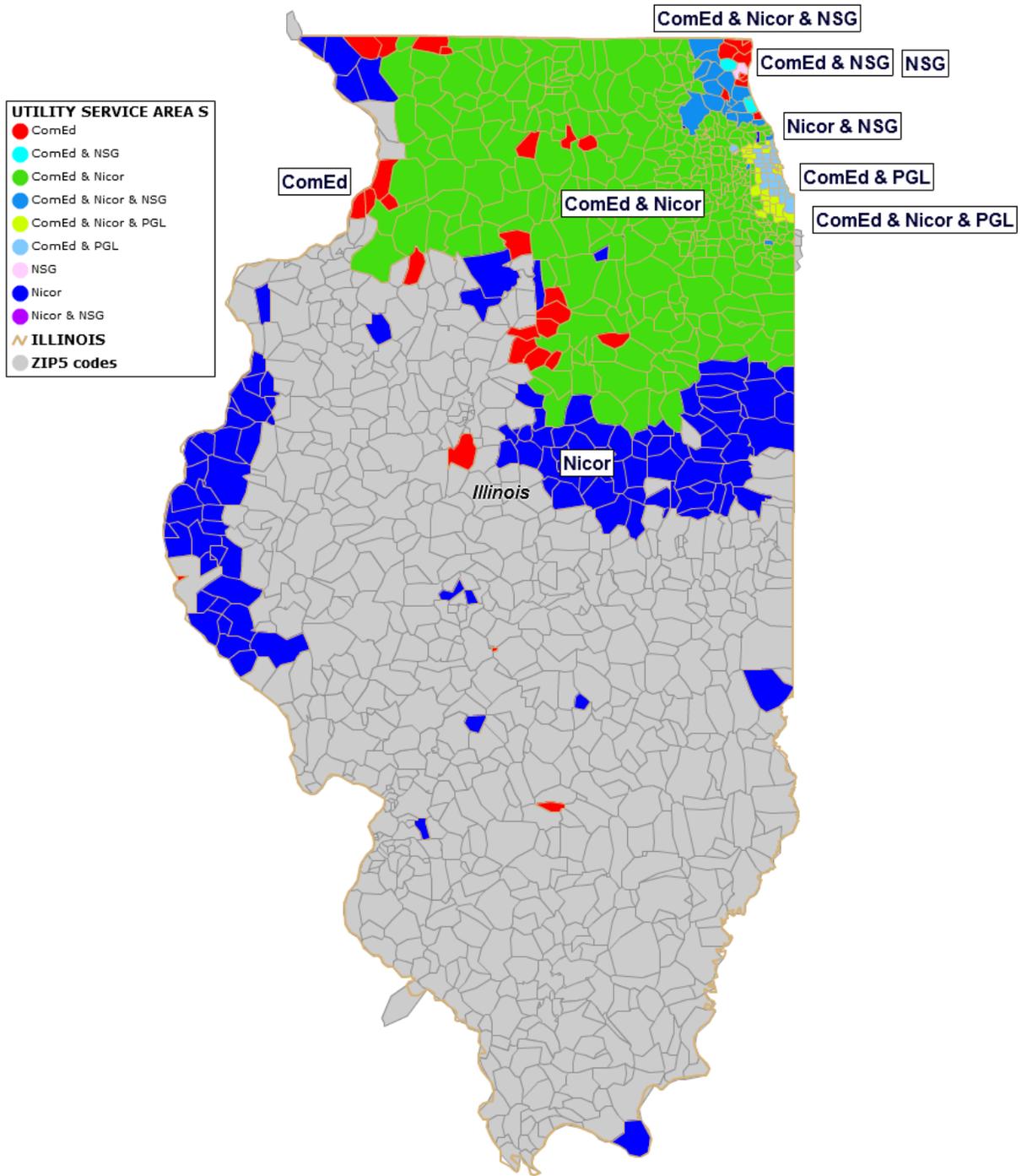


Figure 1 CNP Service Area Overlay Map

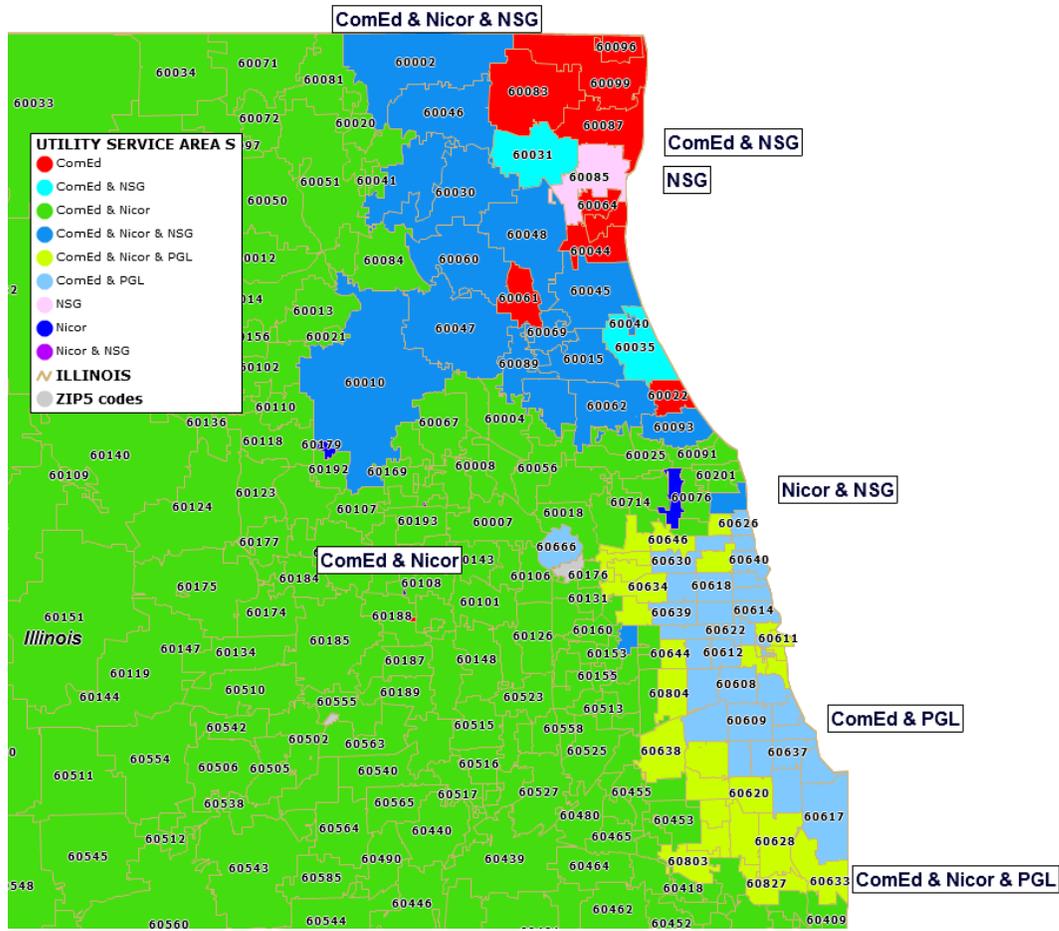


Figure 2 Detail Map of ComEd, Nicor, PGL, and NSG Overlapping Service Area Zip Codes

Commercial Food Service Facilities

The North American Industry Classification System (NAICS) is a six-digit system for classifying business types. Most food service establishments are under 722xxx, Food Services and Drinking Places. Table 2 shows a tabulation of the number of places in the 2018 database by NAICS code for the CNP service areas. Over 80% of facilities are, as expected, in the full service (FSR) and limited service (quick service, or QSR) restaurant categories.

Table 2 CFS Facility Count by NAICS Raw Data Sub-codes for CNP Service Areas

NAICS Description	NAICS Code	CFS Count
Food Service Contractors	722310	50
Caterers	722320	782
Mobile Food Services	722330	143
Drinking Places (alcoholic Beverages)	722410	2,320
Full-Service Restaurants	722511	9,472
Limited-Service Restaurants	722513	7,635
Cafeterias, Grill Buffets, And Buffets	722514	49
Snack and Nonalcoholic Beverage Bars	722515	12
Grand Total		20,463

Based on a review of some QSR and Drinking Places sub-codes, it appears that some of the entries are misclassified. For example, there are about 300 McDonald’s restaurants in the CNP service area. A search on “McDonalds” or “McDonald’s” included records that should be classified as something other than food service (private residence, doctor’s office) or included records for McDonald’s that were misclassified as FSRs. Another example is the inclusion of companies with the word “salon” (instead of “saloon”) in their names in the Drinking Places sub-code. They might serve drinks to their customers, but their primary business is providing personal hair or nail services. Also, although the word “lounge” is common in Drinking Place company names, and it is also common in hair and nail care services.

It appears that some businesses are classified in the NAICS (and probably the SIC) system based on their name by someone who does not actually represent the business or does not have knowledge of its actual operations. It is expected that this is a source of error across the entire database, but it goes both ways, meaning that there are other businesses that should have been classified under 722xxx, but are not. The apparent error rate is probably less than 2% and since it likely goes both ways (meaning there are businesses that should have been in 722xxx and there are businesses that should have been classified as something other than 722xxx), the aggregate CFS figures in the NAICS data is sufficiently accurate for population estimating purposes. Table 3 lists the total zip codes and number of food service locations by utility.

Table 3 Adjusted 2018 NAICS Data for Food Service and Drinking Places in CNP Zip Codes

	Zip Codes	Full-Service Restaurants	Limited-Service Restaurants	Cafeterias, Grill Buffets, And Buffets	Snack And Nonalcoholic Beverage Bars	Drinking Places (alcoholic Beverages)	Caterers	Subtotals CFS	Food Service Contractors	Mobile Food Services	Grand Total
ComEd	60	125	107	1	1	27	14	275	2	2	279
ComEd & Nicor	392	4,955	4,506	29	7	842	441	10,780	25	72	10,877
ComEd & Nicor & PGL	32	1,138	816	4	1	187	93	2,239	5	20	2,264
ComEd & Nicor & NSG	22	626	511	4	0	69	48	1,258	5	12	1,275
ComEd & PGL	36	2,185	1,282	8	3	375	140	3,993	9	31	4,033
ComEd & NSG	2	93	74	1	0	5	9	182	2	0	184
Nicor	164	224	219	0	0	70	24	537	2	2	541
Nicor & PGL	1	0	0	0	0	0	0	0	0	0	0
Nicor & NSG	1	0	0	0	0	0	0	0	0	1	1
PGL	1	0	0	0	0	0	0	0	0	0	0
NSG	3	0	0	0	0	0	0	0	0	0	0
Totals	714	9,346	7,516	47	12	1,575	769	19,265	50	140	19,455
Electric Only	60	125	108	1	1	27	14	275	2	2	280
Electric & Gas	484	8997	7189	46	11	1478	731	18,452	46	135	18,633
Gas Only	170	224	220	0	0	70	24	537	2	3	542

Adjustments to the data are as follows:

1. The Drinking Places (alcoholic Beverages) segment covers facilities that offer alcoholic beverages, but many of these places offer a limited food menu (pizza, burgers, sandwiches, etc.). The totals in this segment have been multiplied by a factor of 0.70, assuming that 70% of Drinking Places have some kitchen equipment that is comparable to a general QSR.
2. To avoid overstating the facility count, the number of food service locations has been reduced in 12 zip codes where the number of utility commercial customers is less than the number of food service locations. This reduced the total by 330.

The total CFS locations within the zip codes served by the four utilities is 19,250, or 75% of the state total. This figure does not include food service contractors (accounted for in the institutional segment) and mobile food service operators.

Nicor, PGL, and NSG have customers in 48 common zip codes (see Appendix A). The number of CFS locations within these zip codes will be adjusted by allocations shown in Table 4. The allocation was based on the ratio of commercial customers for each utility to total commercial customers within these zip codes multiplied by the aggregated CFS customers within these zip codes.

Table 4 Allocation of CFS Customers among Nicor, PGL, and NSG

	Zip Code Count	Nicor Customer Sum	PGL/NSG Customer Sum	Fraction to PGL/NSG	CFS Total Count	PGL/NSG Portion	Nicor Portion
NSG	20	11,099	7,818	41.3%	1,258	520	738
PGL	28	4,854	20,734	81.0%	2,239	1,814	425
Sum	48	15,953	28,552		3,497	2,334	1,163

Non-Commercial (Institutional) Food Service Facilities

The NAICS total CFS locations listed in Table 3 account for a small portion of non-commercial (institutional) food service facilities in the CNP service areas. Non-commercial facilities in general do not offer service to the general public, such as K-12 schools, colleges, healthcare, hotels, corporate cafeterias, prisons, military installations, and recreational facilities (stadiums, golf and country clubs, casinos). In general, identifying food service facilities in the non-commercial sector is more challenging because they are not identified separately from the organizations that they serve, and they are often part of a large building or campus. They are not tracked separately by NAICS or the US Census Bureau. Following is a broad overview of the different facility classifications within the non-commercial segment.

In the NAICS database a small portion of the records (probably under 300) are non-commercial or not relevant for this analysis, but are classified within NAICS 722, including and Food Service Contractors (722310) and Mobile Food Services (NAICS 722330). In addition, other NAICS codes, such as Cafeterias, Grill Buffets, and Buffets (NAICS 722514) has 47 records, and three of them appear to be for institutional facilities (university cafeterias).

Food Service Contractors are firms that primarily serve large corporate customers by providing management, staffing, and food purchasing for food service operations in corporate, government, hospital, and educational organizations. They will be included in the estimate of institutional facilities. Mobile Food Services include food trucks, kiosks, and services that are provided on a temporary basis. These companies are served indirectly by the CNP utilities, but in general are not direct users of electricity and natural gas for the CFS appliances that they use. They will not be included in the estimated inventory of CFS appliances.

K-12 Schools

There are 4,266 public K-12 facilities in 879 school districts in Illinois.¹ Assuming that the percentage of schools within the CNP service area is the same as the percentage of CFS locations (75%), then there are about 3,200 public schools within the service area. Likewise, there are 1,781 private K-12 schools in Illinois, and the number with the CNP service area is estimated to be 1,336. Not all of these schools will have cafeterias where food is cooked. Some locations, especially the private ones, may have a breakfast/lunch area for meals to be consumed, but food may be brought in by students and not prepared on the premises. Some public districts may have a central district cook/chill kitchen and many of the schools (especially elementary and middle schools) will have only rethermalization appliances and reach-in refrigeration. Assuming that the ratio of schools with kitchens in Illinois is the same as in California (estimated to be 67.5%), the total in CNP service areas is 3,063.

Colleges

There are 308 universities and colleges in Illinois, including trade schools.² Assuming that 75% are located within CNP service areas, the total would be about 231. The larger campuses will have multiple kitchens and some of the smaller ones will not have kitchens. We will assume an average of one per campus, or 231 food service venues.

Healthcare

Healthcare facilities can be divided into three primary subgroups: hospitals, long-term healthcare, and assisted living facilities. Major healthcare facilities, mainly hospitals, have kitchens for patient care and visitors. The CNP service area has approximately 119 hospitals, 62 of which are located in Cook

¹ <https://www.greatschools.org/schools/districts/Illinois/IL/>

² <http://www.free-4u.com/Colleges/Illinois-Colleges.html>

County.³ Further research will be needed to identify each hospital within the CNP zip codes. We will assume one kitchen per hospital. There are 1,200 long term health care facilities in Illinois,⁴ and assuming 75% of them are in the CNP service area, the total is 900. Again, one kitchen will be assigned for each facility. There are 476 residential care (assisted living and shared housing) facilities in Illinois.⁵ As not all residential health care facilities have a commercial kitchen, we will assume 75% are in the CNP service area and have one kitchen each.

Hotels

The American Hotel & Lodging Association (AHLA) reports that there are 1,489 hotel properties in Illinois. Of these, 61% are considered economy class facilities that likely do not have kitchens. The remainder, 580 facilities, likely have some level of kitchen facilities, ranging from warming equipment to full convention-style catering kitchens. Assuming 50% have large kitchens, and that 80% of those are located in the CNP service areas, at total of about 230 would be suitable for inclusion in the program appliance estimate. These kitchens are classified as the internal kitchens for hotel catering, room service and staff service. Restaurants open to the general public residing within hotel facilities are included in the restaurant dataset for the purposes of this study and are not included in the hotel subset.

Military

There is one large federal military base, the Naval Station Great Lakes which is within ComEd's service area, although we do not know if ComEd provides electricity to the Station. Military installations have dining halls for enlisted personnel and officers, as well as many have commercial brand-name restaurants. There may be as many as 20 kitchens at the Station. Other military bases, such as National Guard installations, are likely in the CNP service area, but we will not include them in the institutional count because they are typically active for one weekend a month and many do not have food service during training weekends.

Correctional Facilities

There are 42 state correctional facilities in Illinois. Assuming 75% are in CNP service areas, then there are 31 facilities and six are major state prisons that appear to be within the CNP service area.⁶ These prisons have large populations of inmates (in the thousands) and may have either central kitchens or several kitchens serving different security areas within the complex. We will assume 3 kitchens in each, for a total of 18. There are 25 smaller state facilities in the CNP service areas and we will assume one kitchen each. There are 105 counties in Illinois, 48 of which have some CNP customers. We will assume one jail per county with one kitchen each. The total kitchen count is 91.

³ <http://www.countymapsofillinois.com/aaallil.shtml>

⁴ <http://dph.illinois.gov/topics-services/health-care-regulation/nursing-homes>

⁵ https://data.illinois.gov/dataset/379idph_assisted_living_and_shared_housing_licensed_establishments_listing

⁶ https://en.wikipedia.org/wiki/Illinois_Department_of_Corrections

Amusement Parks

There are 14 amusement parks (racing, theme parks, water parks, and zoos) in the CNP service areas. Food service in amusement parks ranges from FSRs to a variety of QSR styles to kiosks. We will assume an equivalent of 2 kitchens per park.

Country Clubs and Golf Courses

There are 53 country clubs in Illinois and about 40 are located in CNP service areas.⁷ We estimate there are about 130 golf courses within the CPN service areas, some of which are associated with country clubs. Golf courses within 20 miles of Chicago total 82.⁸ For purposes of this analysis, we assume that there are 90 kitchen facilities in the combined population of country clubs and golf courses.

Casinos and Stadiums

Illinois has 15 casinos⁹ and 45 CFS venues¹⁰ within them. There are 28 major stadiums in Illinois with seating capacity ranging from 10,000 to 78,000. Many of these are likely to be served either by Food Service Contractors or Caterers.

Grocery/Retail Services

The dataset for the supermarket and warehouse retail sector includes all establishments of the major national, state and regional chains, which offer retail food items prepared and cooked at an onsite facility. These sites can be described as extensive delis/roisseries (offering hot meats and small meals) and bakeries. There are an estimated 680 supermarket locations in CNP service areas that have on-site food service operations. The major grocery retail chains in CNP are: Aldi, Dominick's, Jewel-Osco, Kroger, and Wal-Mart. The data set is comprised of 2,239 stores that are representative of these chains.

Large Private Employers

Similar data for employers with campus facilities is not readily available, but a reasonable estimate would be 100.

Based on the above preliminary data, Table 5 summarizes the estimated non-commercial food service facilities by sector.

⁷ <http://country-clubs.regionaldirectory.us/illinois.htm>

⁸ <https://www.golflink.com/golf-courses/il/>

⁹ <https://www.worldcasinodirectory.com/illinois>

¹⁰ <https://www.worldcasinodirectory.com/illinois/dining>

Table 5 Estimated Non-commercial Facilities with Food Service Kitchens

Sector in CNP Service Area	Estimated Totals	Estimated CFS Services
Public K-12 schools	3,200	2,161
Private K-12 schools	1,336	902
Universities & Colleges	231	231
Grocery/Retail Food service	580	580
Hospitals	119	119
Long Term Health Care	900	900
Residential Care	357	357
Soup Kitchens & Homeless Shelters	82	82
Hotels	580	465
Military	1	20
Correctional Facilities	80	91
Amusement Parks	14	28
Country Clubs & Golf Courses	512	384
Casinos, Stadiums	70	65
Corporate Cafeterias	100	100
Totals	8,161	6,485

The total food service facility count was adjusted to include non-commercial (institutional or industrial) food service places discussed above. The facility count for the CNP service area would be 19,265 commercial plus 6,485 non-commercial, for a total of 25,750. The non-commercial facility count is about 25% of the total. We will use an estimate of 25,750 food service facilities for subsequent calculations.

Subtask 1B Appliance Inventory Estimate

Frontier Energy used the facilities that were characterized in Subtask 1A to develop estimated inventories of CFS appliances. The general approach for estimating the inventory of commercial cooking appliances was adopted from methodology developed for the 2010 CEC PIER report *Characterizing the Energy Efficiency Potential of Gas-Fired Commercial Food Service Equipment*.¹¹

Table 6 on the following page contains the appliance inventory estimates for the CNP service areas. This study assumes that the distribution of food service facilities by sector and type is generally in line with that of the state of California, with adjustments for facility categories that have significant differences between the CNP service areas and California. The work conducted in the 2010 PIER report entailed the following:

- classification of food service sectors
- number of food service facilities
- cooking appliance inventories by facility sector, group, category and subdivision
- percentage of cooking appliances that are gas vs. electric by facility sector, group and category

The 2010 PIER study used an extensive classification system (85 unique categories) to define food service facility types and to quantify the number in each category. The categories were defined by menu type, chain, independent, commercial, institutional, hours and days of operation per year, and by size for some categories. Each category has its own kitchen definition covering 40 cooking appliance types. The appliance types and number per facility type were assigned based on experience from facility audits conducted by Frontier Energy as manager of The FSTC over the past two decades. The resulting matrix was used to estimate the aggregate number and type of appliances in the inventory of about 93,000 food service establishments in California.

The estimated CNP food service customer base of 25,750 establishments is approximately 28% of the California customer base that was estimated in the 2010 PIER study. Analysis of the SIC sub-codes contained in the NAICS data revealed that there are fewer Mexican and Asian restaurants in CNP service area compared to California and a greater proportion of American menu restaurants. The distributions were adjusted for these categories based on the counts in the NAICS data.

¹¹ <http://www.energy.ca.gov/2013publications/CEC-500-2013-050/CEC-500-2013-050.pdf>

Table 6 Gas and Electric Commercial Cooking Appliance Inventory in CNP Service Areas

Group	Category	CNP Estimated Inventory (all appliances)	% Gas	CNP Gas Appliances	CNP Electric Appliances
	Number of Facilities	25,750			
Braising Pan	Skillets/Braising Pans	3,816	52%	1,984	1,832
Broiler	Conveyor	488	91%	444	44
Broiler	Overfired	2,163	87%	1,882	281
Broiler	Salamander	9,639	88%	8,482	1,157
Broiler	Underfired	13,120	94%	12,333	787
Fryer	Donut	1,213	90%	1,092	121
Fryer	French Fryer	42,234	85%	35,899	6,335
Fryer	Large Vat	3,955	80%	3,164	791
Fryer	Pressure	1,215	38%	462	753
Griddle	Double-Sided	1,425	58%	827	598
Griddle	Standard	21,382	65%	13,898	7,484
Kettle	Steam Kettle <10g	1,294	48%	621	673
Kettle	Steam Kettle 10g-40g	6,727	45%	3,027	3,700
Kettle	Steam Kettle 40g-80g	1,240	55%	682	558
Kettle	Steam Kettle >80g	402	52%	209	193
Oven	Combination	1,168	34%	397	771
Oven	Convection	35,021	60%	21,013	14,008
Oven	Conveyor	4,542	54%	2,453	2,089
Oven	Cook & Hold (Slow Cook)	2,290	41%	939	1,351
Oven	Deck	8,981	76%	6,826	2,155
Oven	Range Oven	15,194	85%	12,915	2,279
Oven	Rapid Cook	1,967	0%	-	1,967
Oven	Retherm	231	0%	-	231
Oven	Roll-in Rack-DBL	730	90%	657	73
Oven	Roll-in Rack-SGL	487	90%	438	49
Oven	Rotisserie	479	60%	287	192
Oven	Smoker	494	70%	346	148
Pasta Cooker	Pasta Cooker	7,013	60%	4,208	2,805
Range	Hot Top	1,256	85%	1,068	188
Range	Open Top	14,924	85%	12,685	2,239
Range	Stock Pot	6,765	41%	2,774	3,991
Range	Wok	6,502	98%	6,372	130
Steamer	Pressure	821	40%	328	493
Steamer	Standard	15,875	26%	4,128	11,747
Toasters	Contact	1,824	0%	-	1,824
Toasters	Conveyor	11,049	0%	-	11,049
Warming Equip	Holding Cabinet	11,669	0%	-	11,669
Warming Equip	Steam Table	5,305	0%	-	5,305
Warming Equip	Warming Drawer	4,526	0%	-	4,526
	Totals	269,426		162,840	106,586

Appliance Fuel Type and Estimated Energy Efficiency Distribution

Table 7 is a summary of the estimated number of gas and electric appliances and the estimated distribution between standard efficiency and high efficiency. The standard efficiency stock will be the target for this Pilot Program but note that some of these appliances will be in facilities that are served by utilities other than the four in this program. Certain zip codes served by ComEd have gas service supplied by a gas utility other than Nicor or PGL/NSG, which reduces the available gas appliance inventory by 1.4%. Similarly, certain zip codes served by Nicor have electric service supplied by an electric utility other than ComEd, which reduces the available electric appliances by 2.8%. Consequently, the sums of the standard and high efficiency equipment inventory listed in Table 7 are less by those respective percentages compared to the CNP Total Inventory. The number of appliances available, and the estimated energy use for them, is discussed in more detail in the Subtask 1C *Appliance Energy Potential Savings* section.

Table 7 Appliance Inventory by Fuel Type and Energy Efficiency

Group	CNP Total Inventory	Gas Inventory	Gas Standard Efficiency	Gas High Efficiency	Electric Inventory	Electric Standard Efficiency	Electric High Efficiency
Braising Pans	3,816	1,985	1,370	606	1,831	1,780	0*
Broilers	25,410	23,141	20,011	3,086	2,269	2,205	0*
Fryers	48,617	40,617	35,720	4,828	8,000	7,776	218
Griddles	22,807	14,725	13,783	929	8,082	7,856	220
Ovens	71,584	46,273	40,157	6,030	25,311	24,602	689
Pasta Cookers	7,013	4,208	3,734	467	2,805	2,726	77
Ranges	29,447	22,899	22,578	317	6,548	6,365	178
Steamers	16,696	4,456	3,759	687	12,240	11,897	333
Kettles	9,663	4,541	4,477	63	5,122	4,979	139
Toasters	12,873	0	0	0	12,873	12,513	350
Warming Equip	21,500	0	0	0	21,500	20,898	585
Totals	269,426	162,845	145,589	17,013	106,581	103,597	2,789

*No energy-efficient classification exists for this category.

Reach-in Refrigeration

Table 8 lists the estimated refrigeration appliance inventory. The national commercial refrigeration inventory estimate for 2002 was multiplied by a compound growth rate of 1.5% for 15 years to estimate the 2017 inventory. The growth rate was higher prior to 2008, slumped during the recession years, increased again until 2015, and has decreased again, although still positive.¹² The California inventory is estimated to be 10% of the national inventory. In turn, the CNP inventory is about 28% of the California inventory. The cumulative sales of ENERGY STAR certified refrigerated appliances for the past 10 years is about 42% of installed inventory.¹³ The expected time before replacement is 10 years. The remaining stock is standard efficiency and will be eligible for the UFSIP.

Table 8 Estimated Refrigeration Appliance Inventory

Group	Category	Frontier Energy Estimate of National Inventory as of 2002	Frontier Energy Estimate of National Inventory as of 2017	FSTC California Inventory Estimate as of 2017	Frontier Energy Estimate of CNP Inventory as of 2017	Frontier Energy Estimate of CNP Rebate Eligible Inventory
Full Height Reach-in						
	Upright Refrigerators	1,498,768	1,873,808	187,381	52,673	22,580
	Upright Freezers	986,999	1,233,978	123,398	34,687	14,870
	Upright Combinations	185,644	232,098	23,210	6,524	2,797
	Total	2,671,411	3,339,884	333,988	93,884	40,247
Cases						
	Refrigerator Cases	673,356	841,851	84,185	23,664	10,145
	Freezer Cases	469,330	586,771	58,677	16,494	7,071
	Total	1,142,686	1,428,623	142,862	40,159	17,216
Roll-in						
	Refrigerators	137,985	172,513	17,251	4,849	2,079
	Freezers	111,886	139,883	13,988	3,932	1,686
	Total	249,871	312,397	31,240	8,782	3,765
Undercounter						
	Refrigerators	717,611	897,180	89,718	25,220	10,811
	Freezers	115,517	144,423	14,442	4,060	1,740
	Combinations	43,347	54,194	5,419	1,523	653
	Total	876,475	1,095,797	109,580	30,803	13,204
	Grand Total	4,940,443	6,176,701	617,670	173,627	74,432¹⁴

¹² https://fishnick.com/handouts/02212018/RAshton_Food service_Forecast_FSTC_02212018.pdf

¹³ ENERGY STAR® Unit Shipment and Market Penetration Reports for Calendar Years 2008 - 2016

¹⁴ Corrected error in this column compared to stand-alone Subtask 1C Report.

Ice Machines

Frontier Energy estimated the stock of ice machines for California as well as the United States.¹⁵ The findings were based on a number of previous studies, including the 2010 PIER Study. The average number of ice machines per facility was 1.67. For CNP's service area, we estimate there are 43,000 ice machines in aggregate for the 25,750 food service facilities.

Ice makers are also prevalent in the convenience store segment. The US Census database for 2012 shows 4,294 in Illinois (3,482 with gas stations, 812 without gas stations).¹⁶ Six counties in the CNP service area (Cook, Lake, DuPage, McHenry, Will and Winnebago) have a total of 2,187 convenience stores (51% of the state total). Assuming that the number of convenience stores in the state is currently 4,500, and that the CNP service area includes 60% of convenience stores in the state and that each store has one ice machine, the total ice machines in this segment is estimated to be 2,700.

Hotels also use ice machines outside of kitchen operations for the convenience of guests. Hotels will typically have one per floor. Assuming a typical hotel will be three stories, three ice makers will be present. There are 1,489 hotel properties in Illinois.¹⁷ Assuming 80% of them are in the CNP service area, the number of ice machines would be about 3,570.

The total estimated ice machine population in the CNP service area is 49,270.

Prerinse Spray Valves

Prerinse spray valves are common cleaning tools in food service facilities, even those that do not have a dishwasher. Assuming there is an average of one per food service facility, the total estimated number is 25,750.

Heated Handwrap Machines

Heated Handwrap machines are used in deli, butcher, and bakery operations in groceries. There were 2,894 supermarkets and other grocery stores in Illinois in 2012. Assuming that the number has increased since 2012, the total today is estimated to be 3,000. US Census data for 2012 shows that about 2,060 were in the six most populated counties (Cook, Lake, DuPage, McHenry, Will and Winnebago) in the CNP service area. Assuming that 70% of the state supermarkets are in the CNP service area today, and assuming there are two heated handwrap machines per grocery in the CNP service area, the total estimated number is 4,200.

¹⁵ Commercial Ice Machines: The Potential for Energy Efficiency and Demand Response. D. Fisher et al, ACEEE Paper 056042012.

¹⁶ <https://factfinder.census.gov>

¹⁷ <https://www.ahla.com/statefacts>

Commercial Dishwashers

Commercial dishwashers are used in almost all establishments that use non-disposable dishes, glassware, and utensils, such as restaurants, bars, schools, hospitals, nursing homes, churches, and institutional cafeterias. The dishwashing operation in a typical restaurant consumes over two-thirds of all of the water used in that establishment (Koeller, 2002) and dishwashers themselves are considered to be one of the biggest energy users in the kitchen.

The two basic strategies for washing and sterilizing dishes involve high-temperature and low-temperature approaches. Low-temperature dishwashers use the hot water supplied by the kitchen’s existing water heater – typically this hot water is supplied at 140°F. These dishwashers use a chemical sanitizing agent in the final rinse and in some cases, a drying agent. High-temperature dishwashers use a booster heater to raise the rinse water temperature to 180°F, hot enough to sterilize the dishes and assist in the drying process. There is also a heater in the dishwasher that keeps the wash water at the required temperature. Many models on the current market are available as either high or low temperature units.

Size requirements for commercial dishwashing machines can be calculated by estimating the number of individuals served by the food service establishment. This information is a key determinant of the type of dishwasher (undercounter, door-type, rack, or flight) that is most suited for a facility. There are an estimated 16,249 commercial dishwashers in CNP territory. Frontier Energy’s estimate of market penetration for high-efficiency dishwashers is about 39% based on adjusting ENERGY STAR estimated market penetration by the national food service facility estimate. Table 9 shows the breakdown by type of machine. The estimated total does not include leased machines.

Table 9 Estimated Commercial Dish Machine Inventory

Type	Inventory	Rebate Eligible Inventory
Undercounter-- High Temp	742	455
Undercounter -- Low Temp	1,505	923
Door-Type – High Temp	2,904	1,781
Door-Type – Low Temp	5,712	3,504
Conveyor--High Temp	3,729	2,288
Conveyor--Low Temp	1,444	886
Flight Type	213	
Totals	16,249	9,837

Ventilation Systems

Commercial kitchen hoods are a significant component of energy consumption in commercial kitchens. They function to reduce fire hazards and exhaust cooking effluent to comply with air quality standards within a commercial kitchen. Exhaust hoods in commercial kitchens are normally tied to a make-up air (MUA) unit that balances building pressure during the kitchens operation. Generally, commercial kitchen hoods exhaust requirements are sized to peak cooking usage of each appliance under the hood. Typical commercial kitchen hoods have a simple “on” or “off” control strategy. When the hood is on, its exhaust and MUA fans are on at full speed. In reality food is not being cooked at all times therefore not needing the peak exhaust requirements. Due to the common controls strategies employed in most commercial kitchens a significant amount of energy was wasted on venting unnecessary cubic feet per minute of air (cfm) when appliances were not fully used. It was evident that there was an opportunity for change. A demand control kitchen ventilation system (DCKV) is an energy management system for commercial kitchen hoods. It optimizes energy efficiency by reducing the exhaust and make-up air supply fan speed. This is accomplished by leveraging sensors to determine the minimum amount of exhaust air required to capture and contain effluent from the cookline.

Within the combined CNP service areas, we estimate that there are 52,000 commercial kitchen exhaust hoods, the many of which are candidates for DCKV controls. Eligibility for DCKV should be restricted to hoods that exhaust 5,000 cfm or more and operate at least 8 hours per day. The number, size, and types of exhaust hoods will vary across the population. Table 10 provides an estimate of the percentage of eligible facilities by segment based on our auditing experience. Assuming there are on average two exhaust hoods per facility, the number of eligible hoods for DCKV controls would be about 21,600.

Table 10 Exhaust Hood Potential Rebate Eligibility

Facility Type	CNP Facility Inventory Estimate	Estimated % of Facilities with Hoods Eligible for DCKV Controls	Eligible Facilities
K-12 Schools	2,893	20%	579
K-12 Commissary Kitchens	170	80%	136
College & University	231	60%	139
All Education	3,294		854
Long Term HC	900	50%	450
Hospitals	119	80%	95
Residential Care	357	20%	71
Soup Kitchens	82	20%	16
All Health Care	1,458		632
Correctional Facilities	91	80%	73
Military Installations	20	50%	10
Amusement	28	50%	14
Stadiums & Arenas	20	0%	0
Casinos	45	70%	32
Golf Courses + Country Clubs	384	20%	77
All Recreation	477		206
Hotels	465	70%	326
Corp Cafeteria	100	70%	70
Supermarkets	580	50%	290
Independent QSRs	3,451	30%	1,035
Small Chain QSRs	500	30%	150
Large Chain QSRs	4,127	30%	1,238
All QSRs	8,078		2,423
Independent FSRs	8,175	60%	4,905
Small Chain FSRs	368	60%	221
Large Chain FSRs	282	60%	169
Caterers	781	50%	391
Drinking Places w/ Limited Menu	1,581	20%	316
All FSRs	11,187		6,002
Total Institutional	6,485		2,378
Total Commercial	19,265		8,425
Grand Total	25,750		10,803

Subtask 1C Appliance Potential Energy Savings

The potential energy savings for each appliance type can be used by CNP to track estimated energy savings in their service areas as energy-efficient appliances are purchased under the program. However, since savings estimates presented in this report are averages based on typical appliances, the deemed savings figures for each rebate sale will have to be calculated individually based on the characteristics of the appliances sold.¹⁸ Eligible electric appliance totals were multiplied by 0.972 since ComEd does not serve certain zip codes among the gas utility service areas. Similarly, eligible gas appliance totals were multiplied by 0.986 since there are some zip codes that the gas utilities do not serve.

Eligible Facilities

The estimated 25,750 food service facilities in the aggregate utility service areas were determined based on food service locations within the zip codes served by the four utilities. The served zip codes substantially overlap, but not completely. Due to this fact, the number of gas and electric major appliances that may be eligible for a rebate in aggregate service areas is less than the estimated total appliances. For example, a customer receives gas service from Nicor, PGL, or NSG, but receives its electrical service from a provider other than ComEd. In this case, the customer is not eligible for an electric appliance rebate from ComEd but may apply to its electric service provider’s rebate program. Consequently, the number of appliances eligible for an UFSIP appliance rebate will be less than the total inventory. Table 11 summarizes the estimated number of food service customers by utility based on zip codes.

Table 11 Estimated Utility Food Service Customers

Utility	CFS Customers	Institutional Food Service Customers	Total Food Service Customers
ComEd	18,726	6,304	25,030
Nicor	12,480	4,201	16,681
PGL	5,807	1,955	7,762
NSG	702	236	938
Total Gas	18,989	6,393	25,382
Total Food Service Facilities	19,265	6,485	25,750

Appliance Energy Use

Frontier Energy characterized the food service operations based on 38 facility subtypes and 54 menu subtypes that generated 172 different combinations of facilities. The lineup of appliances in each

¹⁸ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0 Volume 2: Commercial and Industrial Measures, Final February 8, 2017, Effective January 1, 2018.

combination were identified from a list of 39 appliance subtypes along with an estimate of the number of each appliance.

Appliance energy use varies widely due to the large variation in menus and food service facility types. Factors that must be taken into consideration include appliance sizes, average daily hours of operation, average annual days of operation, appliance fuel source, distribution of average appliance efficiency values, and typical usage patterns for each appliance within each facility subcategory. To determine the energy consumption of each appliance, energy profiles were established by combining facility operational information with data generated by ASTM standard energy calculations and appliance end-use monitoring.

Calculation Methodology

The general approach for estimating the total energy load attributed to commercial cooking appliances was adopted from methodology developed for the 2010 CEC PIER study. In order to characterize the energy load profiles of the major cooking appliances, information and descriptive data was collected, and operating assumptions made, based on:

- Average daily hours of operation
- Average annual days of operation
- Distribution of average appliance efficiency values
- Average daily amount of production per appliance type

From this collected information, the following parameters were calculated and used to estimate the total annual appliance energy load in commercial and non-commercial facilities:

- Total annual electric and gas load attributed to CFS appliances by appliance type/category
- Total annual electric and gas load attributed to CFS appliances by facility sector

Assumptions about annual operating hours were developed for every sector of non-commercial and commercial food services in order to perform energy use calculations. The distribution of standard-efficiency and high-efficiency appliance breakdown was informed largely by discussions with a substantial number of contacts at every level of the industry. To date, many specific CFS appliance types (such as range ovens, open top ranges and Chinese ranges) lack high efficiency options in the market altogether; these current inventories were assumed to be composed of entirely standard-efficiency appliances. The appliance Daily Energy Consumption Rate was calculated using Equation 1.

Equation 1 Cooking Appliance Daily Energy Use Rate Calculation

$$EDAY = \frac{(LBFOOD \times EFOOD) \div EFFICIENCY + [IDLERATE \times (TON - LBFOOD/PC - nP \times TP/60)]}{+ nP \times EP}$$

Where:

EDAY =	Daily Energy Consumption (Btu/day)
LBFOOD =	Pounds of Food Cooked per Day (lb)
EFOOD =	ASTM Energy to Food (Btu/lb) = Btu/pound of energy absorbed by food product during cooking
EFFICIENCY =	Heavy Load Cooking Energy Efficiency %
IDLERATE =	Idle Energy Rate (Btu/h)
TON =	Operating Hours/Day
PC =	Production Capacity (lb/hr)
TP =	Preheat Time (min)
nP =	Number of preheats/day
EP =	Preheat Energy (Btu)

The calculation in Equation 1 is based on an assumption of standard operating hours per day that is specific to each appliance and was developed using data acquired from monitoring projects conducted at The FSTC. While applying these calculations results in a standardized daily energy use profile for each appliance type, in order to estimate what the appliances are consuming across establishments with extremely varied operating hours it was necessary to determine each appliance’s *Average Energy Consumption Rate*. The *Average Energy Consumption Rate* is expressed in units of “Btu/hour or kW”, for gas or electric, respectively, and is calculated as follows in Equation 2:

Equation 2 Average Hourly Energy Use Rate

$$EHOUR = EDAY^{btu} / TON$$

Where:

EHOUR =	Average Energy Consumption Rate (Btu/hour or kW)
EDAY =	Daily Energy Consumption (Btu/day or kW)
TON =	Operating Hours/Day

The *Average Energy Consumption Rate* for an appliance is established for both standard- and high-efficiency cases. The *Average Energy Consumption Rate* is then combined with assumptions about appliance-weighted annual operating hours and market shares of standard- vs. high-efficiency units in order to generate the following energy load model. Final calculations for determining the total energy load of an installed appliance base is shown in Equation 3:

Equation 3 Energy Load Calculation by Appliance Category

$$ETOT = PP \times nAPP \times EQHOURS \times ((STDUSE \times STD\%) + (HIUSE \times HI\%))$$

Where:

ETOT =	Total Appliance Energy Load
--------	-----------------------------

PP =	Percent of Primary Appliances
nAPP =	Total number of appliances
EQHOURS =	Total number of weighted annual operating hours
STDUSE =	Average Energy Consumption Rate (therm/hr or kW) of standard efficiency appliance
STD% =	Percent of Standard-efficiency Appliances
HIUSE =	Average Energy Consumption Rate (therm/hr or kW) of high efficiency appliance
HI% =	Percent of High-efficiency Appliances

Example

$$\text{ETOT} = 0.50 \times 555 \times 3,570 \times [(24,900 \times 0.70) + (15,100 \times 0.30)]$$

Total Appliance Energy Load = 0.22 million CCF

The calculations used to establish the average energy consumption rates of the appliances are based on typical usage conditions and an average daily operating schedule unique to each appliance type. There are often multiple appliances of the same type within a given kitchen, some of which are for peak preparation periods or backup or are used for certain menu items that are not prepared each day. These appliances will use less energy than the primary appliance(s) within a given category that are used more frequently and on a daily basis. Because of the difference in energy use between primary and secondary appliances, the total energy load must be reduced to account for the lower energy use of the secondary appliances. The Percent of Primary Appliances in Equation 3 is a factor that is applied to each appliance in a given category to reduce the total energy consumption, depending on the number of appliances and the type of kitchen.

For example, assume that a hamburger Quick Service Restaurant (QSR) has four fryers, two for cooking French fries, one for fish, and one for chicken. One of the French fryers is the primary fryer and the other is used for peak periods and may be idle or off during non-peak periods. Since the QSR serves hamburgers as a main menu item, the fish and chicken fryers would be used occasionally, and thus would not use as much energy as the primary French fryer. The Percent Primary Appliances is a fraction that reflects the fact that average hourly energy use of the four fryers is less than the primary fryer. The Percent Primary Appliances fraction also varies in magnitude by kitchen type. For example, a fryer in a hospital kitchen would be used less than one in a Full Service Restaurant (FSR).

The calculations in Equations 1 through 3 were performed for each cooking appliance type listed in Table 12.

Cooking Appliances

The estimated inventories for each appliance type were multiplied by their respective electric and gas fuel split for the estimated 25,750 food service facilities. Each fuel type was split between estimated standard and high efficiency for each appliance type to calculate the number of appliances eligible to participate in the UFSIP.

Note that not all appliance categories have high-efficiency products available. For gas appliances, 48% of the 31 categories have high-efficiency options available on the market. For electric appliances 26% of the 39

categories have high-efficiency options available on the market. Appliance categories with high-efficiency alternatives are the focus of the UFSIP.

Table 12 shows the estimated populations of appliances based on this calculation.¹⁹ Table 13 lists the rebate-eligible gas-fired cooking appliances with the estimated annual gas use savings. Table 14 lists the rebate eligible electric cooking appliances with the estimated annual electric use savings.

Table 12 Appliance Energy Load Estimates for Rebate-Eligible Cooking Appliances

Group	Category	Total Sites Gas Inventory	Rebate Eligible Gas Inventory	Rebate Eligible Gas Energy Use Therms/Yr	Total Sites Electric Inventory	Rebate Eligible Electric Inventory	Rebate Eligible Electric Energy Use kWh/Yr
Braising Pans	Skillets/Braising Pans	1,985			1,831		
Broilers	Conveyor	445	329	831,694	43		
Broilers	Overfired	1,881	1,855	2,419,691	282		
Broilers	Salamander	8,482	6,273	1,233,848	1,157		
Broilers	Underfired	12,333	11,554	11,786,220	787		
Fryers	Donut	1,092			121		
Fryers	French Fryer	35,899	31,502	27,852,931	6,335	5,480	46,802,999
Fryers	Large Vat	3,165	2,778	1,996,725	790	683	4,608,857
Fryers	Pressure	461			754		
Griddles	Double-Sided	827	490	267,622	598	349	4,253,677
Griddles	Standard	13,898	13,293	9,898,282	7,484	7,057	98,357,986
Kettles	Steam Kettle <10g	622			672		
Kettles	Steam Kettle 10g-40g	3,027			3,700		
Kettles	Steam Kettle 40g-80g	683			557		
Kettles	Steam Kettle >80g	209			193		
Ovens	Combi	396	333	292,877	772	640	15,912,492
Ovens	Convection	21,013	17,612	5,772,538	14,008	11,575	60,774,364
Ovens	Conveyor	2,453	2,296	3,157,316	2,089		
Ovens	Cook & Hold	940			1,350		
Ovens	Deck	6,825			2,156		
Ovens	Range Oven	12,915			2,279		
Ovens	Rapid Cook	0			1,967		
Ovens	Retherm	0			231		
Ovens	Roll-in Rack-Double	658	488	1,355,975	72		
Ovens	Roll-in Rack-Single	439	326	452,783	48		
Ovens	Rotisserie	288	56	43,541	191		
Ovens	Smoker	346			148		
Pasta Cookers	Pasta Cookers	4,208	3,734	2,722,198	2,805		
Ranges	Hot Top	1,068			188		
Ranges	Open Top	12,685			2,239		
Ranges	Stock Pot	2,774			3,991		
Ranges	Wok	6,372			130		
Steamers	Pressure Steamer	328	259	219,211	493	383	8,053,939
Steamers	Pressureless Steamer	4,128	3,499	2,974,014	11,747	10,848	130,926,329
Toasters	Contact	0			1,824		
Toasters	Conveyor	0			11,049		
Warming Equip	Holding Cabinet	0			11,669	8,733	13,833,937
Warming Equip	Steam Table	0			5,305		

¹⁹ Note that appliance totals by category and facility type may vary from the estimates in Report 1B due to re-classification of facilities among the FSR and QSR segments due to errors in the NAICS data.

Warming Equip	Warming Drawer	0			4,526		
Totals		162,845	96,677	73,277,466	106,581	45,748	383,524,580

Table 13 Energy Savings Potential for Gas Cooking Appliances

Group	Category	Eligible Std Efficiency Gas Inventory	Std Efficiency Energy Use, Therms/yr	High Efficiency Energy Use, Therms/yr	Gas Energy Saving Potential, Therms/yr
Braising Pans	Skillets/Braising Pans				
Broilers	<22" Wide Conveyor	82	157,925	83,200	74,725
Broilers	22-28" Wide Conveyor	165	451,370	282,198	169,172
Broilers	>28" Wide Conveyor	81	299,979	164,149	135,830
Broilers	Overfired	1,855	2,419,691	2,056,737	362,954
Broilers	Salamander	6,273	1,233,848	1,048,771	185,077
Broilers	Underfired	11,554	11,786,220	7,690,214	4,096,006
Fryers	Donut				
Fryers	French Fryer	31,502	27,852,931	19,219,032	8,633,899
Fryers	Large Vat	2,778	1,996,725	932,052	1,064,673
Fryers	Pressure				
Griddles	Double-Sided	490	267,622	238,565	29,057
Griddles	Standard	13,293	9,898,282	9,149,228	749,054
Kettles	Steam Kettle <10g				
Kettles	Steam Kettle 10g-40g				
Kettles	Steam Kettle 40g-80g				
Kettles	Steam Kettle >80g				
Ovens	Combi	333	292,877	216,937	75,940
Ovens	Convection	17,612	5,772,538	4,396,084	1,376,454
Ovens	Conveyor	2,296	3,157,316	2,396,443	760,873
Ovens	Cook & Hold				
Ovens	Deck				
Ovens	Range Oven				
Ovens	Rapid Cook				
Ovens	Retherm				
Ovens	Roll-in Rack-Double	488	1,355,975	829,455	526,520
Ovens	Roll-in Rack-Single	326	452,783	278,060	174,723
Ovens	Rotisserie	56	43,541	37,010	6,531
Ovens	Smoker				
Pasta Cookers	Pasta Cookers	3,734	2,722,198	1,956,729	765,469
Ranges	Hot Top				
Ranges	Open Top				
Ranges	Stock Pot				
Ranges	Wok				
Steamers	Pressure Steamer	259	219,211	73,504	145,707
Steamers	Pressureless Steamer	3,499	2,974,014	744,516	2,229,498
Toasters	Contact				
Toasters	Conveyor				
Warming Equip	Holding Cabinet				
Warming Equip	Steam Table				
Warming Equip	Warming Drawer				
Totals for All Gas Appliance Categories		96,676	73,355,046	51,792,884	21,562,162

Table 14 Energy Savings Potential for Electric Cooking Appliances

Group	Category	Eligible Std Efficiency Electric Inventory	Std Efficiency Energy Use, kWh/yr	High Efficiency Energy Use, kWh/yr	Electric Energy Saving Potential, kWh/yr
Braising Pans	Skillets/Braising Pans				
Broilers	Conveyor				
Broilers	Overfired				
Broilers	Salamander				
Broilers	Underfired				
Fryers	Donut				
Fryers	French Fryer	5,480	46,802,999	40,114,951	6,688,048
Fryers	Large Vat	683	4,608,857	3,934,424	674,433
Fryers	Pressure				
Griddles	Double-Sided	349	4,253,677	3,037,271	1,216,406
Griddles	Standard	7,057	98,357,986	70,196,863	28,161,123
Kettles	Steam Kettle <10g				
Kettles	Steam Kettle 10g-40g				
Kettles	Steam Kettle 40g-80g				
Kettles	Steam Kettle >80g				
Ovens	Combi	640	15,912,492	9,750,976	6,161,516
Ovens	Convection	11,575	60,774,364	45,583,723	15,190,641
Ovens	Conveyor				
Ovens	Cook & Hold				
Ovens	Deck				
Ovens	Range Oven				
Ovens	Rapid Cook				
Ovens	Retherm				
Ovens	Roll-in Rack-Double				
Ovens	Roll-in Rack-Single				
Ovens	Rotisserie				
Ovens	Smoker				
Pasta Cookers	Pasta Cookers				
Ranges	Hot Top				
Ranges	Open Top				
Ranges	Stock Pot				
Ranges	Wok				
Steamers	Pressure Steamer	383	8,053,939	949,059	7,104,880
Steamers	Pressureless Steamer	10,848	130,926,329	12,544,328	118,382,001
Toasters	Contact				
Toasters	Conveyor				
Warming Equip	Holding Cabinet	8,733	13,833,937	3,914,948	9,918,989
Warming Equip	Steam Table				
Warming Equip	Warming Drawer				
Totals for All Electric Appliance Categories		45,748	383,524,580	190,026,543	193,498,037

Reach-in Refrigeration

The reach-in refrigeration population of the United States was first estimated in the 1989 NAFEM market study²⁰. The U.S. population estimate was updated by Frontier Energy in 2002 based on adjustments for market growth. Based on a 2% growth rate to inventory data published by NAFEM in 1989, the inventory of upright refrigerators and freezers in 2002 was projected at 2,500,000 units. This corresponds with the 1996 report²¹ estimating inventory of 2,100,000 units, assuming 2% growth between 1996 and 2002. Based on a nominal 10-year product life, the number of replacement refrigerators and freezers purchased by food service operators would be in the order of 250,000 units per year in 2002. Sales figures for that period show about 300,000 units per year, which is consistent with industry reports and interviews^{22,23}. Based on industry interviews, 75% of sales per year could be replacement units. The sale/purchase of used equipment would be included within these estimates.

To update the inventory to 2015, Frontier Energy applied a 1.5% compound growth rate from 2002 to 2017. This compound rate reflects the impact of the recession starting in 2009. The California estimate is about 10% of the national population based on the extensive survey conducted for the 2010 CEC PIER study. In turn, based on the number of food service facilities within CNP's service areas, the number of reach-in refrigeration units was estimated at 28% of California's.

The ENERGY STAR market penetration rate was calculated by summing the last ten years of high-efficiency reach-in refrigeration from ENERGY STAR annual shipping reports and dividing that total by the current inventory estimate. In 2002 there were 167 reach-in units listed as ENERGY STAR rated; in 2015 there were 1,022. Due to an upgrade in the qualifying criteria, 589 reach-in units are now qualified. A breakdown by subcategory is not available from the ENERGY STAR data.

Table 15 is a summary of the energy calculations for different sizes of reach-in units. Table 16 lists the unit annual energy use estimates based on the standard and high-efficiency categories in the FSTC Life Cycle Calculators²⁴ and the assumptions listed below the table. Table 17 shows the estimated aggregate annual energy use assuming all remaining reach-in refrigeration units were replaced with high-efficiency units.

²⁰ NAFEM 1989 Equipment & Supply Study, Volume A—Food Storage Equipment

²¹ Westphalen, D., Zogg, R.A., et. al., *Energy Savings Potential for Commercial Refrigeration Equipment*, prepared by Arthur D. Little for Building Equipment Division, Office of Building Technologies, U.S. Department of Energy, June 1996.

²² The Cadmus Group, Inc., *Preliminary Market Background Report for Commercial Reach-In Refrigerators and Freezers*, prepared for the ENERGY STAR Program Climate protection Division, U.S. Environmental Protection Agency, March 1, 2002

²³ Nadel, S. and Kubo, T., American Council for Energy-Efficient Economy, *Reach-In Refrigerators and Freezers: Background Information for CEE*, July 2002.

²⁴ <http://fishnick.com/saveenergy/tools/calculators/>

Table 15 Reach-in Refrigeration Energy Use Calculation Summary

Appliance Type	Sections	Storage Volume, ft3	Standard Efficiency kWh/day	High Efficiency kWh/day	Assumed % Distribution	Std. Eff. Annual kWh	High Eff Annual kWh	Std. Eff. Weighted Avg kWh/yr	Hi Eff. Weighted Avg kWh/yr
Glass-Door Reach-in Freezer									
	Undercounter	10	11.6	6.96	20%	4,234	2,540	4,234	2,540
	1 Section	24	22	17	50%	8,067	6,055		
	2 Section	44	37	25	20%	13,542	8,943		
	3 Section	72	58	36	10%	21,207	13,104	8,863	6,127
Solid-Door Reach-in Freezer									
	Undercounter	10	5.38	3.75	20%	1,964	1,369	1,964	1,369
	1 Section	24	11	9	50%	4,008	3,139		
	2 Section	44	19	13	20%	6,928	4,855		
	3 Section	72	30	18	10%	11,016	6,464	4,491	3,187
Glass-Door Reach-in Refrigerator									
	Undercounter	10	4.54	2.56	20%	1,657	934	1,657	934
	1 Section	24	6	4	50%	2,270	1,610		
	2 Section	44	9	7	20%	3,146	2,373		
	3 Section	72	12	9	10%	4,373	3,438	2,202	1,623
Solid-Door Reach-in Refrigerator									
	Undercounter	10	3.04	2.3	20%	1,110	840	1,110	840
	1 Section	24	4	3	50%	1,621	1,128		
	2 Section	44	6	4	20%	2,351	1,497		
	3 Section	72	9	6	10%	3,373	2,095	1,618	1,073

Table 16 Estimate of Annual Energy Use for Reach-in Refrigeration Inventory

Group	Category	Frontier Energy Estimate of National Inventory as of 2002	Frontier Energy Estimate of National Inventory as of 2017	FSTC California Inventory Estimate as of 2017	Frontier Energy Estimate of CNP Inventory as of 2017	Frontier Energy Estimate of CNP Rebate Eligible Inventory	Std. Eff. Annual Energy kWh per Unit	High Eff. Annual Energy kWh per Unit	Cumulative Energy Star Market Penetration	Notes
Full Height Reach-in										
	Upright Refrigerators	1,498,768	1,873,808	187,381	51,623	22,580	1,631	1,256	55%	1
	Upright Freezers	986,999	1,233,978	123,398	33,996	14,870	5,948	4,167	55%	2
	Upright Combinations	185,644	232,098	23,210	6,394	2,797	2,494	1,838	55%	3
	Total	2,671,411	3,339,884	333,988	92,014	40,247				
Cases										
	Refrigerator Cases	673,356	841,851	84,185	23,193	10,145	2,202	1,623	55%	4
	Freezer Cases	469,330	586,771	58,677	16,166	7,071	8,863	6,127	55%	5
	Total	1,142,686	1,428,623	142,862	39,358	17,216				
Roll-in										
	Refrigerators	137,985	172,513	17,251	4,753	2,079	3,146	2,373	55%	6
	Freezers	111,886	139,883	13,988	3,854	1,686	8,067	6,055	55%	7
	Total	249,871	312,397	31,240	8,607	3,765				
Undercounter										
	Refrigerators	717,611	897,180	89,718	24,717	10,811	1,292	871	55%	1
	Freezers	115,517	144,423	14,442	3,979	1,740	2,721	1,759	55%	2
	Combinations	43,347	54,194	5,419	1,493	653	1,578	1,049	55%	3
	Total	876,475	1,095,797	109,580	30,189	13,204				
	Grand Total	4,940,443	6,176,701	617,670	170,168	74,432				

Table 6 Notes:

- 1 Assumed ratio of 1 glass-door refrigerator to 2 solid door refrigerators.
- 2 Assumed ratio of 1 glass-door freezer for 2 solid door freezers.
- 3 Assumed combo energy was 80% refrigerator and 20% freezer.
- 4 Assumed refrigerator case was equivalent to an average glass-door refrigerator.
- 5 Assumed freezer case was equivalent to an average glass-door freezer.
- 6 Assumed roll-in refrigerator was a 2-section solid-door refrigerator.
- 7 Assumed roll-in freezer was a 2-section solid-door freezer.

Table 17 Summary of Reach-in Refrigeration Potential Savings

Grand Total Reach-in Energy Use, kWh/yr	455,720,184
Energy Use If All Std. Eff. Inventory Converted to Energy Star	189,817,536
Potential Savings If All Remaining Std. Eff. Inventory Converted	76,085,112
ComEd Estimated Food Service Accounts	18,728
ComEd Average Reach-in Energy Use Savings per Account kWh/yr	4,063
ComEd Estimated Number of Std Eff Units	76,972
ComEd Average Savings per Reach-in Unit Converted kWh/yr	988

Ice Machines

In conjunction with the 2010 CEC PIER gas appliance study, FNI also estimated that there were about 155,000 ice machines in the 93,000 California food service facilities (or about 1.67 ice machines per facility). Using the 25,750 food service facility estimate for CNP, the number of ice machines would be 43,003. ComEd serves 97.2% of those facilities within its service area, so the adjusted estimated total is 41,799. From the ENERGY STAR shipment reports for the past ten years and the national ice machine inventory estimate, the cumulative market penetration for high-efficiency ice machines is about 35%.

There is little published data for ice production and ice machine energy use. One DOE study published in 2009 estimated that the ice machine national average energy use was 5,429 kWh per year per machine.²⁵ Table 18 lists Frontier Energy’s assumptions regarding average ice production per facility and lists the estimated energy use per year based on assumed ice production of 650 pounds per day per facility using two of the most common ice machine sizes.

Table 18 Ice Production Assumptions and Energy Use

Ice Maker Capacity (lb ice/day)	400 lb ice/day	600 lb ice/day
Assumed Ice Production per day	260	390
Std. Eff., kWh/ 100lb ice	8.5	6.9
High Eff., kWh/ 100lb ice	7.2	5.8
CEE Adv. Tier Eff, kWh/ 100lb ice	5.63	5.63
Std. Eff. kWh/ day	22.1	26.9
High Eff. kWh/ day	18.72	22.6
CEE Adv. Tier Eff, kWh/ day	14.638	21.957
Std. Eff. Annual kWh	8,067	9,819
High Eff Annual kWh	6,833	8,249
CEE Adv. Tier Eff Annual kWh	5,343	8,014
Assumed Average Distribution per Facility	1.00	0.67
Std. Eff. Weighted Avg kWh/yr	8,067	6,579
Hi Eff. Weighted Avg kWh/yr	6,833	5,527
CEE Adv. Tier Weighted Avg kWh/yr	5,343	5,369

Table 19 shows the estimated ice machine energy use within CNP’s service area assuming a 65/35% split for standard vs. high-efficiency ice machines based on the adjusted ENERGY STAR market sales for high-efficiency machines. A second scenario for high-efficiency ice machine replacement, leveraging the pending Consortium for Energy Efficiency (CEE) Advanced Tier ice machine specification²⁶ is evaluated in Table 20.

²⁵ Navigant Consulting, Inc. 2009. Department of Energy. Energy Savings Potential and R&D Opportunities for Commercial Refrigeration, p. 42.

²⁶ Consortium for Energy Efficiency. CEE High Efficiency Specification for Automatic Commercial Ice Machines, proposed effective January 1, 2019.

Table 19 ENERGY STAR Ice Machine Potential Savings

Ice Machines	Total Units	Std Eff Ice Makers	High Eff. Ice Makers	CEE Adv TIER Ice Makers	Totals
	41,799	65%	35%	0%	14,646
Ice Makers Currently in Use		27,169	14,630	0	41,799
SCENARIO 1: Replace Std Eff with ENERGY STAR			27,169	0	27,169
400 lb Ice Maker Annual kWh/unit		8,067	6,833	5,343	
600 lb Ice Maker Annual kWh/unit		9,819	8,249	8,014	
Assuming 1:0.67 Ratio 400 to 600 lb units, 600 lb Weighted Average Annual kWh		6,579	5,527	5,369	
Current Annual kWh		397,917,174	180,826,800	0	578,743,974
Replace All Std Eff Units: 80% to Hi Eff + 20% to CEE Adv. Tier Annual Energy Use			335,808,840	0	335,808,840
Total Annual Energy Use After Replacement kWh			516,635,640	0	516,635,640
Total Annual Energy Savings kWh					62,108,334

Table 20 CEE Advanced Ice Machine Potential Savings

Ice Machines	Total Units	Std Eff Ice Makers	High Eff. Ice Makers	CEE Adv TIER Ice Makers	Totals
	41,799	65%	35%	0%	14,646
Ice Makers Currently in Use		27,169	14,630	0	41,799
SCENARIO 2: Replace Std Eff with 80% CEE Tier 1 and 20% CEE Tier 2			21,735	5,434	27,169
400 lb Ice Maker Annual kWh/unit		8,067	6,833	5,343	
600 lb Ice Maker Annual kWh/unit		9,819	8,249	8,014	
Assuming 1:0.67 Ratio 400 to 600 lb units, 600 lb Weighted Average Annual kWh		6,579	5,527	5,369	
Current Annual kWh		397,917,174	180,826,800	0	578,743,974
Replace All Std Eff Units: 80% to Hi Eff + 20% to CEE Adv. Tier Annual Energy Use			268,644,600	58,209,008	326,853,608
Total Annual Energy Use After Replacement kWh			449,471,400	58,209,008	507,680,408
Total Annual Energy Savings kWh					71,063,566

Heated Hand Wrap Machines

Heated hand wrap machines are used to wrap products in bakeries, delis, and meat preparation departments in supermarkets, bakeries, or delicatessens. The baseline machine has roll of plastic wrap that is pulled from the roll in a sufficient quantity to wrap an item and a heated wire or strip is used to cut the wrap. The heated element is powered continuously and is usually left on overnight. The new generation of efficient machines have an element that is only heated on demand. Typically, there are 1 or 2 per supermarket. The estimated number of heated hand wrap machines in the CNP service areas is 4,200. Table 21 shows the summary of energy savings calculations. Total estimated energy savings are 6,489,000 kWh/yr.

Table 21 Heated Hand-Wrap Machine Deemed Energy Savings

Baseline (kWh/yr)	Efficient (kWh/yr)	Deemed Savings (kWh/yr)	EE Spec
1,950	405	1,545	On-Demand Hand Wrap Machine ²⁷

Sanitation

Dishwashers

Dishwasher estimates for the CNP service areas are 28% of the California inventory estimate. Based on the number of high-efficiency dishwashers that ENERGY STAR reported for the past 10 years, the market penetration is about 39%. The ENERGY STAR website currently lists 265 models covering all types of dishwashers. Table 22 shows the inventory of dishwashers by type in the CNP service areas and the estimated number of rebate eligible units. Note that ENERGY STAR does not breakdown the reported sales figures by dishwasher type.

Table 22 Dishwasher Inventory in CNP Service Areas

Dishwasher Type	Inventory	Rebate Eligible Inventory
Undercounter-- High Temp	742	455
Undercounter -- Low Temp	1,505	923
Door-Type – High Temp	2,904	1,781
Door-Type – Low Temp	5,712	3,504
Conveyor--High Temp	3,729	2,288
Conveyor--Low Temp	1,444	886
Flight Type*	213	
Totals	16,249	9,837

* Flight Type machines have high efficiency units available, but they are typically customized for large institutional facilities, such as convention centers or large university cafeterias. They are not appropriate for deemed savings calculations.

²⁷ Work Paper PGECOFST128, Commercial Hand Wrap Machine

Table 23 lists the assumed baseline and energy-efficient water use per rack and estimated number of racks per day for each type of dishwasher. Table 24 summarizes the baseline and energy efficient annual electric, gas, and water use for each dishwasher type. Electric use by low temperature dishwashers for motors and pumps is relatively small and are the same for the baseline and high-efficiency cases, and thus are recorded as zero. Gas savings are for service hot water heating. Booster water heater electric and/or gas use is included in the figures for the high temperature dishwashers. Table 25 summarizes the energy and water savings potential for dishwashers.

Table 23 Dishwasher Water Use by Type

Dishwasher Type	Style	Baseline Water	EE Water	Racks/d
Undercounter	High Temp	0.95	0.86	50
Undercounter	Low Temp	1.50	1.20	50
Door-Type	High Temp	1.10	0.90	141
Door-Type	Low Temp	1.70	1.20	141
Single Tank Rack Conveyor	High Temp	1.10	0.70	400
Single Tank Rack Conveyor	Low Temp	1.20	0.80	400
Multi Tank Rack Conveyor	High Temp	1.10	0.50	600
Multi Tank Rack Conveyor	Low Temp	1.00	0.50	600

Table 24 Dishwasher Energy Calculations by Type

Appliance Category	Baseline			Efficient			Energy Efficiency Spec	Savings		
	Elec kWh/yr	Gas Therms/yr	Water gal/yr	Elec kWh/yr	Gas Therms/yr	Water gal/yr		Elec kWh/yr	Gas Therms/yr	Water gal/yr
Undercounter Dishwasher-High Temp	2,005	159	17,338	1,815	144	15,695	ENERGY STAR	190	15	1,643
Undercounter Dishwasher-Low Temp	0	248	27,010	0	200	21,718	ENERGY STAR	0	48	5,292
Door-Type Dishwasher-High Temp	6,548	520	56,612	5,298	421	45,804	ENERGY STAR	1,250	99	10,808
Door-Type Dishwasher-Low Temp	0	795	86,461	0	558	60,729	ENERGY STAR	0	237	25,732
Single-Tank Conveyor-High Temp	19,083	1,516	164,980	11,821	939	102,200	ENERGY STAR	7,262	577	62,780
Single-Tank Conveyor-Low Temp	0	1,651	179,580	0	1,060	115,340	ENERGY STAR	0	591	64,240
Multi-Tank Conveyor-High Temp	27,864	2,214	240,900	13,679	1,087	118,260	ENERGY STAR	14,185	1,127	122,640
Multi-Tank Conveyor-Low Temp	0	1,993	216,810	0	1,087	118,260	ENERGY STAR	0	906	98,550

Table 25 Estimated Dishwasher Energy and Water Savings Potential

Dishwasher Type	Rebate Eligible Inventory	Savings per Unit			Total Savings		
		Elec (kWh/yr)	Gas (Therms/yr)	Water (gallons/yr)	Elec (kWh/yr)	Gas (Therms/yr)	Water (gallons/yr)
Undercounter Dishwasher-High Temp	455	190	15	1,643	86,450	6,825	747,565
Undercounter Dishwasher-Low Temp	923	0	48	5,292	0	44,304	4,884,516
Door-Type Dishwasher-High Temp	1,781	1,250	99	10,808	2,226,250	176,319	19,249,048
Door-Type Dishwasher-Low Temp	3,504	0	237	25,732	0	830,448	90,164,928
Single-Tank Conveyor-High Temp	229	7,262	577	62,780	1,662,998	132,133	14,376,620
Single-Tank Conveyor-Low Temp	797	0	591	64,240	0	471,027	51,199,280
Multi-Tank Conveyor-High Temp	2,059	14,185	1,127	122,640	29,206,915	2,320,493	252,515,760
Multi-Tank Conveyor-Low Temp	89	0	906	98,550	0	80,634	8,770,950
Totals	9,837				33,182,613	4,062,183	441,908,667

Pre-Rinse Spray Valves

Pre-Rinse Spray Valves (PRSVs) are typically used to pre-wash dishware and food prep containers prior to entering a dishwasher. They are also commonly found at multi-compartment sinks and soak tanks. Using newer designs that use less water can save substantial amounts of heated water. Spray patterns, water velocity, and water use rates vary depending on the type of cleaning required. The energy equations for PRSV electric and gas savings were based on the Illinois TRM (pages 60-63) and are described in the following Equations:

Equation 4 PRSV Electric Energy Savings Calculation

ELECTRIC ENERGY SAVINGS

$$\Delta kWh = \Delta Gallons * 8.33 * 1 * (T_{out} - T_{in}) * (1/EFF_{Elec}) / 3,413$$

Equation 5 PRSV Natural Gas Energy Savings Calculation

NATURAL GAS ENERGY SAVINGS

$$\Delta Therms = \Delta Gallons * 8.33 * 1 * (T_{out} - T_{in}) * (1/EFF_{Gas}) / 100,000 * (1 - FLAG)$$

Table 26 summarizes key default values from the Technical Resource Manual.

Table 26 Technical Resource Manual Defaults for PRSV Energy and Water Savings Calculations

TRM Defaults	Electric	Gas
Fuel Fraction	0.2	0.8
Temp Rise	70	70
Eff_WH	0.97	0.80

The water calculations use a baseline of 1.6 gpm and 1.15 gpm for high efficiency PRSVs (0.45 gpm savings). Hot water heating temperature rise was assumed to be 70°F, which is the TRM default. The split between electric and gas water heaters was assumed to be 20/80. The efficiency factors assumed for the electric and gas water heaters are 0.97 and 0.80, respectively, which are the defaults in the TRM.

Table 27 shows the estimated number of PRSVs per facility type, average hours of operation per facility type, and average operating days per year.

Table 27 Estimated Pre-Rinse Spray Valve Energy Savings Potential

Pre-Rinse Spray Valves	Number of Facilities	PRSVs per Facility	Total PRSVs	Estimated PRSV Hours Use per Operating Day	Average Operating Days/Year	Annual Water Savings Gallons	Annual Electric Savings kWh	Annual Gas Savings Therms
K-12 Schools	2,893	1	2,893	0.5	180	7,029,990	247,639	40,992
K-12 Commissary Kitchens	170	2	340	1.5	250	3,442,500	121,266	20,073
College & University	231	2	462	2	249	6,212,052	218,827	36,222
Long Term HC	900	1	900	1	365	8,869,500	312,438	51,718
Hospitals	119	1	119	2	365	2,345,490	82,623	13,677
Residential Care	357	1	357	1	365	3,518,235	123,934	20,515
Soup Kitchens	82	1	41	1	150	166,050	5,849	968
Correctional Facilities	91	1	91	1	344	845,208	29,773	4,928
Military Installments	20	1	20	1.5	365	295,650	10,415	1,724
Amusement	28	1	28	1	280	211,680	7,457	1,234
Stadiums & Arenas	20	3	60	0.25	73	29,565	1,041	172
Casinos	45	1	45	1	313	380,295	13,396	2,218
Golf Courses + Country Clubs	384	1	384	1	260	2,695,680	94,958	15,719
Hotels	465	2	930	1.5	365	13,747,725	484,279	80,163
Corp Cafeteria	100	1	100	1.5	250	1,012,500	35,666	5,904
Supermarkets	580	3	1,740	1	365	17,147,700	604,047	99,988
QSR Independent	3,456	1	3,456	0.5	363	16,936,128	596,594	98,755
QSR Small Chain	495	1	495	0.5	363	2,425,748	85,450	14,145
QSR Large Chain	4,127	1	4,127	1	363	40,448,727	1,424,852	235,857
FSR Independent	8,161	1	8,161	1	312	68,748,264	2,421,736	400,871
FSR Small Chain	382	1	382	1.5	355	5,492,205	193,469	32,025
FSR Large Chain	282	1	282	2	363	5,527,764	194,722	32,232
Caterers	781	1	781	1	363	7,654,581	269,641	44,634
Drinking Places w/ Limited Menu	1,581	1	1,581	0.5	363	7,747,691	272,921	45,177
Total	25,750		27,775			222,930,928	7,852,993	1,299,911

Note that PRSVs will be subject to stricter federal regulations starting in January 2019, with tiers based on spray force. The data is not yet available on which tiers existing models will be classified as manufacturers have until the enforcement date to comply with the test standards.

Commercial Kitchen Ventilation

Exhaust hoods and sources of makeup air are needed to remove emissions from heat and grease producing appliances. Many food service facilities require little or no exhaust, such as sub sandwiches and ice cream shops, or primary schools where meals are prepared at central commissary kitchens. Consequently, the number of facilities that have exhaust hoods is less than the total population of food service facilities. Facilities that have several heat and grease producing appliances may have exhaust hoods that qualify for Demand Controlled Kitchen Ventilation (DCKV) controls.

DCKV controls consist of temperature, optical, and thermal sensors tied to a controller that can vary the speed of the exhaust and makeup air fans based on sensing whether appliances are idle or cooking. For longer operations with idle time between peak cooking periods, the fan energy savings can be significant. Heating and cooling energy savings can be had for facilities that heat or cool makeup air.

Based on national and regional DCKV research programs on the types and sizes of hoods, design exhaust rates, and hours of operation, the following rules of thumb have been published:

- Appropriate hood styles include wall-mounted canopy, single and double-island mounted canopy hoods. Eye-brow, backshelf, and proximity style hoods are not appropriate.
- The appliances under the exhaust hoods should have thermal production diversity, either by being used at different times or operations have idle periods between meal periods. For example, a hood over charbroilers usually experiences a fairly constant thermal plume during cooking and idle periods, resulting in poor savings opportunity.
- The minimum exhaust rate for applying DCKV controls should be 5,000 cfm or greater per exhaust fan, and
- The minimum hours of operation should be 8 hours or longer.

We applied the above rules of thumb to estimate number of exhaust hoods in the CNP service areas that may qualify for DCKV controls by facility type. Based on our experience with typical exhaust hoods in each facility type, we estimated the percentage of buildings that exhaust hoods that are large enough and the right style to be DCKV candidates. We assumed that each eligible facility had enough linear feet of exhaust hood to serve appliance lineups with heavy, medium, and light duty appliances at an average 250 cfm/lf of exhaust hood. The fan power for the baseline fan was assumed to be 0.592 W/cfm. The Illinois TRM (pp. 72-74) default savings values for electric use, electric demand, and gas use were used to estimate total savings by facility type. Table 28 summarizes the estimates.

Table 28 Estimated Inventory of Kitchen Hoods Eligible for DCKV Controls and Potential Savings

Facility Type	CNP Facility Inventory Estimate	Estimated % of Facilities with Hoods Eligible for DCKV Controls	Eligible Facilities	Estimated Total Exhaust Rate cfm	Estimated Fan HP	Deemed Annual Electric Savings (kWh/yr)	Deemed Annual Demand Savings (kW peak)	Deemed Annual Gas Savings (Therms/yr)
K-12 Schools	2,893	20%	579	5,000	2	5,750,628	787	773,312
K-12 Commissary Kitchens	170	80%	136	10,000	4	2,701,504	370	363,283
College & University	231	60%	139	15,000	6	4,141,644	567	556,945
All Education	3,294		854			12,593,776	1,724	1,693,540
Long Term HC	900	50%	450	5,000	2	4,469,400	612	601,020
Hospitals	119	80%	95	15,000	6	2,830,620	388	380,646
Residential Care	357	20%	71	5,000	2	705,172	97	94,828
Soup Kitchens	82	20%	16	5,000	2.01	159,707	22	21,476
All Health Care	1,458		632			8,164,899	1,119	1,097,970
Correctional Facilities	91	80%	73	10,000	4	1,450,072	199	194,998
Military Installations	20	50%	10	20,000	8	397,280	54	53,424
Amusement	28	50%	14	2,500	1	69,524	10	9,349
Stadiums & Arenas	20	0%	0			0	0	0
Casinos	45	70%	32	10,000	4	635,648	87	85,478
Golf Courses + Country Clubs	384	20%	77	5,000	2	764,764	105	102,841
All Recreation	477		206			1,469,936	202	197,668
Hotels	465	70%	326	15,000	6	9,713,496	1,330	1,306,217
Corp Cafeteria	100	70%	70	10,000	4	1,390,480	190	186,984
Supermarkets	580	50%	290	10,000	4	5,760,560	789	774,648
Independent QSRs	3,456	30%	1,037	5,000	2	10,299,484	1,410	1,385,017
Small Chain QSRs	495	30%	149	5,000	2	1,479,868	203	199,004
Large Chain QSRs	4,127	30%	1,238	5,000	2	12,295,816	1,684	1,653,473
All QSRs	8,078		2,424			24,075,168	3,297	3,237,494
Independent FSRs	8,161	60%	4,897	5,000	2	48,637,004	6,660	6,540,433
Small Chain FSRs	382	60%	229	7,500	3	3,411,642	467	458,779
Large Chain FSRs	282	60%	169	7,500	3	2,517,762	345	338,575
Caterers	781	50%	391	5,000	2	3,883,412	532	522,220
Drinking Places w/ Limited Menu	1,581	20%	316	5,000	2	3,138,512	430	422,050
All FSRs	11,187		6,002			61,588,332	8,434	8,282,057
Total Institutional	6,485		2,378			40,940,499	5,607	5,505,449
Total Commercial	19,265		8,426			85,663,500	11,731	11,519,551
Grand Total	25,750		10,804			126,603,999	17,338	31,533,729

Summary

Table 29 shows a summary of the potential energy savings for all of the appliances and systems discussed above within CNP’s service area.

Table 29 Potential Energy Savings by Category

Category	Number of Rebate Eligible Appliances or Systems	Potential Electric Savings, kWh/yr	Potential Gas Savings, Therms/yr
Cooking Appliances, Electric	45,748	193,498,037	
Cooking Appliances, Gas	96,676		21,562,162
Reach-in Refrigeration	76,972	76,085,112	
Ice Machines	27,169	62,108,334	
Handwrap Machines	4,200	6,489,000	
Dishwashers	9,837	33,182,613	4,062,183
Pre-Rinse Spray Valves	27,775	7,852,993	1,299,911
Commercial Kitchen Ventilation	10,804	126,603,999	31,533,729
Total Appliances & Potential Savings	299,181	505,820,088	58,457,985

Subtask 1D Downstream Incentive Analysis

Frontier Energy assessed the downstream incentive structure in CNP Energy’s service area in order to provide recommendations for the upstream pilot program to maximize dealer participation and the subscription rate to the more prevalent appliances within the utility’s service area.

The assessment is divided into sections for gas and electric incentives. The gas portfolio has sections covering gas cooking appliances, sanitation, and kitchen ventilation. The electric portfolio has sections covering electric cooking appliances, reach-in refrigeration and ice makers, and kitchen ventilation.

Each section has three tables: (1) a comparison of CNP incentive categories and rebate amounts to CAIOU categories and rebate amounts, (2) a comparison of the respective appliance specifications for program qualification, and (3) a list of suggested specifications with proposed rebate amounts and optimal rebate amounts for the upstream program. The proposed rebate amounts are considered adequate and are generally higher than those currently in use by the CNP utilities. However, a set of optimal rebates are proposed that will be attractive for end-users and will increase the likelihood of rebate uptake, and motivate dealers to stock and promote high-efficiency appliances.

Gas Food Service Measures

Gas food service measures include cooking appliances, dishwashers that use gas-heated hot water, and kitchen ventilation systems that have makeup air heated with gas.

Gas Cooking Appliances

Table 30 lists all of the gas cooking appliances found in the rebate applications for Nicor, PGL/NSG, and three CAIOUs: Pacific Gas and Electric Company (PG&E), Southern California Gas Company (SoCalGas), and San Diego Gas & Electric (SDG&E). Nicor and PGL/NSG have appliances in common that in general have different qualification language, but that result in substantially equivalent specifications. Both include steam cookers, convection ovens, combination ovens, conveyor ovens, and fryers. Nicor includes pasta cookers and rotisserie ovens, but PGL/NSG and the CAIOUs do not. Nicor and the CAIOUs include griddles, but PGL/NSG does not. Nicor and PGL/NSG include infrared charbroilers (underfired broilers), infrared salamander broilers, and infrared upright broilers, but the CAIOUs do not. SoCalGas and PG&E offer a (recently launched) measure for conveyor broilers, but Nicor and PGL/NSG do not.

There are differences in CAIOU rebate amounts between PG&E and SoCalGas. For certain categories — steamers, combis, and DCKV — PG&E offers a portion of the incentive to the dealer, while SoCalGas provides the entire incentive to the customer regardless of the market channel.

Table 31 provides a side-by-side comparison of the program requirements for each cooking appliance. Table 32 contains recommended qualifications to reconcile the differences between Nicor and PGL/NSG and

recommended Upstream Pilot rebates. The column titled “Incentive” is based on the value of the first year energy savings. The Optimal Incentive represents the value needed to significantly impact the market.

Tables 33, 34, and 35 for the Sanitation section cover the existing incentive amounts, qualification criteria, and recommended qualification criteria and incentive amounts for the upstream pilot program. Nicor and PGL/NSG include rebates for pre-rinse spray valves in their programs if they are served by gas-fired service hot water heaters. PGL/NSG includes high temperature dishwashers served by gas-fired water heaters, but Nicor does not, while CAIOUs included only high temperature door-type dishwashers. PGL/NSG includes low temperature dishwashers served by gas-fired water heaters, but Nicor and the CAIOUs do not.

Tables 36, 37, and 38 in the Kitchen Ventilation section cover the existing incentive amounts, qualification criteria, and recommended qualification criteria and incentive amounts for the upstream pilot program. The gas program incentive in the PGL/NSG program is for demand control kitchen ventilation systems only if the makeup air is conditioned by natural gas-fired equipment. Nicor does not include this in its current downstream program, as well kitchen exhaust heat recovery.

Three of the measures in the tables below are not in the 2019 TRM: (1) Bottom-Finned Stock Pot is part of Nicor’s 2018 downstream program, (2) Kitchen Exhaust Heat Recovery Grease Trap Filter is part of PGL/NSG’s 2018 downstream program, and (3) Conveyor Broiler is part of PG&E’s 2018 program. Base on recent test results, Conveyor Broilers have been approved for California utilities²⁸ and we are recommending that they be included in the Upstream Pilot.

²⁸ SCG Workpaper WPSCGNRCC171226A Rev 0 dated December 28, 2017 (authored by Denis Livchak with Frontier Energy).

Table 30 Gas Cooking Appliance Rebates for Nicor, PGL/NSG, and CAIOU

GAS MEASURES	Nicor Gas		Peoples Gas & Light and North Shore Gas		CAIOU - PG&E			CAIOU - SoCalGas			CAIOU - SDG&E		
	Unit	Incentive	Unit	Incentive	Code	Unit	Incentive	Code	Unit	Incentive	Code	Unit	Incentive
COOKING EQUIPMENT													
STEAM COOKER													
ENERGY STAR Steam Cookers 3 Pan			Unit	\$600									
ENERGY STAR Steam Cookers 4 Pan			Unit	\$800									
ENERGY STAR Steam Cookers 5 Pan	Cooker	\$950	Unit	\$1,000	F109	per Steamer Compartment	\$2,000	530539	per Steamer Compartment	\$2,500	402136	per Steamer Compartment	\$2,000
ENERGY STAR Steam Cookers 6 Pan or >	Cooker	\$950	Unit	\$1,200									
CONVECTION OVEN													
Convection Ovens, Full-size	Oven	\$400	Cavity	\$200	F188	Oven	\$500	530535		\$500	402027		\$500
Convection Ovens, Large Full-size	Oven	\$400	Cavity	\$200	F188	Oven	\$500	530535		\$500	402027		\$500
COMBINATION OVEN													
Combination Ovens < than 15 pans			Oven	\$150	HA48	Unit	\$700	530538		\$1,100	463501		\$700
Combination Ovens 15-28 pans					F101	Unit	\$1,000	540250		\$1,450	463502		\$1,000
Combination Ovens > than 28 pans	"Per Deck"	\$900			HA49	Unit	\$2,000	540249		\$2,400	463503		\$2,000
Combination Ovens 15-30 pans			Oven	\$350									
Combination Ovens > than 30 pans			Oven	\$550									
CONVEYOR OVEN													
Conveyor oven width < 25 inches	Oven Deck	\$500			F208	Per Deck	\$750						
Conveyor oven width ≥ 25 inches	Oven Deck	\$1,000	Oven	\$500	F208	Per Deck	\$750	530542		\$750			
RACK OVEN													
Rack Oven Single	Oven	\$700			F207	Oven	\$2,000	530541	Oven	\$2,000			
Rack Oven Double	Oven	\$1,400	Oven	\$1,000							402029		\$2,000

CNP Upstream Commercial Food Service Pilot Program

GAS MEASURES	Nicor Gas	Peoples Gas & Light and North Shore Gas	CAIOU - PG&E	CAIOU - SoCalGas	CAIOU - SDG&E
FRYER					
ENERGY STAR Fryers < 18 in.	Fryer \$500	Fry Vat \$500	F206 Vat \$749	530537 Vat \$749	402005 Vat \$749
ENERGY STAR Large Vat Fryers >= 18 in.	Fryer \$550	Fry Vat \$500			
GRIDDLE					
ENERGY STAR Griddles	Griddle \$250				
Commercial Griddles			FS003 Per Foot \$100	540022 \$100/ft	462972 \$100/ft
PASTA COOKER	Pasta Cooker \$200				
ROTISSERIE OVEN	Oven \$500				
INFRARED CHARBROILER (UNDERFIRED)	Broiler \$500				
INFRARED SALAMANDER BROILER	Broiler \$500	Broiler \$300			
INFRARED UPRIGHT BROILER	Broiler \$500				
ONVEYOR BROILER					
2-Lane Width (<22")			FS023 Broiler \$2,000	540631 Broiler 1,260	
3-Lane Width (22-28")			FS024 Broiler \$2,500	540632 Broiler 1,900	
4-Lane Width (>28")			FS025 Broiler \$3,000	540633 Broiler 1,740	
BOTTOM-FINNE STOCK POT	Stock Pot \$25				

Table 31 Gas Cooking Appliance Specifications for Nicor, PGL/NSG, and PG&E

Nicor Gas	Peoples Gas & Light and North Shore Gas	CAOIU - PG&E
Existing Specifications		
STEAM COOKER		
<ul style="list-style-type: none"> ENERGY STAR rated with a Cooking Efficiency \geq 38%. Five- and six-pan units are eligible. 	Qualified by ENERGY STAR or Fisher-Nickel, Inc. Minimum 3-pan capacity.	Cooker must meet ENERGY STAR Version 1.2 specification for energy efficiency or must have a tested heavy-load (potato) cooking energy efficiency of 38 percent or greater, using ASTM Standard F1484.
CONVECTION OVEN		
<ul style="list-style-type: none"> ENERGY STAR rated with a Cooking Efficiency \geq 46% using ASTM standard 1496. Must have an Idle Energy Consumption Rate \leq 12,000 Btu/h. 	Qualified by ENERGY STAR or Fisher-Nickel, Inc.	<ul style="list-style-type: none"> Qualifying models must be listed in the CEC database. Model must meet ENERGY STAR Version 2.2 specification or have a tested heavy-load (potato) cooking energy efficiency of 46 percent or more, utilizing ASTM Standard F1496. Full-size gas ovens (\leq 5 pans) must have an idle rate of 12,000 Btuh or less. Large full-size ($>$ 5 pans) must have an idle rate of 13,000 Btuh or less.

Nicor Gas	Peoples Gas & Light and North Shore Gas	CAIOU - PG&E
COMBINATION OVEN		
<p>Installed equipment must be a new ENERGY STAR certified natural gas combination oven with steam oven cooking efficiency \geq 41% and convection mode cooking efficiency \geq 56%.</p>	<p>Qualified by ENERGY STAR or Fisher-Nickel, Inc.</p>	<ul style="list-style-type: none"> • Oven must have a cooking energy efficiency of 38 percent or greater in steam mode and 44 percent or greater in convection mode, utilizing ASTM Standard F2861. <p>Exclusions:</p> <ul style="list-style-type: none"> • 2/3-size combination ovens are not eligible. • Gas combination ovens with a pan capacity < 6 are not eligible. <p>Oven must meet the idle energy rate requirements:</p>
CONVEYOR OVEN		
<ul style="list-style-type: none"> • Cooking efficiency \geq 42% using ASTM standard F1817. Must have an Idle Energy Consumption Rate \leq 57,000 Btu/h. • Number of decks is determined by the manufacturer and model number. • Rebates are paid per deck, based on conveyor width. 	<p>Qualified by ENERGY STAR or Fisher-Nickel, Inc. Conveyor belt width must be greater than or equal to 25 inches.</p>	<ul style="list-style-type: none"> • Oven must have a tested baking energy efficiency of 42 percent or greater and must have a tested idle energy rate that is 57,000 Btu/h or less, using ASTM Standard F1817. • Multiple-deck oven configurations are paid per qualifying oven deck.
RACK OVEN		
<p>Baking Energy Efficiency \geq 50% using ASTM standard 2093. Single and double ovens are eligible. Rebate paid per oven.</p>	<p>Qualified by ENERGY STAR or Fisher-Nickel, Inc. DOUBLE RACK OVEN ONLY</p>	<ul style="list-style-type: none"> • Both single and double full-size rack ovens are eligible. • Oven must have a tested baking energy efficiency of 50 percent or greater, using ASTM Standard F2093. <p>Exclusions:</p> <p>Mini rack ovens (< 15 pans) are not eligible.</p>

Nicor Gas	Peoples Gas & Light and North Shore Gas	CAIOU - PG&E
FRYER		
<p>ENERGY STAR rated with a Heavy Load Cooking Efficiency \geq 50% using ASTM standard F1361 or F2144.</p> <ul style="list-style-type: none"> • Rebate is paid per vat, based on vat width. 	<p>Qualified by ENERGY STAR or Fisher-Nickel, Inc.</p>	<p><u>Vat width < 18"</u> must meet ENERGY STAR Version 2.0 or ASTM Standard F1361 heavy-load cooking eff of 50% AND an idle energy rate \leq 9,000 Btuh.</p>
GRIDDLE		
<ul style="list-style-type: none"> • ENERGY STAR rated with a Heavy Load Cooking Efficiency \geq 38% using ASTM standard F1275. • Idle Energy Consumption Rate \leq 2,650 Btu/h per square foot of cooking surface. 	<p>Not in PGL/NSG program.</p>	<p>Must have ASTM Standard F1275 heavy-load cooking efficiency of \geq38% and an idle energy rate \leq 2,650 Btuh per ft² of cooking surface.</p>
PASTA COOKER		
<p>Must be a dedicated pasta cooker as determined by the manufacturer.</p>	<p>Not in PGL/NSG program.</p>	<p>Not in PG&E's program.</p>
ROTISSERIE OVEN		
<p>Must use infrared burners.</p>	<p>Not in PGL/NSG program.</p>	<p>Not in PG&E's program.</p>
INFRARED CHARBROILER (UNDERFIRED)		
<p>Must use infrared burners.</p>	<p>Not in PGL/NSG program.</p>	<p>Added to PG&E's program in July 2018.</p>
INFRARED SALAMANDER BROILER		
<p>Must use infrared burners.</p>	<p>Must have infrared burner.</p>	<p>Not in PG&E's program.</p>
INFRARED UPRIGHT BROILER		
<p>Must use infrared burners.</p>	<p>Not in PGL/NSG program.</p>	<p>Not in PG&E's program.</p>

Nicor Gas	Peoples Gas & Light and North Shore Gas	CAIOU - PG&E
CONVEYOR BROILER		
Not part of Nicor Gas program.	Not in PGL/NSG program.	<ul style="list-style-type: none"> • Conveyor broiler must have a catalyst and a maximum input rate less than 80 kBtu/h or a dual stage or modulating gas valve with a capability of throttling the input rate below 80 kBtu/h. • Conveyor broiler must be installed under a Type I hood. • Underfired broilers, char broilers, steakhouse or overfired broilers, solid fuel broilers, and salamanders are not eligible.
BOTTOM-FINNE STOCK POT		
<ul style="list-style-type: none"> • Stock pot must be a new, commercial-grade bottom-finned stock pot, capacity 18-40 quarts. • Stock pot must be National Sanitation Foundation (NSF) certified. • Stock pot must be purchased and used in a kitchen facility that is commercially licensed by the state of Illinois. • Residential uses and commercial facility kitchenettes are not eligible. 	Not in PGL/NSG program.	Not in PG&E's program.

Table 32 Recommended Upstream Program Incentives for Gas Cooking Appliances

CRITERIA	UNIT	Standard Incentive	Optimal Incentive
STEAM COOKER			
ENERGY STAR rated with a Cooking Efficiency \geq 38%, using ASTM standard F1484.	Steam Compartment	\$1,000	\$2,000
CONVECTION OVEN			
ENERGY STAR rated with a Cooking Efficiency \geq 46% and an Idle Energy Consumption Rate \leq 12,000 Btu/h, using ASTM standard F1496.	Oven	\$400	\$500
COMBINATION OVEN			
ENERGY STAR rated with steam mode cooking efficiency \geq 41% and convection mode cooking efficiency \geq 56%, using ASTM standard F2861.	Oven	\$900	\$2,000
CONVEYOR OVEN			
Cooking efficiency \geq 42% and an Idle Energy Consumption Rate \leq 57,000 Btu/h, using ASTM standard F1817.	Oven Deck	\$750	\$1,500
RACK OVEN			
ENERGY STAR rated Single-Rack Ovens with a Baking Efficiency \geq 48% and an Idle Energy Consumption Rate \leq 25,000 Btu/h, using ASTM standard F2093. ENERGY STAR rated Double-Rack Ovens with a Baking Efficiency \geq 52% and an Idle Energy Consumption Rate \leq 30,000 Btu/h, using ASTM standard F2093.	Oven	\$700 for Single-Rack Oven \$1,400 for Double-Rack Ovens	\$1000 for Single Rack Ovens \$2000 for Double Rack Ovens
FRYER			
ENERGY STAR rated Fryer with a Cooking Efficiency \geq 50% and an Idle Energy Consumption Rate \leq 9,000 Btu/h, using ASTM standard F1361. ENERGY STAR rated Large Vat Fryer with a Cooking Efficiency \geq 50% and an Idle Energy Consumption Rate \leq 12,000 Btu/h, using ASTM standard F2144.	Fryer Vat	\$500	\$750

GRIDDLE

ENERGY STAR rated with a Heavy Load Cooking Efficiency \geq 38% and an Idle Energy Consumption Rate \leq 2,650 Btu/h per square foot of cooking surface, using ASTM standard F1275 for standard griddles and ASTM standard F1605 for double-sided griddles.	Griddle	\$250	\$500
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PASTA COOKER

Pasta Cooker must have a simmer idle rate \leq 18,000 Btu/h, using ASTM standard F1784.	Pasta Cooker	\$200	\$200
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ROTISSERIE OVEN

Rotisserie must use infrared (IR) burners	Rotisserie	\$500	\$500
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INFRARED CHARBROILER (UNDERFIRED)

Charbroiler must use infrared (IR) burners	Broiler	\$500	\$1,000
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INFRARED SALAMANDER BROILER

Broiler must use infrared (IR) burners	Broiler Deck	\$500	\$500
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CONVEYOR BROILER

<p>Conveyor broiler models (conveyor width < 22-inches) must have a tested idle rate \leq 40,000 Btu/h utilizing ASTM Standard F2239. Conveyor broiler models (conveyor width \geq 22-inches and \leq 28-inches) must have a tested idle energy rate of \leq 60,000 Btu/h utilizing ASTM Standard F2239. Conveyor broiler models (conveyor width > 28-inches) must have a tested idle energy rate of \leq 70,000 Btu/h utilizing ASTM Standard F2239. Conveyor broiler must have a catalyst and a maximum input rate less than 80,000 Btu/h or a dual stage or modulating gas valve with a capability of throttling the input rate below 80,000 Btu/h.</p> <p>NOTE THAT CONVEYOR BROILERS ARE NOT IN THE 2019 TRM.</p>	Broiler	\$2,500	<p>\$2,000 for broilers < 22" conveyor width</p> <p>\$2,500 for broilers with 22-28" conveyor width</p> <p>\$3,000 for broilers > 28" conveyor width</p>
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BOTTOM-FINNE STOCK POT

<ul style="list-style-type: none"> • Stock pot must be a new, commercial-grade bottom-finned stock pot, capacity 18-40 quarts. • Stock pot must be National Sanitation Foundation (NSF) certified. • Stock pot must be purchased and used in a kitchen facility that is commercially licensed by the state of Illinois. • Residential uses and commercial facility kitchenettes are not eligible. <p>NOTE THAT BOTTOM-FINNE STOCK POTS ARE NOT IN THE 2019 TRM.</p>	Stockpot	\$25	\$25
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Sanitation

PG&E and SoCalGas only provide a rebate for high temperature stationary single tank dishwashers, while PGL/NSG provide rebates for all styles except flight conveyor dishwashers.

Table 33 Sanitation Appliance Rebates for Nicor, PGL/NSG, and CAIOU

GAS MEASURES	Nicor Gas		Peoples Gas & Light and North Shore Gas		CAIOU - PG&E			CAIOU - SoCalGas			CAIOU - SDG&E		
	Unit	Incentive	Unit	Incentive	Code	Unit	Incentive	POS Code	Unit	Incentive	Code	Unit	Incentive
PRE-RINSE SPRAY VALVE	Valve	\$25			FS001	Valve	\$35						
LOW-TEMPERATURE COMMERCIAL DISHWASHER													
Under Counter			Unit	\$90									
Stationary Single Tank Door			Unit	\$350									
Single Tank Conveyor			Unit	\$350									
Multi Tank Conveyor			Unit	\$400									
HIGH-TEMPERATURE COMMERCIAL DISHWASHER													
Under Counter			Unit	\$45									
Stationary Single Tank Door			Unit	\$350	FS005	Dishwasher	\$600	540273		\$600			
Single Tank Conveyor			Unit	\$350									
Multi Tank Conveyor			Unit	\$400									

Table 34 Sanitation Appliance Specifications for Nicor, PGL/NSG, and PG&E

Existing Specifications		
Nicor Gas	Peoples Gas & Light and North Shore Gas	CAIOU - PG&E
PRE-RINSE SPRAY VALVE		
Spray valves must be installed in commercial kitchens. <ul style="list-style-type: none"> • New spray valves must have a flow rate ≤ 1.25 gpm at 60 psi. • Only single-valve sprayers are eligible. • Domestic hot water must be gas heated. 	Must have a flow rate of less than or equal to 1.24 GPM, be WaterSense® certified, and replace a sprayer greater than or equal to 1.6 GPM.	<ul style="list-style-type: none"> • Qualifying models must be listed in the CEC database. • Pre-rinse spray valves must meet WaterSense specifications and have a tested flow rate of 1.15 gallons per minute (GPM) or less, utilizing ASTM F2324.
LOW TEMPERATURE COMMERCIAL DISHWASHER		
Not part of Nicor's program.	Qualified by ENERGY STAR. Low-temperature dishwasher with a natural gas-fired water heater.	Not in PG&E's program
HIGH TEMPERATURE COMMERCIAL DISHWASHER		
Not part of Nicor's program.	Qualified by ENERGY STAR. High temperature dishwasher with a natural gas fired water heater.	SINGLE TANK HIGH TEMPERATURE ONLY <ul style="list-style-type: none"> • Qualifying models must meet ENERGY STAR Version 2.0 plus 15 percent water consumption or have a tested water consumption of ≤ 0.75 gallons/rack and idle energy rate ≤ 0.70 kW per the ENERGY STAR test method. • Qualifying models must be door-type high temperature sanitizing. Exclusions: <ul style="list-style-type: none"> • Low-Temperature, Dump & Fill/Tankless, Undercounter, and Conveyor Dishwashers are not eligible.

Table 35 Recommended Upstream Program Incentives for Sanitation Equipment

CRITERIA	UNIT	Standard Incentive	Optimal Incentive
PRE-RINSE SPRAY VALVE²⁹			
Pre-rinse spray valves must meet WaterSense specifications and have a tested flow rate of ≤ 1 gallons per minute (GPM) or less, utilizing ASTM F2324	Spray Valve	\$25	\$25
LOW TEMPERATURE COMMERCIAL DISHWASHER			
Qualifying models must meet ENERGY STAR water consumption for low-temperature sanitizing dishwashers. Undercounter type machines must have a tested water consumption of ≤ 0.5 gallons/rack per the ENERGY STAR test method. Stationary door type machines must have a tested water consumption of ≤ 1.18 gallons/rack per the ENERGY STAR test method. Rack conveyor type machines must have a tested water consumption of ≤ 0.79 gallons/rack per the ENERGY STAR test method.	Dishwasher	\$350	\$200 for undercounter units \$500 for door-type units \$1000 for rack conveyor units
HIGH TEMPERATURE COMMERCIAL DISHWASHER			
Qualifying models must meet ENERGY STAR water consumption for high-temperature sanitizing dishwashers. Undercounter type machines must have a tested water consumption of ≤ 0.86 gallons/rack per the ENERGY STAR test method. Stationary door type machines must have a tested water consumption of ≤ 0.89 gallons/rack per the ENERGY STAR test method. Rack conveyor type machines must have a tested water consumption of ≤ 0.70 gallons/rack per the ENERGY STAR test method.	Dishwasher	\$350	\$300 for undercounter units \$750 for door-type units \$1500 for rack conveyor units

²⁹ We recommend that PRSVs be included in a Direct Install program instead of the Upstream Pilot Program.

Kitchen Ventilation, Gas Incentives

Table 36 lists two kitchen ventilation technologies that reduce gas use for heating makeup air and service hot water. CKV Hood with Demand Control reduces exhaust and makeup air when cooking loads are low. Kitchen Exhaust Heat Recovery Grease Trap Filter uses a built-in water to water heat exchanger that captures heat from exhaust air at the grease filter rack and uses it to preheat incoming service water at the water gas heater. This technology is not recognized in the 2019 TRM.

Table 36 Kitchen Ventilation Rebates for Nicor, PGL/NSG, and CAIOU

GAS MEASURES	Nicor Gas		Peoples Gas & Light and North Shore Gas		CAIOU - PG&E			CAIOU - SoCalGas			CAIOU - SDG&E		
	Unit	Incentive	Unit	Incentive	Code	Unit	Incentive	POS Code	Unit	Incentive	Code	Unit	Incentive
KITCHEN VENTILATION													
CKV HOOD WITH DEMAND CONTROL			Exhaust Fan HP	\$650									
KITCHEN EXHAUST HEAT RECOVERY GREASE TRAP FILTER			Per Unit	\$410									

Table 37 Kitchen Ventilation Measure Specifications for Nicor, PGL/NSG, and PG&E

Existing Specifications		
Nicor Gas	Peoples Gas & Light and North Shore Gas	CAIOU - PG&E
DEMAND CONTROL KITCHEN VENTILATION		
Not in Nicor Gas program.	<p>Control system must include: Temperature sensor in the hood exhaust collar and/or an optic sensor on the end of the hood; variable speed drive on the exhaust fan that will vary the rate of exhaust to what is needed; variable speed drive on the make-up air unit, or other modification to reduce make-up air equivalent to exhaust air reduction. Make-up air must be conditioned to a minimum of 55°F by natural gas-fired equipment. ComEd may offer an additional standard or custom incentive for this measure. Visit ComEd.com for more information.</p> <p>Installation of new or retrofit controls that vary the ventilation based on cooking load and/or the time of day.</p>	<ul style="list-style-type: none"> • New commercial kitchen exhaust hood control system must be installed in a new or an existing, dedicated commercial kitchen exhaust hood and make-up air system. • Control system must be used in conjunction with variable-speed fan motor controls. • Only preapproved control systems will qualify for this incentive.
KITCHEN EXHAUST HEAT RECOVERY GREASE TRAP FILTER		
Not in Nicor Gas program.	Grease trap filter and heat exchanger to recover heat from kitchen exhaust air duct with constant flow. Plumbed to domestic hot water system to provide preheating to incoming water.	Not in PG&E's program.

Table 38 Recommended Upstream Program Gas Incentives for Kitchen Ventilation

CRITERIA	UNIT	Standard Incentive	Optimal Incentive
CKV HOOD WITH DEMAND CONTROL			
Control system must include: Temperature sensor in the hood exhaust collar and/or an optic sensor on the end of the hood; variable speed drive on the exhaust fan that will vary the rate of exhaust to what is needed; variable speed drive on the make-up air unit, or other modification to reduce make-up air equivalent to exhaust air reduction. Make-up air must be conditioned to a minimum of 55°F by natural gas-fired equipment. Installation of new or retrofit controls that vary the ventilation based on cooking load and/or the time of day.	Exhaust fan HP	\$650	\$750
KITCHEN EXHAUST HEAT RECOVERY GREASE TRAP FILTER			
Grease trap filter and heat exchanger to recover heat from kitchen exhaust air duct with constant flow. Plumbed to domestic hot water system to provide preheating to incoming water. THIS TECHNOLOGY IS NOT IN THE 2019 TRM	unit	\$0	\$0

Electric Food Service Measures

Electric Cooking Appliances

ComEd and the CAIOUs include the same cooking appliances in their programs, except that the CAIOUs have an incentive for on-demand hand wrap machines that are typically used in supermarkets. ComEd’s incentive levels in some cases were comparable to the CAIOUs, and in a few cases were higher or lower. Southern California Edison (SCE) in most categories provides the entire rebate to the customer, while for selected categories — steamers, combi ovens, demand DCKV — PG&E provides a portion of it to the equipment dealers. Table 39 shows there are some differences in appliance sizing criteria.

Table 39 Electric Cooking Appliance Rebates for CNP and PG&E

ELECTRIC MEASURES	ComEd		CAIOU - PG&E			CAIOU - SCE			CAIOU - SDG&E		
	Unit	Incentive	Code	Unit	Incentive	Code	Unit	Incentive	Code	Unit	Incentive
COOKING EQUIPMENT											
STEAM COOKER											
ENERGY STAR Steam Cookers, all sizes	Cooker	\$1,500	F108	Per Compartment	\$1,250	FS-38502	Per Compartment	\$1,850	402135	Per Compartment	\$1,250
COMBINATION OVEN / STEAMER											
Combination Oven (ASTM F2861, => 60% heavy load cooking efficiency)	Oven	\$1,100									
Combination Oven < than 15 pans			HA16	Unit	\$1,000	FS-14121	Unit	\$1,350	463498	Unit	\$1,000
Combination Oven 15-28 pans			F100	Unit	\$1,000	FS-30956	Unit	\$1,375	463499	Unit	\$1,000
Combination Oven > than 28 pans			HA19	Unit	\$4,000	FS-20134	Unit	\$5,000	463500	Unit	\$4,000
COMMERCIAL CONVECTION OVEN											
ENERGY STAR Convection Oven, v2											
Convection Oven - Full Size	Oven	\$170	F187	Full-Size Oven	\$350	FS-59869	Full-Size Oven	\$750	402026	Full-Size Oven	\$350
Convection Oven - Half Size			F187	Half-Size Oven	\$350	FS-68320	Half-Size Oven	\$350			

CNP Upstream Commercial Food Service Pilot Program

HOT FOOD HOLDING CABINET						
ENERGY STAR Hot Food Holding Cabinet						
Insulated Holding Cabinet - Full Size: internal measured volume of ≥ 15 ft.3	Cabinet \$320	F110 Full Size HFHC \$750	FS-20224 Full Size HFHC \$750			
Insulated Holding Cabinet - Half Size: internal measured volume of <15 ft.3		F111 Half Size HFHC \$200	FS-31559 Half Size HFHC \$200			
COMMERCIAL FRYER						
ENERGY STAR Electric Vat Fryer	Fryer \$200	F205 Per Vat \$650	FS-57892 Per Vat \$650	402004 Per Vat \$650		
COMMERCIAL GRIDDLE						
Commercial Griddle	Per Griddle \$130	FS002 Per Linear Foot \$150	FS-61445 Per Linear Foot \$150/ft	462971 Per Linear Foot \$150/ft		
ON-DEMAND HAND WRAP MACHINE						
On-Demand Hand Wrap Machine		FS009 Unit \$125	FS-77556 Unit \$125			

Table 40 Electric Cooking Appliance Specifications

ComEd	CAIOU - PG&E
STEAM COOKER	
<p>Must be ENERGY STAR-qualified with a minimum cooking energy efficiency of 50 percent for all size units.</p>	<p>Cooker must meet ENERGY STAR Version 1.2 specification for energy efficiency or must have a tested heavy-load (potato) cooking energy efficiency of 50 percent or greater, using ASTM Standard F1484.</p>
COMBINATION OVEN / STEAMER	
<p>Must meet or exceed heavy load cooking energy efficiency of 60 percent using ASTM Standard F2861.</p>	<p>Oven must have a cooking energy efficiency of 50 percent or greater in steam mode and 70 percent cooking energy efficiency or greater in convection mode, using American Society for Testing and Materials (ASTM) Standard F2861.</p> <ul style="list-style-type: none"> • 2/3-size combination ovens are not eligible. • Electric combination ovens with a pan capacity of < 5 are not eligible. <p>Oven must meet the idle energy rate requirements: steam = 5.0 kW or less; convection = 2.0 kW or less steam = 6.0 kW or less; convection = 2.5 kW or less steam = 9.0 kW or less; convection = 4 kW or less</p>
COMMERCIAL CONVECTION OVEN	
<p>Must meet ENERGY STAR Version 2.0 Convection Oven specification.</p>	<ul style="list-style-type: none"> • Qualifying models must be listed in the California Energy Commission (CEC) database. • Model must meet ENERGY STAR Version 2.2 specification or have a tested heavy-load (potato) cooking energy efficiency of 71 percent or more, using ASTM Standard F1496. • Full-size electric ovens (≤ 5 pans) must have an idle rate of 1.6 kW or less. • Large full-size (> 5 pans) must have an idle rate of 1.9 kW or less and a heavy-load cooking energy efficiency of 73 percent or more. • Half-size electric ovens must have an idle rate of 1.0 kW or less.
HOT FOOD HOLDING CABINET	
<p>Must meet ENERGY STAR Version 2.0 Hot Food Holding Cabinet (HFHC) specification.</p>	<ul style="list-style-type: none"> • Qualifying models must be listed in the CEC database. • Cabinet must meet the Consortium for Energy Efficiency (CEE)-Tier 2 specification and must have a tested idle energy rate less than or equal to 20 W per cubic foot using ASTM Standard F2140. • All measures apply to electric hot-food holding cabinets that are fully insulated and have solid doors.

ComEd	CAIOU - PG&E
COMMERCIAL FRYER	
<p>Must be ENERGY STAR-qualified with a minimum cooking energy efficiency of 80 percent for all size units.</p>	<ul style="list-style-type: none"> • Electric fryer (vat width < 18 inches) must meet ENERGY STAR Version 2.0 specification for energy efficiency or must have a tested heavy-load cooking energy efficiency of 80 percent and an idle energy rate less than or equal to 1,000 watts (W), using ASTM Standard F1361. • Electric large vat fryer (vat width ≥ 18 inches) must meet ENERGY STAR Version 2.0 specification for energy efficiency or must have a tested heavy-load cooking energy efficiency of 80 percent and an idle energy rate less than or equal to 1,100 W, using ASTM Standard F2144.
COMMERCIAL GRIDDLE	
<p>Must be ENERGY STAR-qualified with a minimum cooking energy efficiency of 65 percent for all size units.</p>	<p>Griddle must have a tested heavy-load cooking energy efficiency of 70 percent or greater and an idle energy rate of 355 W per square foot of cooking surface or less, using ASTM Standard F1275.</p>
ON-DEMAND HAND WRAP MACHINE	
<p>Not in ComEd's program.</p>	<p>Must use either a mechanical or optical control system.</p>

The column titled “Incentive” is based on the value of the first year energy savings. The Optimal Incentive represents the value needed to significantly impact the market.

Table 41 Recommended Upstream Program Incentives for Electric Cooking Appliances

CRITERIA	UNIT	Standard Incentive	Optimal Incentive
STEAM COOKER			
ENERGY STAR rated with a Cooking Efficiency \geq 50%, using ASTM standard F1484.	Steam Compartment	\$1,000	\$1,500
COMBINATION OVEN / STEAMER			
ENERGY STAR rated with steam mode cooking efficiency \geq 55% and convection mode cooking efficiency \geq 76%, using ASTM standard F2861.	Oven	\$900	\$2,000
COMMERCIAL CONVECTION OVEN			
<ul style="list-style-type: none"> ENERGY STAR rated full-size ovens with a Cooking Efficiency \geq 71% and an Idle Energy Consumption Rate \leq 1.6kW, using ASTM standard F1496. ENERGY STAR rated half-size ovens with a Cooking Efficiency \geq 71% and an Idle Energy Consumption Rate \leq 1.0 kW, using ASTM standard F1496. 	Oven	\$400	\$600
HOT FOOD HOLDING CABINET			
<ul style="list-style-type: none"> ENERGY STAR rated half-size cabinets ($<$ 13 ft³) with an Idle Energy Consumption Rate \leq 21.5 W per cubic foot volume, using ASTM standard F2140. ENERGY STAR rated full-size cabinets (between 13 and 28 ft³) with an Idle Energy Consumption Rate (\leq 2V + 254) W, using ASTM standard F2140. ENERGY STAR rated banquet-size cabinets (\geq 28 ft³) with an Idle Energy Consumption Rate \leq (3.8 V + 203.5) W, using ASTM standard F2140. 	Cabinet	\$320	\$300
COMMERCIAL FRYER			
<ul style="list-style-type: none"> ENERGY STAR rated Fryer with a Cooking Efficiency \geq 83% and an Idle Energy Consumption Rate \leq 800 W, using ASTM standard F1361. ENERGY STAR rated Large Vat Fryer with a Cooking Efficiency \geq 80% and an Idle Energy Consumption Rate \leq 1,100 W, using ASTM standard F2144. 	Fryer Vat	\$500	\$600
COMMERCIAL GRIDDLE			
ENERGY STAR rated with a Heavy Load Cooking Efficiency \geq 70% and an Idle Energy Consumption Rate \leq 320 W per square foot of cooking surface, using ASTM standard F1275 for standard griddles and ASTM standard F1605 for double-sided griddles.	Griddle	\$250	\$600
ON-DEMAND HAND WRAP MACHINE			
Handwrap machine must use either a mechanical or optical sensor to activate the heating element. NOTE THAT ON-DEMAND HAND WRAP MACHINES ARE NOT IN THE 2019 TRM.	Machine	\$100	\$150

Reach-in Refrigeration and Ice Makers

Table 42 shows that the reach-in refrigeration unit sizes are essentially the same between ComEd and the CAIOUs, while ComEd’s program has a fixed rebate amount for each style and type of reach-in and the CAIOUs have increasing rebate amounts as sizes increase. PG&E no longer provides rebates for glass door freezers, but SCE and SDG&E do; whereas SDG&E has eliminated measures for solid-door refrigerators and freezers.

ComEd’s ice makers are differentiated by size only, while the CAIOUs also differentiate by ice making technology (SCU, IMH, and RCU).

Table 42 Electric Refrigeration Appliance Rebates for CNP and CAIOUs

ELECTRIC MEASURES	ComEd		CAIOU - PG&E			CAIOU - SCE			CAIOU - SDG&E		
	Unit	Incentive	Code	Unit	Incentive	Code	Unit	Incentive	Code	Unit	Incentive
REFRIGERATION											
Solid Door Refrigerators											
ENERGY STAR Commercial Solid Door Refrigerators < than 15 ft3	Refrigerator	\$45	F183	Unit	\$45	FS-13121	Unit	\$45			
ENERGY STAR Commercial Solid Door Refrigerators 15 to 30 ft3	Refrigerator	\$45	F184	Unit	\$60	FS-42962	Unit	\$60			
ENERGY STAR Commercial Solid Door Refrigerators 31 - 50 ft3	Refrigerator	\$45	F185	Unit	\$85	FS-93044	Unit	\$85			
ENERGY STAR Commercial Solid Door Refrigerators > than 50 ft3	Refrigerator	\$45	F186	Unit	\$120	FS-31425	Unit	\$120			
Glass Door Refrigerators											
ENERGY STAR Commercial Glass Door Refrigerator - Internal Volume < than 15 ft3	Refrigerator	\$45	F171	Unit	\$40	FS-77373	Unit	\$30			
ENERGY STAR Commercial Glass Door Refrigerator - Internal Volume 15 to 29.9 ft3	Refrigerator	\$45	F172	Unit	\$60	FS-28291	Unit	\$60			
ENERGY STAR Commercial Glass Door Refrigerator - Internal Volume 30 - 49.9 ft3	Refrigerator	\$45	F173	Unit	\$80	FS-68882	Unit	\$80			
ENERGY STAR Commercial Glass Door Refrigerators - Internal Volume 50 ft3 or greater	Refrigerator	\$45	F174	Unit	\$100	FS-44686	Unit	\$100			

ELECTRIC MEASURES	ComEd	CAIOU - PG&E	CAIOU - SCE	CAIOU - SDG&E
Solid Door Freezers				
ENERGY STAR Commercial Solid Door Freezers - Internal Volume < than 15 ft3	Freezer \$100	F179 Unit \$100	FS-21276 Unit \$75	
ENERGY STAR Commercial Solid Door Freezers - Internal Volume 15 - 30 ft3	Freezer \$100	F180 Unit \$150	FS-61432 Unit \$100	
ENERGY STAR Commercial Solid Door Freezers - Internal Volume 31 - 50 ft3	Freezer \$100	F181 Unit \$300	FS-86848 Unit \$160	
ENERGY STAR Commercial Solid Door Freezers - Internal Volume > than 50 ft3	Freezer \$100	F182 Unit \$600	FS-54809 Unit \$350	
Glass Door Freezers				
Glass Door Freezers < 15ft3			FS-16170 Unit \$60	Unit
Glass Door Freezers 15 - 29.9 ft3	Freezer, All Sizes \$200		FS-38598 Unit \$125	402160 Unit \$60
Glass Door Freezers 30 - 49.9 ft3		FS-58112 Unit \$275	402161 Unit \$80	
Glass Door Freezers >= 50 ft3		FS-30794 Unit \$515	402159 Unit \$100	
ICE MACHINES				
Efficient Air-Cooled 100–200 lbs/day	Ice Maker \$100			
efficient Air-Cooled 201–300 lbs/day	Ice Maker \$100			
efficient Air-Cooled 301–400 lbs/day	Ice Maker \$100			
efficient Air-Cooled 401–500 lbs/day	Ice Maker \$100			
efficient Air-Cooled 501–1000 lbs/day	Ice Maker \$150			
efficient Air-Cooled 1001–1500 lbs/day	Ice Maker \$150			
efficient Air-Cooled > 1500 lbs/day	Ice Maker \$200			

CNP Upstream Commercial Food Service Pilot Program

Commercial Ice Machine SCU < 110 lbs/day		FS014 Unit \$50	FS-20160 Unit \$50	464053 Unit \$50
Commercial Ice Machine SCU 110–200 lbs/day		FS015 Unit \$75	FS-20161 Unit \$75	464055 Unit \$75
Commercial Ice Machine SCU > 200 lbs/day		FS016 Unit \$100	FS-20162 Unit \$100	464057 Unit \$100
Commercial Ice Machine IMH < 300 lbs/day		FS017 Unit \$75	FS-20163 Unit \$75	464059 Unit \$75
Commercial Ice Machine IMH 300–800 lbs/day		FS018 Unit \$125	FS-20164 Unit \$125	464061 Unit \$125
Commercial Ice Machine IMH 801–1,500 lbs/day		FS019 Unit \$200	FS-20165 Unit \$200	464063 Unit \$200
Commercial Ice Machine IMH >1,500 lbs/day		FS020 Unit \$300	FS-20166 Unit \$300	464065 Unit \$300
Commercial Ice Machine RCU < 988 lbs/day		FS021 Unit \$200	FS-20167 Unit \$200	464067 Unit \$200
Commercial Ice Machine RCU ≥ 988 lbs/day		FS022 Unit \$300	FS-20168 Unit \$300	464069 Unit \$300

Table 43 Electric Refrigeration Measure Specifications

ComEd	California - PG&E
SOLID DOOR REFRIGERATORS	
<p>1. Must meet ENERGY STAR Version 2.1 specification. 2. Cases with remote refrigeration systems are not eligible.</p>	<ul style="list-style-type: none"> • Qualifying models must be listed in the CEC database. • Refrigeration system must be built in (packaged). • Model must meet ENERGY STAR Version 4.0 specification.
GLASS DOOR REFRIGERATORS	
<p>1. Must meet ENERGY STAR Version 2.1 specification. 2. Cases with remote refrigeration systems are not eligible.</p>	<ul style="list-style-type: none"> • Qualifying models must be listed in the CEC database. • Refrigeration system must be built in (packaged). • Model must meet ENERGY STAR Version 4.0 specification.
SOLID DOOR FREEZERS	
<p>1. Must meet ENERGY STAR Version 2.1 specification. 2. Cases with remote refrigeration systems are not eligible.</p>	<ul style="list-style-type: none"> • Qualifying models must be listed in the CEC database. • Refrigeration system must be built in (packaged). • Model must meet ENERGY STAR Version 4.0 specification.
GLASS DOOR FREEZERS	
<p>1. Must meet ENERGY STAR Version 2.1 specification. 2. Cases with remote refrigeration systems are not eligible.</p>	<p>No longer a PG&E Measure.</p>
ICE MACHINES	
<p>1. Only air-cooled, cube-type machines including ice-making head, self-contained and remote-condensing units, qualify. This measure excludes flake and nugget-type ice machines. 2. The ice maker must be ENERGY STAR-qualified.</p>	<ul style="list-style-type: none"> • Qualifying models must be listed in the CEC database. • Qualifying models must meet Qualified Ice Maker specifications listed on fishnick.com/saveenergy/rebates. • Models must meet ENERGY STAR Version 3.0 specification. • Models include machines generating ice cubes that are 60 grams (2 oz.) or lighter. It also includes ice makers that flake, crush and fragment ice cubes. • Rebate amount depends on ice making rate (lbs/day) and equipment type: self-contained units (SCU), ice making heads (IMH), and remote condensing units (RCU). • Only air-cooled machines qualify for this rebate. • Customer must purchase the entire Air Conditioning, Heating and Refrigeration Institute (AHRI)-tested ice-making system. • Remote machines must be purchased with qualifying remote condenser or remote condenser/compressor unit. • Ice machines must be tested in accordance with the AHRI Standard 810.

CEE has recently introduced a TIER 2 Advanced Ice Machine specification that we recommend supporting in the Upstream program. The performance criteria are above those of ENERGY STAR v3.0 for Ice

Machines. The column titled “Incentive” is based on the value of the first year energy savings. The Optimal Incentive represents the value needed to significantly impact the market.

Table 44 Recommended Upstream Program Incentives for Commercial Refrigeration Appliances

NEW CRITERIA	UNIT	Standard Incentive	Optimal Incentive
REFRIGERATION			
SOLID DOOR REFRIGERATOR			
Refrigeration system must be built in (packaged); Model must meet ENERGY STAR V4.0 specification, using ASHRAE standard 72.	Refrigerator	\$45	\$75
GLASS DOOR REFRIGERATOR			
Refrigeration system must be built in (packaged); Model must meet ENERGY STAR V4.0 specification, using ASHRAE standard 72.	Refrigerator	\$45	\$75
SOLID DOOR FREEZER			
Refrigeration system must be built in (packaged); Model must meet ENERGY STAR V4.0 specification, using ASHRAE standard 72.	Freezer	\$100	\$200
GLASS DOOR FREEZER			
Refrigeration system must be built in (packaged); Model must meet ENERGY STAR V4.0 specification, using ASHRAE standard 72.	Freezer	\$200	\$200
ICE MACHINES			
<ul style="list-style-type: none"> • Only air-cooled, cube-type machines including ice-making head, self-contained and remote-condensing units, qualify. This measure excludes flake and nugget-type ice machines. • Models must meet ENERGY STAR V3.0 performance criteria, using AHRI standard 810; • Advanced models must meet CEE Tier 2 performance criteria for Advanced-Tier Air-Cooled Equipment, using AHRI standard 810. 	Ice Maker	\$100 for ENERGY STAR units \$200 for CEE Tier 2 Advanced units	\$150 for ENERGY STAR units \$300 for CEE Tier 2 Advanced units

Kitchen Ventilation, Electric Incentives

Table 45 Commercial Kitchen Ventilation Rebates for CNP and CAIOUs

ELECTRIC MEASURES	ComEd		CAIOU - PG&E			CAIOU - SCE			CAIOU - SDG&E		
	Unit	Incentive	Code	Unit	Incentive	Code	Unit	Incentive	Code	Unit	Incentive
COMMERCIAL VENTILATION											
Demand Control Kitchen Ventilation											
DCKV - New or Retrofit	Per exhaust fan hp	\$350	F150	Per exhaust fan hp	\$500/HP	FS-17337	Per exhaust fan hp	\$700/HP			
DCKV - New									402033	Per exhaust fan hp	\$500/HP
DCKV - Retrofit										402032	Per exhaust fan hp

Table 46 Electric Kitchen Ventilation Measure Specifications

ComEd	CAIOU - PG&E
DEMAND CONTROL KITCHEN VENTILATION	
<p>1. Control system must include:</p> <ul style="list-style-type: none"> • Temperature sensor in the hood exhaust collar and/or an optic sensor on the end of the hood. • VSD on the exhaust fan that will vary the rate of exhaust to what is needed. • VSD on the makeup air unit if applicable. <p>2. Incentive is based on exhaust fan HP only (not makeup air fan HP).</p> <p>3. VSDs on the make-up air fan do not qualify for an additional incentive.</p>	<ul style="list-style-type: none"> • New commercial kitchen exhaust hood control system must be installed in a new or an existing, dedicated commercial kitchen exhaust hood and make-up air system. • Control system must be used in conjunction with variable-speed fan motor controls. • Only preapproved control systems will qualify for this incentive.

Table 47 Recommended Upstream Program Incentives for Kitchen Ventilation

NEW CRITERIA	UNIT	Standard Incentive	Optimal Incentive
DEMAND CONTROL KITCHEN VENTILATION			
<p>Control system must include: Temperature sensor in the hood exhaust collar and/or an optic sensor on the end of the hood; variable speed drive on the exhaust fan that will vary the rate of exhaust to what is needed; variable speed drive on the make-up air unit, or other modification to reduce make-up air equivalent to exhaust air reduction. Installation of new or retrofit controls that vary the ventilation based on cooking load and/or the time of day.</p>	Exhaust Fan HP	\$0*	\$0*

*Note: Since DCKV systems offer more gas than electric savings, it is recommended that the incentive be sponsored by gas energy efficiency funds.

Summary

The CNP downstream incentive levels were tabulated and compared to the CAIOU incentives for CFS equipment, including sanitation and kitchen ventilation. The comparison shows that the CNP incentive values for gas and electric cooking equipment are generally lower than those set by the California utilities. In general, California's incentive amounts were selected to represent first-year-energy savings for the appliance. But even at this level, the financial incentive often falls short of attracting purchase by the restaurant operator, due in large part, to the high first cost of the equipment being considered. For example, a \$500 rebate does not exhibit the desired influence on the purchase of a \$6,000 ENERGY STAR appliance, particularly when a commodity-level model can be purchased for \$1,000. This is the experience for deep-fat fryers where the cost premium for the ENERGY STAR models is a huge hurdle. When the California utilities increased the incentive to \$750, combined with the recent introduction of an "economy" ENERGY STAR fryer by two leading manufacturers, the uptake was dramatic. The California experience shows that there is significant uptake in the rebates for CFS equipment when the incentive amount approaches twice the first-year-energy savings.

Based on California IOU's experience and authors' insight, increased incentive amounts are recommended for most of the gas and electric appliances in the CNP programs. Recognizing the importance of rebate levels from the customer's viewpoint is a critical first step to realize significant uptake of the food service program. The overall goal of this project is to recommend integrated CNP program strategies that will increase the energy savings from the food service sector.

Subtask 1E Market Structure

The market structure for the CFS industry is extremely complex, including thousands of companies nationwide that build, distribute, promote, install, support, and service CFS equipment. It involves many market actors at each market level. In addition, the procurement channels that are used can vary depending on customer size, type and market segment. CFS equipment is primarily sold through a dealer network, which interfaces with the food service operators on the commercial side and with food service consultants on the non-commercial side of the business. Manufacturers frequently sell direct to large (chain) end-users, whose corporate procurement departments are staffed by architects and engineers and operations specialists focused on designing chain-specific specifications for all equipment purchases. Some of the larger franchised restaurant chains utilize a contracted Kitchen Equipment Supplier (KES) to ensure consistency among both franchised and corporate-owned locations. Independent “mom-and-Pop”-type of operations frequently purchase used equipment from local refurbishment dealers. If buying new, they get it from their local food service equipment and supplies dealer (retail restaurant supply store). A UFSIP will need to be attractive to all of these market participants to be effective.

The viewpoints of these diverse market actors drive purchasing decisions with very different criteria. For example, chain restaurants have centralized purchasing processes that dictate the make and model options of appliances for corporate and franchisee stores. Chains in the CNP service areas have about 12% of all installed appliances³⁰. The purchasing process may not take into account rebates in a given utility territory and utility program administrators do not learn about new stores or rebuilds in time to influence decisions. However, some chains are now beginning to use third-party firms to identify and leverage utility incentives across their franchise footprint. Chains are often slow to change specifications because of the impact on food production, maintenance and concerns about reliability of brands that are new to their inventory. ENERGY STAR levels of efficiency usually are not a high priority in developing specifications. On the other hand, independent restaurant owners are usually local, but decisions are often driven by first costs and the immediate need to replace failed appliances (frequently on very short notice). They will usually buy the least-expensive appliance that is stocked by the dealer and available in the dealer’s showroom or warehouse that they are comfortable will both provide a consistent product and meet their production demands. These decision-making factors must be considered in shaping a successful utility rebate program.

³⁰ Based on analysis of NAICS data for CFS in the CNP service areas using distributions by facility type developed under Zabrowski, D. and Mills, L. (Fisher-Nickel, Inc.) *Characterizing the Energy Efficiency Potential of Gas-fired Commercial Food Service Equipment*. 2010 April. Prepared for the California Energy Commission, Public Interest Energy Research (PIER).

Common Distribution Channels

CFS equipment is distributed through a web of interconnected market actors, each focused on different customer segments. The primary actors include distributors, buying groups, dealers, KES and food and equipment broadliners. CFS equipment and supply manufacturers can be local, national or international. The path the goods follow between the manufacturer and the customer depends upon the type and volume of equipment, the purchasing power of the customer and the overall distance between the two parties.

High-volume appliances such as ice machines and commercial refrigeration frequently utilize a classic distribution system to manage new equipment as well as replacement parts. The distributors sell to equipment dealers (represented by FEDA) and food and equipment broadliners, which then sell directly to customers. Medium volume appliances, such as ovens and fryers, are routed through buying groups, to equipment dealers, directly from manufacturers to kitchen equipment suppliers for chain customers, or via dealer/distributors that leverage the purchasing and sales power of multiple locations.

These primary distribution channels are supported by independent manufacturer's sales representatives (Reps), service agents and food service design consultants. Each of these groups serve a different and complementary role in the promotion and adoption of CFS equipment.

CFS Reps (represented by MAFSI) are the local marketing and sales presence for the various manufacturers. Reps make routine visits to foodservice equipment and supply dealerships, key customers and foodservice designers to provide sales information and training for the products that they represent. Each Rep carries multiple lines, ranging from equipment to supplies and services. The Rep acts as the primary point of contact between the manufacturer and the local dealer and customer, providing technical support, product specifications, in-warranty service support, operations training, price quotations.

CFS service agencies (represented by CFESA) are the primary point of contact for out of warranty service and support. Manufacturers may contract with local service agencies to provide in-warranty support, which is typically managed by the local Rep. Quality service agents are often in the position of a trusted advisor to independent operators for equipment selection. Service agents are trained either directly by the manufacturer, the distributor, or supported by the Rep.

CFS design Consultants (represented by FCSI) work with customer and architectural firms to lay out kitchen process, flow and design. Consultants re trained on equipment features and capabilities by the Reps and the Manufacturer. Due to the higher cost of employing specific designers, Consultants work primarily on non-commercial kitchens (schools, health care, hotels, military, corporate feeding). Some Consultants specialize in high-end restaurant and small (emerging) chain restaurant design. Once a consultant has completed a design, the package is typically submitted to equipment dealers for an open bid. The dealers bidding on a project may be from a different territory.

It is estimated that appliance sales/purchases are divided evenly between the three major food service segments: chains, independents and large commercial/non-commercial. In 1993, Restaurants and Institutions (ref. 7) reported 737,000 food service facilities, of which the non-commercial and institutional represented about one third of the facilities. Foodservice Equipment Reports magazine (telephone conversation with Brian Ward³¹) claims that the chain business is now 50% of the commercial business (which is approximately two-thirds of the total market). Distribution channels and market players are illustrated for each of these three sectors.

The flow chart in Figure 3 shows *typical* distribution channels for the flow of both new installations and replacement of existing appliances.³²

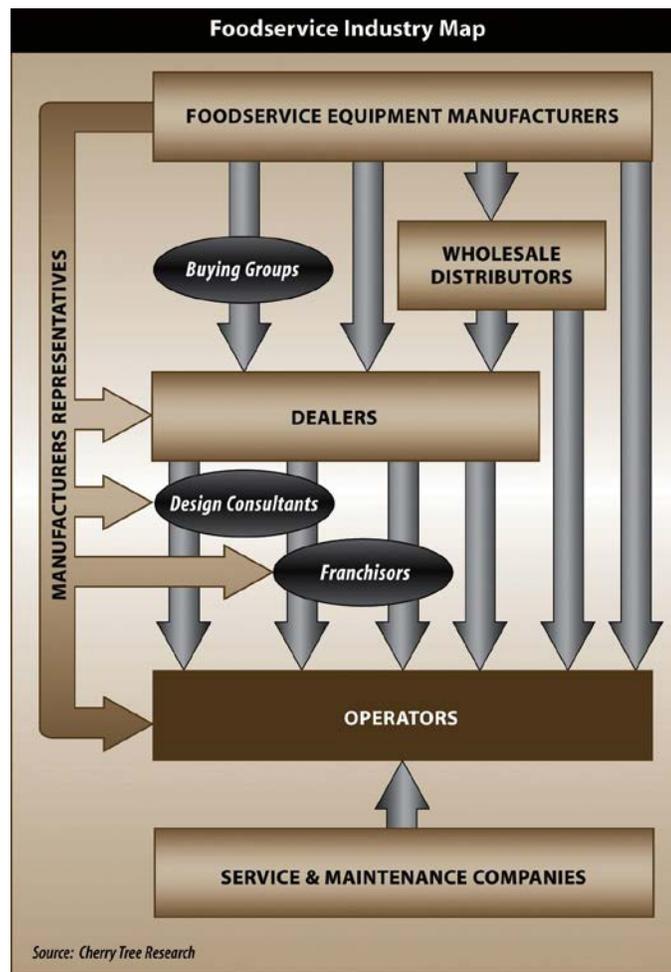


Figure 3 Food Service Industry Map.

Different customer segments interact with the food service equipment and supplies industry in different ways. The three predominant operator groups are large chain operators, independent and

³¹ Don Fisher conversation with Brian Ward, August 2002.

³² NAFEM Certified Food Service Professional training manual.

small chain operators and non-commercial operators. The purchasing power of each customer segment presents opportunities different leverage points within the distribution chain.

Large Chains:

There are three primary channels by which new or replacement units reach a corporate-owned or franchised chain facility:

1. Corporate distribution channel: The corporate design/purchase group works directly with the manufacturer to specify the equipment, including acceptable equipment alternatives and equipment pricing. The equipment is shipped to the corporate distributor, where it awaits to be delivered to the corporate/franchised facility. In some cases, the equipment may be drop-shipped to the project site.
2. Kitchen Equipment Supplier (KES): The corporate design/purchase group contracts with a designated KES to coordinate the marketing, purchase and installation of equipment to both corporate and franchise locations. Pricing is based on a corporate-negotiated rate with the manufacturer and the KES. The KES manages the equipment distribution to the customer site.
3. Equipment dealer: The corporate design group works with a specific food service equipment and design dealership to develop the equipment specifications. In this case, the dealer is typically local to the corporate headquarters. The customer location work directly with the specified dealers, or its designates.

The decision to repair or replace equipment is mostly through repair/maintenance servicing companies.

Some multi-unit operators have in-house service teams or relationships with specific service companies that help to manage equipment service, repair and preplacement. When a unit fails, the maintenance company is called upon for repair. The equipment will be replaced if the technician feels that the unit is no longer serviceable.

Small Chains and Independents:

Independent restaurant operators typically leverage local dealerships or broadline distributors as the primary source for both new and replacement equipment purchases. A small percentage utilize the on-line catalog or large dealer warehouses. Small chain operators typically partner with a local dealer with an in-house design component that can provide both process design and equipment supply to store locations. New equipment is specified the operator (most independent restaurants) or by design consultants (non-commercial and high-end restaurants) and supported by the local manufacturer's Reps.

There are four channels by which a new appliance gets to the independent restaurant:

1. Small dealers: Small dealers negotiate the price of their equipment from the manufacturer through buying groups, who represent a large number of small dealers, or by combining forces with other dealers through a collective association. By coming together and forming buying groups, the smaller dealers can get the same kind of deals/incentives as the large dealers. For cash-and-carry dealers, customers may utilize an outside party to coordinate installation.

2. **Larger dealers:** Larger dealers typically obtain their equipment directly from the manufacturer with local specification support from the Rep. Because of their sales volume, the larger dealers normally obtain equipment at a discounted price.
3. **Catalog house:** Catalog houses obtain their equipment in the same manner as the dealer, often working closely with the local/regional manufacturer's sales representative. An independent can purchase the appliance through the internet and telephone. The unit is then drop-shipped to their location.
4. **Broadliners:** Food broadliners work through the local manufacturer's Reps to secure equipment to offer for sale to customers. Small customers may prefer to purchase equipment from their primary food distributor.

Non-Commercial (Institutional) Facilities:

Institutional facilities rely on professional kitchen designers to identify the equipment and processes needed for new builds. The food service design Consultants write the equipment specifications for the larger commercial and non-commercial sectors. Once the layout of the kitchen has been determined, a procurement list is issued. The appliance is selected/specified by the design consultant who works closely with the manufacturer's Rep to select the equipment according to the design requirements. The specification is then sent to the installing contractor who sends it out to several large dealers and the local service companies to come up with a comprehensive bid on the equipment. The large dealers work with the manufacturer's sales representative to negotiate the lowest price. The dealers (bid houses) then send in the bid for the job. The installing contractor reviews the bid and the bid house with the lowest bid wins the contract. The bid is then returned to the food service design consultant/owner for final approval. The large food service equipment dealer's bid is a complete package that includes the cost of the equipment, shipping, and installation.

Installation, Maintenance, and Repair Channels

Replacement equipment is purchased the same way as described above except that a repair service is used to determine the condition of the old equipment prior to ordering a replacement. There are three primary channels for kitchen operators to obtain installation, maintenance, and repair services:

- Equipment dealers have in-house factory/manufacturer-trained personnel.
- CFESA has local service groups that are factory/manufacturer-certified technicians.
- Local air conditioning/refrigeration, electrical, and plumbing service companies.

All of these channels can have significant influence on appliance replacement choices. Currently there are no incentives for installers (or manufacturer's representatives) to promote high-efficiency appliances when replacement is being considered.

Market Barriers to Promoting Energy-Efficient Cooking Appliances

Although the CFS industry is a very dynamic sector of the North American economy, the industry as a whole has been slow to adopt advances in modern commercial cooking appliance technologies that are related to energy efficiency. One reason for the slow adoption of efficient technology is due to the complexity of the industry. The restaurant market involves a number of key stakeholders within different systems. Some stakeholders are especially important as decision-makers within restaurants, and others play a more critical role as commercial kitchen equipment is brought to market.

A few trends in improving energy efficiency have been observed in key QSR chains nationwide, and, more recently, in noncommercial kitchens, such as higher education and health care (most notably in the state of California). These trends have been driven by the advent of life-cycle cost analysis for primary cooking appliances. Life-cycle cost analysis for cooking appliances can be attributed to the research and dissemination of information from the appliance testing programs sponsored by utilities, such as The FSTC and SCE's Refrigeration Thermal Test Center (RTTC).

A recent operator survey published in the NRA Industry Forecast has shown that many members are interested in upgrading to more efficient equipment. Quick-service venues are currently believed to lead the purchase of energy-efficient equipment; with 16% of the operators interviewed claiming they had purchased some type of energy-efficiency appliance³³. QSR chains, in particular, are more likely to be influenced in their purchasing policies by the general performance data that results from appliance testing.

Despite the large operating costs associated with cooking appliance energy use and a growing awareness of life-cycle cost analysis, first cost (purchase price) continues to be a major factor in food service equipment purchases. Although numerous facilities can benefit from energy-efficiency measures, new energy-efficient technologies typically have a cost premium associated with them, which deters food service operators from purchasing these models. This cost premium is especially pronounced with major commercial cooking appliances, where high-efficiency designs are often bundled with other features such as all-stainless-steel construction and high-quality components and controls.

The CFS market is extremely volatile; the average restaurant may go out of business before realizing the return on investment from high-efficiency appliances that require large capital expenditures. For most food service establishments, especially those from the independent commercial sector, cost premiums associated with advanced energy-efficient technology have prohibited many operators from purchasing energy-efficient equipment. For this reason, there has been little motivation

³³ National Restaurant Association, Research Department (US). 2018 State of the Restaurant Industry [Internet]. Washington, DC: National Restaurant Association; 2017 Dec.

for manufacturers to develop and promote high-efficiency cooking equipment outside of those demanded by major chain restaurant companies.

Used Equipment Market

Transforming the inventory of commercial cooking appliances is challenged by the fact that buying used equipment is always a more attractive option than buying new based on the lower cost of purchase. In the absence of any definitive studies on the actual useful life for CFS equipment, it is reasonable to adopt the 12-year lifespan listed in the California Database for Energy Efficiency Resources (DEER). From the DEER sources listed in the EUL spreadsheet these studies indicate “retention” versus actual equipment life. In fact, properly maintained commercial kitchen equipment has a significantly longer life and can have several owners, hence the considerable and lively market in used cooking equipment.

The estimated useful life of CFS equipment ranges dramatically and is dependent on a number of factors including type of equipment, operating environment, amount of use, and the level of maintenance. An appliance in a moderate-duty kitchen with a solid maintenance program will have as much as two to three times the life of a heavily-used and improperly maintained appliance. Anecdotal reports from different institutional operators have indicated that equipment can last 20 years or more, while poorly maintained and heavily-used equipment in the restaurant segment can last as little as two years.

Since most CFS equipment can be repaired indefinitely using after-market replacement parts, the deciding factor for replacement is often determined by the increasing maintenance costs compared with the declining salvage value of the equipment. Other times, the decision to replace equipment may be determined by the availability of newer, better-performing models. Considering the size of the used appliance market, it is clear that a portion of CFS equipment may enjoy multiple lifespans in different locations. Although a “retirement” incentive could decrease the proliferation of used equipment, it is not considered critical for the success of an incentive program that stimulates the purchase of new energy-efficient equipment. This is somewhat analogous to the automobile market where the purchase of fuel-efficient cars eventually flows down to the used car market. However, a “cash for clunkers”-style program for CFS equipment might speed up the replacement of older inefficient used equipment with efficient equipment. However, the concept has yet to be piloted for food service equipment by any utility in North America.

A DOE report, based on NAFEM data, states that approximately 50% of the units purchased by restaurants was used equipment³⁴. This is much larger than estimates reported through industry interviews. Several manufacturer’s reps estimated the used market at less than 20%. Also, the phasing

³⁴ Patel, R., Teagan, P. & Dieckmann, J. (Arthur D. Little, Inc., Cambridge, MA) Characterization of commercial building appliances. Final report 1993.

out of environmentally-unfriendly refrigerants has probably reduced the used equipment market to some degree. Used refrigeration equipment recirculates through smaller dealers that have developed a business around the refurbishment of such equipment (somewhat analogous to the used car dealer).

First-Cost Economics

CFS facility owners/operators place a high importance on the first cost (purchase price) of CFS equipment. In addition to the low first-cost economic pressure on the food service operator to purchase less efficient equipment, the general lack of objective performance data has placed a greater emphasis on initial equipment cost. If the buyer is not exposed to accurate efficiency data and recommendations from a trusted source, there is less incentive on the part of the manufacturers to improve equipment performance and offer energy-efficient models. The very existence of energy-efficiency incentives has been the major driving force in motivating manufacturers to develop and promote more efficient CFS appliances to an industry that historically is interested only in first-cost. In fact, the initial cost of the appliances is often the primary metric for choosing new or replacement appliances. A study published by the U.S. Department of Energy, Characterization of Commercial Building Appliances³⁵, effectively summarizes the industry:

“The largest impact on the future efficiency of the installed base of cooking equipment will depend more on factors that influence the purchase decision criteria for the equipment than on technology developments. Quite simply, the installed base of [commercial cooking] equipment efficiencies could be significantly increased if customers purchased more efficient models. However, the cost premium associated with the high efficiency cooking equipment does not always justify the resultant savings. As a result, projecting future efficiencies, we need to consider customer trends and driving forces behind the more energy-efficient system. Often times, the higher efficiency systems also provide better cooking performance which is extremely important to the fast food chains.”

In a recent interview, a representative from a major Canadian FSR chain stated that they believed the price premium for energy-efficient (or ENERGY STAR) equipment to be 10%-15%.³⁶ Using the published data from AutoQuotes³⁷ that is used by the CAIOU Work Papers, this report has typically found appliance price premiums to be 12%-55% (steam cookers and convection ovens representing the two extremes). One possible explanation for such a discrepancy might be the advantage of discounted pricing for factory-direct or bulk orders that is available to chain customers. Independent equipment buyers are more likely to experience the higher equipment costs that are published by AutoQuotes.

³⁵ Ibid.

³⁶ Fisher, Don (Fisher-Nickel, Inc.). Interview with Canadian FSR chain representative. Unpublished. 2011 Oct.

³⁷ AutoQuotes is a full-featured, subscription-based electronic catalog for food service equipment that compiles new manufacturer appliance pricing monthly. The CAIOU Work Papers used AutoQuotes data published in 2006. More information about AutoQuotes can be found at <http://www.agnet.com/>.

Given that, in almost every case, the price differential between more and less energy-efficient equipment in the marketplace is so high that without a rebate and utility support, little or no headway would be made by energy-efficient equipment in this market. For example, a typical energy-efficient convection oven has a street price from \$4,000 to \$5,500, while a standard efficiency oven will cost \$3,000 to \$4,000. Similarly, a high-efficiency French fryer has a street price between \$3,000 and \$4,500 whereas a quality standard-efficiency fryer is priced anywhere from \$1,000 to \$3,000³⁸. Both appliances are estimated to respectively save around \$300 to \$500 per year in annual energy costs. In the absence of any cash rebate, the French fryer may pay for itself in three to five years, while the convection oven may take as long as six years.

Note, however, that the manufacturing sector is responding in a limited way. Four manufacturers have introduced entry-level ENERGY STAR fryers that cost less than \$2,000. Until this trend takes hold in other appliance categories, a successful efficiency program needs to overcome barriers such as these simultaneously in order to achieve significant market penetration. An effective rebate program would contain a portfolio of measures that attempt to reduce the simple payback period to three years or less.

Hard-to-Reach Customers

The California Public Utility Commission (CPUC) has defined any “hard-to-reach” utility customer as having any or a combination of the following traits: small customers that have less than ten employees, businesses in leased space, rural customers, customers in strip malls, local chain or single-location restaurants, “Mom-and-Pop” restaurants and stores, and convenience stores. A large percentage of CFS customers will meet multiple definitional criteria as hard-to-reach utility customers including, size, ownership, and geography.

In CNP’s service area, Frontier Energy estimates that just over half of all CFS establishments can be described as small independents³⁹. Independents typically employ fewer people than their non-commercial sector or chain-segment counterparts. Despite spending a higher percentage of operating costs on energy compared to larger businesses, small enterprises present a number of obstacles to successful energy-efficiency program implementation.

Key market barriers include:

- **Technology information search costs**

Small businesses lack the time and expertise to evaluate efficiency opportunities. Larger businesses, and especially institutions, hotels, or chain enterprises have dedicated engineers and purchasing staff to evaluate life-cycle cost analysis and incorporate efficiency measures into the business plan.

³⁸ Standard-efficiency “economy” (or “budget”) fryers may cost as little as \$1,000 and are an attractive option to small independent segment operators.

³⁹ Based on the statistics in California and NAICs data for CNP service areas.

- **Financing**

Small independent operators do not have the financial bandwidth to upgrade equipment with higher comparative costs. Non-commercial or chain food services can rely on internal financial resources while waiting for savings to accrue over time. For small enterprises working on small profit margins, initial negative cash flow can be compromising to business and research of optimum rebate or loan programs can be time-consuming. Small firms often do not have the time or financial resources to develop and implement new projects.

User Perceptions

Businesses can be unsure about appropriate energy-efficiency technologies as well as the skills, honesty and motive of unfamiliar contractors. Food service equipment marketing efforts have mistakenly given customers the impression that saving energy equates to sacrificing performance. According to a survey conducted by Frontier Energy with a representative from a large Canadian full-service chain restaurant, the participant confirmed that they believed there were performance tradeoffs with using energy-efficient appliances. Because it is generally not possible to demo commercial cooking equipment before purchase many operators are not willing to take risks in absence of experience. In an effort to promote the acceptance of efficient appliances, each of the four CAIOU food service energy centers offer appliance demonstrations for chefs and operators.

Business owners tend to view energy costs as fixed rather than as expenses they can control. According to the NRA 2018 Industry Forecast, energy costs were determined to make up roughly 3-8% of the total expenditures of operating a restaurant⁴⁰. Addressing these costs proves to be lower of a priority than bigger-ticket items such as labor and food costs.

Language

A portion of the population in regions serviced by CNP use languages other than English as their primary (at-home) language. Frontier Energy assumes similar percentages of businesses prefer to do business in these languages, especially independent restaurants that serve ethnic cuisine. As such, it is crucial that food service outreach programs, such as direct-install programs, seminars, and site audit programs, reach non-English speaking populations using language-appropriate written materials and direct translation support. For this reason, it is also necessary to engage ethnic-specific community groups and Chambers of Commerce when appropriate.

Split Incentives

Many food service operators in both commercial and non-commercial market segments lease their kitchen space from another entity. In non-commercial kitchens, large contract food service companies such as Sodexo and Cara may be used to manage and operate dining services. In most cases the landlord

⁴⁰ National Restaurant Association, Research Department (US). 2018 Restaurant industry forecast [Internet]. Washington, DC: National Restaurant Association; 2017 Dec.

pays energy costs, but where metering covers multiple tenants or no sub-metering exists, the responsibility for energy costs, and how those costs are incurred, can become muddled. If the contracted dining services are not paying the energy bills, there is little incentive for the operator to lobby for the purchase of energy-efficient equipment. With such disconnect from daily operations, the landlord is likely to view energy costs as fixed costs that are not within their power to control and will not investigate means to curbing energy use in the facility.

There are further split incentives when it comes to the relationship between operator and equipment dealer/manufacturer's representative. When buying new, restaurant owners typically buy from an equipment retailer or (depending on how many facilities they operate) may coordinate purchasing directly from the factory. Independent restaurant owners do not typically have the purchasing power to coordinate directly with the factory, whereas a chain company with hundreds or thousands of locations worldwide have a strong bargaining position with suppliers. This is a problem because, as is indicated in formal and informal surveys, equipment dealers do not frequently promote or recommend energy-efficient equipment and prefer instead to stock lower cost equipment that has a greater propensity to move quickly. Equipment dealers and buying groups also frequently receive back-end manufacturer rebates for selling standard-efficiency "economy" appliances to increase manufacturer market share. Dealers in these situations are often dis-incentivized to upsell customers to the high-efficiency models. The lack of equipment availability at the local dealers is a major hurdle to a utility rebate program with respect to independent restaurant operators.

Geography

While the majority of CNP's CFS customer base is located in urban areas near Chicago, some customers are in regions of low population, such as Nicor's gas service region in the western and mid-section areas of the state.

Commercial Food Service in CNP Service Areas

We reviewed the NAICs data to identify large and small corporate chains in the CNP service areas. Large chains are those with 20 or more stores and small chains are those with 4 to 19 stores.

Large Corporate Chains

Table 1 lists the brand names and the number of stores for each large full-service restaurant chain. Note that six of the top ten FSR chains are national chains. Table 2 lists large chain quick-service restaurants (QSRs), which make up a significantly larger number of the total base of restaurants in CNP territory. The majority of these top QSR chains are also National brands.

Table 48 Large Chain FSRs in CNP Service Areas

Brand Name	Number of Stores
GIORDANOS PIZZERIA	41
CHILIS	38
DENNYS	38
IHOP	35
LACEYS PLACE	25
PEPES MEXICAN RESTAURANT	22
TGI FRIDAYS	22
APPLEBEES	21
FRANCESCA RESTAURANT	20
OLIVE GARDEN	20
Total	282

Table 49 Large Chain QSRs in CNP Service Areas

Brand Name	# of Stores	Brand Name	# of Stores	Brand Name	# of Stores
SUBWAY	706	POPEYES CHICKEN & BISCUITS	86	DUNKIN DONUTS	30
MCDONALDS	445	PANDA EXPRESS	84	WINGSTOP	30
STARBUCKS	320	LITTLE CAESARS	80	HAROLDS CHICKEN SHACK	28
BURGER KING	214	CULVERS FROZEN CUSTARD	77	SHARKS FISH & CHICKEN	27
JIMMY JOHNS	204	POT BELLY SANDWICH WORKS	76	BOSTON MARKET	26
WENDYS	145	PAPA JOHNS	64	CHICK-FIL-A	25
Taco Bell	124	ARBYS	62	QUIZNOS SUBS	25
BASKIN-ROBBINS	119	WHITE CASTLE	55	SBARRO	24
PIZZA HUT	114	BUFFALO WILD WINGS	51	AURELIOS PIZZA	21
DAIRY QUEEN	112	NOODLES & COMPANY	44	BROWNS CHICKEN & PASTA	20
DOMINOS PIZZA	103	PORTILLOS HOT DOGS	43	JETS PIZZA	20
CHIPOTLE MEXICAN GRILL	100	JERSEY MIKES SUBS	41	LA MICHOACANA PREMIUM	20
ROSATIS PIZZA	88	FIVE GUYS BURGERS AND FRIES	34	Total	4,127
PANERA BREAD	87	LOU MALNATIS PIZZERIA	34		
KFC	86	STEAK N SHAKE	33		

Small Corporate Chains

Table 50 lists small chain FSRs, with less than 20 stores in the CNP service areas.

Table 50 Small Chain FSRs in CNP Service Areas

Brand Name	Number of Stores	Brand Name	Number of Stores
BAKERS SQUARE RESTAURANT	18	PATIO RESTAURANT	6
CORNER BAKERY CAFE	18	BARNELLIS PASTA BOWL	5
RED LOBSTER	18	CHEESECAKE FACTORY	5
RED ROBIN	17	COCULA RESTAURANT	5
BURRITO LOCO	15	FAMOUS DAVES	5
HOOTERS	14	LAO SZE CHUAN	5
OUTBACK STEAKHOUSE	14	MELTING POT	5
ROTI MEDITERRANEAN GRILL	12	NICKS BBQ RIBS	5
SEE THRU CHINESE KITCHEN	12	PF CHANG'S CHINA BISTRO	5
CALIFORNIA PIZZA KITCHEN	10	PROTEIN BAR	5
CRACKER BARREL	10	RUBY TUESDAY	5
EGG HARBOR CAFE	10	BENIHANA	4
EL FAMOUS BURRITO	10	BIAGGIS	4
CHINESE KITCHEN	8	BOB EVANS	4
GOLDEN CORRAL	8	BRUNCH CAFÉ	4
MICHAELS ON MAIN CAFÉ	8	BUCA DI BEPPO	4
COOPERS HAWK WINERY & RESTAURANT	7	DAVE & BUSTERS	4
HOULIHANS	7	FUDDRUCKERS	4
LAS ISLAS MARIAS	7	LAS FUENTES RESTAURANT	4
MORTONS OF CHICAGO	7	LONGHORN STEAKHOUSE	4
BUONA BEEF RESTAURANT	6	LOS BURRITOS TAPATIOS	4
EGGSPERIENCE	6	NEW CHINA MANDARIN RESTAURANT	4
LAS PALMAS MEXICAN RESTAURANT	6	PEKING CHINESE FOOD	4
MAGGIANOS	6	STEAK N EGGERS INC	4
NEW CHINA BUFFET	6	WEBER GRILL RESTAURANT	4
ORIGINAL PANCAKE HOUSE	6	NOOKIES	4
		Total	382

Independent Restaurants

Independent FSRs total about 10,560 (over 90% of the FSR category, including Caterers and Drinking Places with kitchens), while independent QSRs total about 3,535 (only 43% of the QSR category).

Non-Commercial Food Service in CNP Service Areas

The estimated number of non-commercial (institutional) food service organizations is 6,495, as described in Subtask 1A, *Food Service Facility Population Estimate*. Outreach to non-commercial will be primarily through design firms and independent manufacturer's representatives. It is recommended to include a survey of CFS contacts at the major institutions and inquire about the firms that do their design work and food service consultation during the pilot implementation phase.

CFS Equipment Dealers and Influencing Actors

Table 51 lists CFS equipment dealers in the CNP service areas that we have identified to date. Several of those listed were not in the NAICS database under food service subcategories but were identified through web searches.

Table 51 CFS Equipment Dealers in CNP Service Areas

COMPANY	WEBSITE	NOTES
Edward Don & Company	https://www.don.com	Full equipment line, national, probably the largest dealer in Chicago
Restaurant Depot LLC	https://www.therdstore.com	5 locations in Chicagoland
Trimark Marlinn LLC	http://www.trimarkusa.com	Locations all over US. Alto-Shaam, Avtec, Giles, Groen, Hatco, Hoshizaki, Power Soak, Randell, Vollrath
ADE Restaurant Services Inc	http://www.adefoodservice.com	24 brands with at least 1 ENERGY STAR product
City Food Equipment Co	https://www.cityfoodequipment.com/	45K sf showroom, 2 locations in Chicagoland, one in Tampa, FL
Zepole Restaurant Supply Co	https://www.zepole.com/	Sells AccuTemp, Pitco, Anets, Dean
Cook's Direct	cooksdirect.com	Has 6 ENERGY STAR manufacturers
AAT Sales Inc	https://www.aatsales.com	Reps 4 lines that have ENERGY STAR
Gibbs & Associates Inc	GIBBS PHIL & ASSOC	Kool-It, Jet-Tech dishwashers, Royal Range (fryers),
Boelter Food Service Design, Equipment & Supply	https://www.boelterfoodservice.com/chicago-2/	Runs a superstore at 1071 W. Division St.
Alpha Distributors Inc	http://alphadist.com/	2 locations. True Refrigeration, Manitowoc Ice Machines, Imperial Range, Silver King, Koolaire Ice Machines
MPM Food Equipment Group Inc	MPM FOOD EQUIPMENT	20 employees, design, construction management, equip sales. No brands listed.
Midwest Rest Eqp Supplier	http://www.mresmfg.com/commercial-cooking-equipment.html	Stainless welding but sells Imperial and Royal
Cora Italian Specialties Inc	https://corainc.com/collections/all-equipment-test	Mostly espresso, coffee, and pasta, including 4 pasta cookers
Gator Chef Inc	https://www.gatorchef.com	Has a page dedicated to ENERGY STAR, Pitco; mostly lower cost products
Herzog Fixture Co Inc	herzog.com	Brand new unpopulated website herzog.com; Refrigerators & Freezers, Microwaves, Walk-In Coolers, Bar Equipment
Olympic Store Fixtures Inc	https://www.olympicstorefixtures.com	Very few categories with products listed. Imperial convection ovens, but nothing listed for griddles
Rogers Supply Company Inc	https://www.rogerssupply.com/	Sells Manitowoc Ice Machines. Has 2 locations
United Fast Fd & Bev Svc Corp	https://www.unitedfastfood.com	Sells True Manufacturing reach-ins
Cobblestone Ovens	cobblestoneovens.com	Revent rack oven sellers

Note that on-line CFS equipment dealers that do not have a showroom or other physical presence in the CNP service areas also sell to CNP CFS customers. The number and market share are not readily available. A few of the larger ones are identified below, but we are not recommending including them in the UFSIP because the logistics of working with them are likely to be complicated.

Table 52 lists CFS design consultants and manufacturer’s representatives.

Table 52 Major CFS Design Firms, Manufacturer’s Reps, and Design/Build Firms

Design Firms, Reps, and Design/Build Firms	Website	Notes
Cini Little	http://cinilittle.com/contact-us/chicago/	Design firm focused on institutional projects. Well known in the industry, with national and international offices.
Next Step Design	http://nextstepdesign.com	Chicago office 220 N. Green Street, Chicago IL 60607; has sustainability commitment statement on website; offices in Annapolis, NYC, Seattle
S2O Consultants, Inc.	http://www.s2oconsultants.net	Design firm focused on Sports, Healthcare, Corporate, Educational and Hospitality industries in the areas of food service, laundry, and solid waste.
Mirkovich & Associates Inc	http://www.mirkovitch.com	Food service manufacturers reps, 4 ENERGY STAR manufacturers, smaller rep/design firm
Losurdo Inc	http://www.losurdo.com	Food service design and equipment sales - doesn't have list of manufactures up yet
PRF Marketing, Inc.	http://www.prfmarketing.com	Rep for Food Warming Equip; do not list who they rep on their website, found it on FWEs website

Table 53 lists members of Foodservice Consultants Society International (FCSI) in Illinois. Firm names are not listed on FCSI’s website and we will identify more as further research is performed in the early stages of Phase 2.

Table 53 FCSI Members in CNP Service Areas

Name	Firm	Location
Mr. Kevin Banas		Des Plaines
Ms. Melissa Bruce		Bloomingtondale
Ms. Pamela Easton, FCSI, LEED AP DB+C		Chicago
Mr. Ken Ellerth		Oak Brook
Mr. Armand Iaia	Cini-Little	Des Plaines
Chef John Reed		Skokie
Mr. Ryan Rongo	Cini-Little	Chicago
Mr. Harry Schildkraut	S2O Consultants	Hawthorn Woods
Ms. Kristin Sedej	S2O Consultants	Chicago

Table 54 lists three manufacturers located in the CNP service areas, some of whom manufacture ENERGY STAR appliances and one that makes gas pasta cookers that will be part of the UFSIP. During Phase 2, we will reach out to these firms to identify dealers that we may have not identified during Phase 1 and to understand how much product they sell direct to chains.

Table 54 CFS Manufacturers in the CNP service areas

Manufacturers	Website	Comments
Ali Group Food Service Equipment	https://www.aligroupna.com	International holding company, US HQ in Vernon Hills. Ali Group North America operates 20 brands: Aladdin Temp-Rite, ACP, Belshaw Adamatic, Beverage-Air, Bi-Line, Burlodge, Carpigiani, Champion, CMA, Edlund, Egro, Electro Freeze, Eloma, Ice-O-Matic, Metro, Moffat, Moyer Diebel, Rancilio, Scotsman and Victory.
Antunes	http://www.ajantunes.com	Toasters, steamers, holding cabinets, specialty grills
Bunn-O-Matic Corporation	http://www.bunn.com	Coffee makers
Carter Hoffmann, LLC	http://www.carter-hoffmann.com	Hot food holding cabinets, all types
Comstock-Castle Stove Co., Inc.	https://www.castlestove.com	Fryers, griddles, ovens, ranges
Desco USA	http://www.descousa.com	Gas pasta cooker manufacturer in Chicagoland
EmberGlo Div. of Midco International	http://emberglo.com	Broilers and steamers
Fri-Jado Inc.	http://usa.frijado.com	rotisseries, grab-and-go refrigerated displays, deli cases
Food Warming Equipment Co Inc	https://www.fwe.com	Energy Star maker of HFHC located in Chicagoland
ITW/FEG (Illinois Tool Works/Food Equipment Group)	https://www.itwfoodequipment.com	Owns Hobart, Traulsen, Baxter, Vulcan, Wolf, Berkel, All Brands
Keating Of Chicago Inc	http://keatingofchicago.com	Energy Star maker of griddles in Chicagoland; also makes gas pasta cookers

Manufacturers	Website	Comments
Marmon	http://www.marmon.com	Beverage & food service - Prince Castle, Silver King, many others
Middleby Corporation	http://www.middleby.com	diverse cooking appliance maker, ovens, broilers, fryers
Prince Castle LLC	https://www.princecastle.com	Conveyor toasters
RATIONAL USA	https://www.rational-online.com	Combi-ovens and cooking centers
Scotsman Ice Systems, An Ali Group Company	https://www.scotsman-ice.com	Ice machines
Taylor Company	https://www.taylor-company.com	Shake/smoothie machines, 2-sided griddles (Estar)

Table 55 lists a few of the on-line CFS equipment sellers.

Table 55 On-line CFS Equipment Vendors

On-line CFS Equipment Vendors
www.centralrestaurant.com
www.culinarydepotinc.com
www.etundra.com
www.foodserviceequipmentwarehouse.com
www.jesrestaurantequipment.com
www.katom.com
www.webrestaurantstore.com

Recommended Appliance Rebates and Market Actor Incentives

Section Subtask 1D, *Downstream Incentive Analysis*, provided a comparison of CNP utility rebate categories, qualifying criteria, and rebate amounts to those offered by the CAIOUs. This section uses the recommended categories, qualifying criteria, and rebate amounts from that report along with our estimates of the number of rebate-eligible appliances in each category and expected rebate uptake rates to develop a set of tables for the UFSIP.

Given the short amount of time before the beginning of 2019 and the expected time it will take to have both GTI and CNP management and legal teams to approve the Pilot Program, the Operations Manual, and proposed contract and program documents to be offered to dealers, manufacturer’s reps, and CFS design consultants, we do not anticipate having the program on-line before the end of March 2019. Signing participants into the Program may take from a few weeks to several months. Once onboarded, Participants will need to analyze their current stock keeping unit (SKU) list and to compare them to the list of qualifying products to ensure that the eligible products trigger the incentive for

eligible customers. In some cases, this may require selling off older inventory before the Participants can make space for efficient inventory. From past experience, the number of appliance applications submitted will be slow in the beginning while the Participants become accustomed to the program requirements and will ramp up as program participants work with their customers to encourage the purchase of qualifying products.

Certain categories, such as gas fryers and gas ovens are likely to be the larger share of rebates on the gas side, and reach-in refrigeration and ice makers are likely to be the larger share on the electric side. These appliance categories have larger overall populations and a longer history participating with the ENERGY STAR program to recognize energy-efficient models.

Table 56 shows the estimated eligible gas inventory, overall energy savings potential, and the estimated rebate uptake in the UFSIP. Tables 57 – 59 show data from Table 56 and the allocation of appliances and energy savings between Nicor and PGL/NSG for Program Years (PY) 1, 2 and 3, respectively. The allocation is based on the estimated total number of food service customers in their respective service areas (65.7% for Nicor and 34.3% for PGL/NSG). In the 48 zip codes shared by Nicor, PGL and NSG, the allocation was based on the ratio of total food service establishments to total number of commercial customers for each utility (see Table 4). The first full program year will be dedicated to recruiting participants and building momentum. Once fully running, the second year can show significant growth over the first full program year. Assuming that the program will have considerable adoption by major Participants in PY1, we can project a growth of 40% in rebates paid compared to in PY2, and a further 20% growth in rebates paid in PY3.

Table 60 shows rebate costs for PY1 through PY3 for all gas measures using standard rebate levels, and the split between Nicor and PGL/NSG for PY1. The standard rebate levels approximate the cost of the first year of energy savings. Table 61 is similar to Table 60, except that the optimal rebate levels are used. Table 62 shows the estimated allocation of number of rebates for PY1 and PY2 for Nicor and PGL/NSG. The optimal levels are higher than standard levels and are designed to cover a larger portion of the differential between baseline appliance costs and high-efficiency appliance costs. In our opinion, the optimal levels should be used in the UFSIP, for at least the first and second program years to build momentum with the distribution channel. Once the uptake rate has reached acceptable levels, the rebate rates could be reduced, ultimately in the range of the standard levels shown in Table 58.

Tables 63 through 66 show the estimated energy savings, number of electric measures, and rebate costs for the standard and optimal rebate levels similar to those in Tables 56 through 62 for the gas measures. The PY2 estimates are based on a 11% growth in rebates paid compared to PY1 and the PY3 estimates are based on a 20% growth in rebates paid compared to PY2.

Table 56 Estimated Standard Gas Rebate Level Uptake and Energy Savings

Group	Category	Gas Inventory	Std Efficiency Energy Use, Therms/yr	Gas Energy Saving Potential, Therms/yr	Estimated Market Adoption Rate Potential in PY1	High Eff Uptake in PY1	Energy Saved in PY1, Therms/yr	High Eff Uptake in PY2	Energy Saved in PY2, Therms/yr	High Eff Uptake in PY3	Energy Saved in PY3, Therms/yr
Broilers	<22" Wide Conveyor*	82	157,925	74,725	2.00%	2	1,823	3	2,734	4	3,645
Broilers	22-28" Wide Conveyor*	165	451,370	169,172	2.00%	3	3,076	4	4,101	5	5,126
Broilers	>28" Wide Conveyor*	81	299,979	135,830	2.00%	2	3,354	3	5,031	4	6,708
Broilers	Overfired	1,855	2,419,691	362,954	0.10%	2	391	3	587	4	783
Broilers	Salamander	6,273	1,233,848	185,077	0.10%	6	177	8	236	10	295
Broilers	Underfired	11,554	11,786,220	4,096,006	0.10%	12	4,254	17	6,027	20	7,090
Fryers	French Fryer	31,502	27,852,931	8,633,899	0.12%	38	10,415	53	14,526	64	17,541
Fryers	Large Vat	2778	1,996,725	1,064,673	0.10%	3	1,150	4	1,533	5	1,916
Griddles	Double-Sided	490	267,622	29,057	0.15%	1	59	1	59	1	59
Griddles	Standard	13,293	9,898,282	749,054	0.10%	13	733	18	1,014	22	1,240
Ovens	Combi	333	292,877	75,940	0.15%	0	0	0	0	0	0
Ovens	Convection	17,612	5,772,538	1,376,454	0.12%	21	1,641	29	2,266	35	2,735
Ovens	Conveyor	2296	3,157,316	760,873	0.15%	3	994	4	1,326	5	1,657
Ovens	Roll-in Rack-Double	488	1,355,975	526,520	0.15%	1	1,079	1	1,079	1	1,079
Ovens	Roll-in Rack-Single	326	452,783	174,723	0.15%	0	0	0	0	0	0
Ovens	Rotisserie	56	43,541	6,531	0.15%	0	0	0	0	0	0
Pasta Cookers	Pasta Cookers	3734	2,722,198	765,469	0.15%	6	1,230	8	1,640	10	2,050
Steamers	Pressure Steamer	259	219,211	145,707	0.15%	0	0	0	0	0	0
Steamers	Pressureless Steamer	3499	2,974,014	2,229,498	0.15%	5	3,186	7	4,460	8	5,097
Sanitation	Pre-Rinse Spray Valve	27,775		1,299,911	0.15%	42	1,966	59	2,761	71	3,323
Low Temp Dishwashers	Under Counter	923	228,904	44,304	0.15%	1	48	1	48	1	48
Low Temp Dishwashers	Stationary Single Tank Door	3,504	2,785,680	830,448	0.15%	5	1,185	7	1,659	8	1,896
Low Temp Dishwashers	Single Tank Conveyor	797	1,315,847	471,027	0.15%	1	591	1	591	1	591
Low Temp Dishwashers	Multi Tank Conveyor	89	177,377	80,634	0.15%	0	0	0	0	0	0
High Temp Dishwashers	Under Counter	455	72,345	6,825	0.15%	1	15	1	15	1	15
High Temp Dishwashers	Stationary Single Tank Door	1,781	926,120	176,319	0.15%	3	297	4	396	5	495
High Temp Dishwashers	Single Tank Conveyor	229	347,164	132,133	0.15%	0	0	0	0	0	0
High Temp Dishwashers	Multi Tank Conveyor	2,059	4,558,626	2,320,493	0.15%	3	3,381	4	4,508	5	5,635
Kitchen Ventilation	DCKV	10,804		31,533,729	0.10%	11	32,106	15	43,781	18	52,537
Totals		145,092	83,767,109	58,457,985		185	73,151	255	100,378	308	121,561

*Conveyor Broilers are not currently included in the Illinois TRM. These appliances were added with this report based on a new category that was launched in the PG&E and SoCalGas programs in July 2018. Distribution of eligible inventory among conveyor sizes is estimated based on discussions with manufacturers' reps.

Table 57 Estimated Nicor and PGL/NSG PY1 Gas Rebate Uptake and Energy Savings

GAS SAVINGS IN PY1		STANDARD REBATE LEVEL PLAN				OPTIMAL REBATE LEVEL PLAN			
Group	Category	Nicor Estimated Appliances	Nicor Estimated Saved Therms/yr in PY1	PGL/NSG Estimated Appliances	PGL/NSG Estimated Saved Therms/yr in PY1	Nicor Estimated Appliances	Nicor Estimated Saved Therms/yr in PY1	PGL/NSG Estimated Appliances	PGL/NSG Estimated Saved Therms/yr in PY1
Broilers	<22" Wide Conveyor	1	1,198	1	625	1	1,198	1	625
Broilers	22-28" Wide Conveyor	2	2,022	1	1,054	2	2,022	1	1,054
Broilers	>28" Wide Conveyor	1	2,204	1	1,150	1	2,204	1	1,150
Broilers	Overfired	1	257	1	134	1	257	1	134
Broilers	Salamander	4	116	2	61	4	116	2	61
Broilers	Underfired	8	2,796	4	1,458	8	2,796	4	1,458
Fryers	French Fryer	25	6,845	13	3,570	41	11,348	22	5,919
Fryers	Large Vat	2	756	1	394	3	1,007	1	526
Griddles	Double-Sided	1	39	0	20	1	39	0	20
Griddles	Standard	9	482	4	251	9	482	4	251
Ovens	Combi	0	0	0	0	0	0	0	0
Ovens	Convection	14	1,078	7	563	23	1,797	12	938
Ovens	Conveyor	2	653	1	341	2	653	1	341
Ovens	Roll-in Rack-Double	1	709	0	370	1	709	0	370
Ovens	Roll-in Rack-Single	0	0	0	0	0	0	0	0
Ovens	Rotisserie	0	0	0	0	0	0	0	0
Pasta Cookers	Pasta Cookers	4	808	2	422	4	808	2	422
Steamers	Pressure Steamer	0	0	0	0	0	0	0	0
Steamers	Pressureless Steamer	3	2,094	2	1,092	3	2,094	2	1,092
Sanitation	Pre-Rinse Spray Valve	27	1,263	14	659	27	1,263	14	659
Low Temp Dishwashers	Under Counter	1	32	0	16	1	32	0	16
Low Temp Dishwashers	Stationary Single Tank Door	3	779	2	406	3	779	2	406
Low Temp Dishwashers	Single Tank Conveyor	1	388	0	203	1	388	0	203
Low Temp Dishwashers	Multi Tank Conveyor	0	0	0	0	0	0	0	0
High Temp Dishwashers	Under Counter	1	10	0	5	1	10	0	5
High Temp Dishwashers	Stationary Single Tank Door	2	195	1	102	2	195	1	102
High Temp Dishwashers	Single Tank Conveyor	0	0	0	0	0	0	0	0
High Temp Dishwashers	Multi Tank Conveyor	2	2,222	1	1,159	2	2,222	1	1,159
Kitchen Ventilation	DCKV	7	21,093	4	11,002	7	21,093	4	11,002
Totals		122	48,039	62	25,057	148	53,512	76	27,913

Table 58 Estimated Nicor and PGL/NSG PY2 Gas Rebate Uptake and Energy Savings

GAS SAVINGS IN PY2		STANDARD REBATE LEVEL PLAN				OPTIMAL REBATE LEVEL PLAN			
Group	Category	Nicor Estimated Appliances	Nicor Estimated Saved Therms/yr in PY2	PGL/NSG Estimated Appliances	PGL/NSG Estimated Saved Therms/yr in PY2	Nicor Estimated Appliances	Nicor Estimated Saved Therms/yr in PY2	PGL/NSG Estimated Appliances	PGL/NSG Estimated Saved Therms/yr in PY2
Broilers	<22" Wide Conveyor	2	1,797	1	937	2	1,797	1	937
Broilers	22-28" Wide Conveyor	3	2,695	1	1,406	3	2,695	1	1,406
Broilers	>28" Wide Conveyor	2	3,306	1	1,725	2	3,306	1	1,725
Broilers	Overfired	2	386	1	201	2	386	1	201
Broilers	Salamander	5	155	3	81	5	155	3	81
Broilers	Underfired	11	3,961	6	2,066	11	3,961	6	2,066
Fryers	French Fryer	35	9,546	18	4,980	58	15,851	30	8,268
Fryers	Large Vat	3	1,007	1	526	4	1,512	2	788
Griddles	Double-Sided	1	39	0	20	1	39	0	20
Griddles	Standard	12	666	6	348	12	666	6	348
Ovens	Combi	0	0	0	0	0	0	0	0
Ovens	Convection	19	1,489	10	777	32	2,517	17	1,313
Ovens	Conveyor	3	871	1	455	3	871	1	455
Ovens	Roll-in Rack-Double	1	709	0	370	1	709	0	370
Ovens	Roll-in Rack-Single	0	0	0	0	0	0	0	0
Ovens	Rotisserie	0	0	0	0	0	0	0	0
Pasta Cookers	Pasta Cookers	5	1,078	3	562	5	1,078	3	562
Steamers	Pressure Steamer	0	0	0	0	0	0	0	0
Steamers	Pressureless Steamer	5	2,931	2	1,529	5	2,931	2	1,529
Sanitation	Pre-Rinse Spray Valve	39	1,815	20	946	39	1,815	20	946
Low Temp Dishwashers	Under Counter	1	32	0	16	1	32	0	16
Low Temp Dishwashers	Stationary Single Tank Door	5	1,090	2	569	5	1,090	2	569
Low Temp Dishwashers	Single Tank Conveyor	1	388	0	203	1	388	0	203
Low Temp Dishwashers	Multi Tank Conveyor	0	0	0	0	0	0	0	0
High Temp Dishwashers	Under Counter	1	10	0	5	1	10	0	5
High Temp Dishwashers	Stationary Single Tank Door	3	260	1	136	3	260	1	136
High Temp Dishwashers	Single Tank Conveyor	0	0	0	0	0	0	0	0
High Temp Dishwashers	Multi Tank Conveyor	3	2,963	1	1,545	3	2,963	1	1,545
Kitchen Ventilation	DCKV	10	28,773	5	15,008	10	28,773	5	15,008
Totals		168	65,968	87	34,410	205	73,805	107	38,497

Table 59 Estimated Nicor and PGL/NSG PY3 Gas Rebate Uptake and Energy Savings

GAS SAVINGS IN PY3		STANDARD REBATE LEVEL PLAN				OPTIMAL REBATE LEVEL PLAN			
Group	Category	Nicor Estimated Appliances	Nicor Estimated Saved Therms/yr in PY3	PGL/NSG Estimated Appliances	PGL/NSG Estimated Saved Therms/yr in PY3	Nicor Estimated Appliances	Nicor Estimated Saved Therms/yr in PY3	PGL/NSG Estimated Appliances	PGL/NSG Estimated Saved Therms/yr in PY3
Broilers	<22" Wide Conveyor	3	2,395	1	1,250	3	2,395	1	1,250
Broilers	22-28" Wide Conveyor	3	3,369	2	1,757	3	3,369	2	1,757
Broilers	>28" Wide Conveyor	3	4,408	1	2,300	3	4,408	1	2,300
Broilers	Overfired	3	515	1	268	3	515	1	268
Broilers	Salamander	7	194	3	101	7	194	3	101
Broilers	Underfired	13	4,660	7	2,430	13	4,660	7	2,430
Fryers	French Fryer	42	11,528	22	6,013	70	19,093	36	9,959
Fryers	Large Vat	3	1,259	2	657	5	1,763	2	920
Griddles	Double-Sided	1	39	0	20	1	39	0	20
Griddles	Standard	14	815	8	425	14	815	8	425
Ovens	Combi	0	0	0	0	0	0	0	0
Ovens	Convection	23	1,797	12	938	39	3,030	20	1,581
Ovens	Conveyor	3	1,089	2	568	3	1,089	2	568
Ovens	Roll-in Rack-Double	1	709	0	370	1	709	0	370
Ovens	Roll-in Rack-Single	0	0	0	0	0	0	0	0
Ovens	Rotisserie	0	0	0	0	0	0	0	0
Pasta Cookers	Pasta Cookers	7	1,347	3	703	7	1,347	3	703
Steamers	Pressure Steamer	0	0	0	0	0	0	0	0
Steamers	Pressureless Steamer	5	3,350	3	1,747	5	3,350	3	1,747
Sanitation	Pre-Rinse Spray Valve	47	2,184	24	1,139	47	2,184	24	1,139
Low Temp Dishwashers	Under Counter	1	32	0	16	1	32	0	16
Low Temp Dishwashers	Stationary Single Tank Door	5	1,246	3	650	5	1,246	3	650
Low Temp Dishwashers	Single Tank Conveyor	1	388	0	203	1	388	0	203
Low Temp Dishwashers	Multi Tank Conveyor	0	0	0	0	0	0	0	0
High Temp Dishwashers	Under Counter	1	10	0	5	1	10	0	5
High Temp Dishwashers	Stationary Single Tank Door	3	325	2	170	3	325	2	170
High Temp Dishwashers	Single Tank Conveyor	0	0	0	0	0	0	0	0
High Temp Dishwashers	Multi Tank Conveyor	3	3,703	2	1,932	3	3,703	2	1,932
Kitchen Ventilation	DCKV	12	34,527	6	18,010	12	34,527	6	18,010
Totals		202	79,890	106	41,671	247	89,192	129	46,523

Table 60 Estimated Gas Rebate Costs Using Standard Rebate Level and Gas Utility Allocations

Group	Category	Gas Inventory	Standard Rebate \$	High Eff Uptake in PY1	Total Appliance Rebate Cost in PY1	High Eff Uptake in PY2	Total Appliance Rebate Cost in PY2	High Eff Uptake in PY3	Total Appliance Rebate Cost in PY3	Nicor Estimated Appliances PY1	Nicor Estimated Rebate Cost in PY1	PGL/NSG Estimated Appliances PY1	PGL/NSG Estimated Rebate Cost in PY1
Broilers	<22" Wide Conveyor	82	\$2,000	2	\$4,000	3	\$6,000	4	\$8,000	1.0	\$2,000	1.0	\$2,000
Broilers	22-28" Wide Conveyor	165	\$2,500	3	\$7,500	4	\$10,000	5	\$12,500	2.0	\$5,000	1.0	\$2,500
Broilers	>28" Wide Conveyor	81	\$3,000	2	\$6,000	3	\$9,000	4	\$12,000	1.0	\$3,000	1.0	\$3,000
Broilers	Overfired	1,855	\$500	2	\$1,000	3	\$1,500	4	\$2,000	1.0	\$500	1.0	\$500
Broilers	Salamander	6,273	\$500	6	\$3,000	8	\$4,000	10	\$5,000	4.0	\$2,000	2.0	\$1,000
Broilers	Underfired	11,554	\$500	12	\$6,000	17	\$8,500	20	\$10,000	8.0	\$4,000	4.0	\$2,000
Fryers	French Fryer	31,502	\$500	38	\$19,000	53	\$26,500	64	\$32,000	25.0	\$12,500	13.0	\$6,500
Fryers	Large Vat	2,778	\$500	3	\$1,500	4	\$2,000	5	\$2,500	2.0	\$1,000	1.0	\$500
Griddles	Double-Sided	490	\$250	1	\$250	1	\$250	1	\$250	1.0	\$250	0.0	\$0
Griddles	Standard	13,293	\$250	13	\$3,250	18	\$4,500	22	\$5,500	9.0	\$2,250	4.0	\$1,000
Ovens	Combi	333	\$900	0	\$0	0	\$0	0	\$0	0.0	\$0	0.0	\$0
Ovens	Convection	17,612	\$400	21	\$8,400	29	\$11,600	35	\$14,000	14.0	\$5,600	7.0	\$2,800
Ovens	Conveyor	2,296	\$750	3	\$2,250	4	\$3,000	5	\$3,750	2.0	\$1,500	1.0	\$750
Ovens	Roll-in Rack-Double	488	\$1,400	1	\$1,400	1	\$1,400	1	\$1,400	1.0	\$1,400	0.0	\$0
Ovens	Roll-in Rack-Single	326	\$700	0	\$0	0	\$0	0	\$0	0.0	\$0	0.0	\$0
Ovens	Rotisserie	56	\$500	0	\$0	0	\$0	0	\$0	0.0	\$0	0.0	\$0
Pasta Cookers	Pasta Cookers	3,734	\$200	6	\$1,200	8	\$1,600	10	\$2,000	4.0	\$800	2.0	\$400
Steamers	Pressure Steamer	259	\$1,000	0	\$0	0	\$0	0	\$0	0.0	\$0	0.0	\$0
Steamers	Pressureless Steamer	3,499	\$1,000	5	\$5,000	7	\$7,000	8	\$8,000	3.0	\$3,000	2.0	\$2,000
Sanitation	Pre-Rinse Spray Valve	27,775	\$25	42	\$1,050	59	\$1,475	71	\$1,775	28	\$700	14	\$350
Low Temp Dishwashers	Under Counter	923	\$350	1	\$350	1	\$350	1	\$350	1.0	\$350	0.0	\$0
Low Temp Dishwashers	Stationary Single Tank Door	3,504	\$350	5	\$1,750	7	\$2,450	8	\$2,800	3.0	\$1,050	2.0	\$700
Low Temp Dishwashers	Single Tank Conveyor	797	\$350	1	\$350	1	\$350	1	\$350	1.0	\$350	0.0	\$0
Low Temp Dishwashers	Multi Tank Conveyor	89	\$350	0	\$0	0	\$0	0	\$0	0.0	\$0	0.0	\$0
High Temp Dishwashers	Under Counter	455	\$350	1	\$350	1	\$350	1	\$350	1.0	\$350	0.0	\$0
High Temp Dishwashers	Stationary Single Tank Door	1,781	\$350	3	\$1,050	4	\$1,400	5	\$1,750	2.0	\$700	1.0	\$350
High Temp Dishwashers	Single Tank Conveyor	229	\$350	0	\$0	0	\$0	0	\$0	0.0	\$0	0.0	\$0
High Temp Dishwashers	Multi Tank Conveyor	2,059	\$350	3	\$1,050	4	\$1,400	5	\$1,750	2.0	\$700	1.0	\$350
Kitchen Ventilation	DCKV	10,804	\$650	11	\$7,150	15	\$9,750	18	\$11,700	7.0	\$4,550	4.0	\$2,600
Totals		145,092		185	\$82,850	255	\$114,375	308	\$139,725	123	\$53,550	62	\$29,300

Table 61 Total Estimated Gas Rebate Costs Using Optimal Rebate Levels

Group	Category	Gas Inventory	Optimal Rebate \$	High Eff Uptake in PY1	Total Appliance Rebate Cost in PY1	High Eff Uptake in PY2	Total Appliance Rebate Cost in PY2	High Eff Uptake in PY3	Total Appliance Rebate Cost in PY3
Broilers	<22" Wide Conveyor	82	\$2,000	2	\$4,000	3	\$6,000	4	\$8,000
Broilers	22-28" Wide Conveyor	165	\$2,500	3	\$7,500	4	\$10,000	5	\$12,500
Broilers	>28" Wide Conveyor	81	\$3,000	2	\$6,000	3	\$9,000	4	\$12,000
Broilers	Overfired	1,855	\$500	2	\$1,000	3	\$1,500	4	\$2,000
Broilers	Salamander	6,273	\$500	6	\$3,000	8	\$4,000	10	\$5,000
Broilers	Underfired	11,554	\$1,000	12	\$12,000	17	\$17,000	20	\$20,000
Fryers	French Fryer	31,502	\$750	63	\$47,250	88	\$66,000	106	\$79,500
Fryers	Large Vat	2,778	\$750	4	\$3,000	6	\$4,500	7	\$5,250
Griddles	Double-Sided	490	\$500	1	\$500	1	\$500	1	\$500
Griddles	Standard	13,293	\$500	13	\$6,500	18	\$9,000	22	\$11,000
Ovens	Combi	333	\$2,000	0	\$0	0	\$0	0	\$0
Ovens	Convection	17,612	\$500	35	\$17,500	49	\$24,500	59	\$29,500
Ovens	Conveyor	2,296	\$1,500	3	\$4,500	4	\$6,000	5	\$7,500
Ovens	Roll-in Rack-Double	488	\$1,000	1	\$1,000	1	\$1,000	1	\$1,000
Ovens	Roll-in Rack-Single	326	\$2,000	0	\$0	0	\$0	0	\$0
Ovens	Rotisserie	56	\$500	0	\$0	0	\$0	0	\$0
Pasta Cookers	Pasta Cookers	3,734	\$200	6	\$1,200	8	\$1,600	10	\$2,000
Steamers	Pressure Steamer	259	\$2,000	0	\$0	0	\$0	0	\$0
Steamers	Pressureless Steamer	3,499	\$2,000	5	\$10,000	7	\$14,000	8	\$16,000
Sanitation	Pre-Rinse Spray Valve	27,775	\$25	42	\$1,050	59	\$1,475	71	\$1,775
Low Temp Dishwashers	Under Counter	923	\$200	1	\$200	1	\$200	1	\$200
Low Temp Dishwashers	Stationary Single Tank Door	3,504	\$500	5	\$2,500	7	\$3,500	8	\$4,000
Low Temp Dishwashers	Single Tank Conveyor	797	\$1,000	1	\$1,000	1	\$1,000	1	\$1,000
Low Temp Dishwashers	Multi Tank Conveyor	89	\$1,000	0	\$0	0	\$0	0	\$0
High Temp Dishwashers	Under Counter	455	\$300	1	\$300	1	\$300	1	\$300
High Temp Dishwashers	Stationary Single Tank Door	1,781	\$750	3	\$2,250	4	\$3,000	5	\$3,750
High Temp Dishwashers	Single Tank Conveyor	229	\$1,500	0	\$0	0	\$0	0	\$0
High Temp Dishwashers	Multi Tank Conveyor	2,059	\$1,500	3	\$4,500	4	\$6,000	5	\$7,500
Kitchen Ventilation	DCKV	10,804	\$750	11	\$8,250	15	\$11,250	18	\$13,500
Totals		145,092		225	\$145,000	312	\$201,325	376	\$243,775

Table 62 Estimated Gas Rebate Costs Using Optimal Rebate Levels and Gas Utility Allocations

Group	Category	Gas Inventory	Optimal Rebate \$	Nicor Estimated Appliances PY1	Nicor Estimated Rebate Cost in PY1	PGL/NSG Estimated Appliances PY1	PGL/NSG Estimated Rebate Cost in PY1	Nicor Estimated Appliances PY2	Nicor Estimated Rebate Cost in PY2	PGL/NSG Estimated Appliances PY2	PGL/NSG Estimated Rebate Cost in PY2
Broilers	<22" Wide Conveyor	82	\$2,000	1	\$2,000	1	\$2,000	2	\$4,000	1	\$2,000
Broilers	22-28" Wide Conveyor	165	\$2,500	2	\$5,000	1	\$2,500	3	\$7,500	1	\$2,500
Broilers	>28" Wide Conveyor	81	\$3,000	1	\$3,000	1	\$3,000	2	\$6,000	1	\$3,000
Broilers	Overfired	1,855	\$500	1	\$500	1	\$500	2	\$1,000	1	\$500
Broilers	Salamander	6,273	\$500	4	\$2,000	2	\$1,000	5	\$2,500	3	\$1,500
Broilers	Underfired	11,554	\$1,000	8	\$8,000	4	\$4,000	11	\$11,000	6	\$6,000
Fryers	French Fryer	31,502	\$750	41	\$30,750	22	\$16,500	58	\$43,500	30	\$22,500
Fryers	Large Vat	2,778	\$750	3	\$2,250	1	\$750	4	\$3,000	2	\$1,500
Griddles	Double-Sided	490	\$500	1	\$500	0	\$0	1	\$500	0	\$0
Griddles	Standard	13,293	\$500	9	\$4,500	4	\$2,000	12	\$6,000	6	\$3,000
Ovens	Combi	333	\$2,000	0	\$0	0	\$0	0	\$0	0	\$0
Ovens	Convection	17,612	\$500	23	\$11,500	12	\$6,000	32	\$16,000	17	\$8,500
Ovens	Conveyor	2,296	\$1,500	2	\$3,000	1	\$1,500	3	\$4,500	1	\$1,500
Ovens	Roll-in Rack-Double	488	\$1,000	1	\$1,000	0	\$0	1	\$1,000	0	\$0
Ovens	Roll-in Rack-Single	326	\$2,000	0	\$0	0	\$0	0	\$0	0	\$0
Ovens	Rotisserie	56	\$500	0	\$0	0	\$0	0	\$0	0	\$0
Pasta Cookers	Pasta Cookers	3,734	\$200	4	\$800	2	\$400	5	\$1,000	3	\$600
Steamers	Pressure Steamer	259	\$2,000	0	\$0	0	\$0	0	\$0	0	\$0
Steamers	Pressureless Steamer	3,499	\$2,000	3	\$6,000	2	\$4,000	5	\$10,000	2	\$4,000
Sanitation	Pre-Rinse Spray Valve	27,775	\$25	28	\$700	14	\$350	39	\$975	20	\$500
Low Temp Dishwashers	Under Counter	923	\$200	1	\$200	0	\$0	1	\$200	0	\$0
Low Temp Dishwashers	Stationary Single Tank Door	3,504	\$500	3	\$1,500	2	\$1,000	5	\$2,500	2	\$1,000
Low Temp Dishwashers	Single Tank Conveyor	797	\$1,000	1	\$1,000	0	\$0	1	\$1,000	0	\$0
Low Temp Dishwashers	Multi Tank Conveyor	89	\$1,000	0	\$0	0	\$0	0	\$0	0	\$0
High Temp Dishwashers	Under Counter	455	\$300	1	\$300	0	\$0	1	\$300	0	\$0
High Temp Dishwashers	Stationary Single Tank Door	1,781	\$750	2	\$1,500	1	\$750	3	\$2,250	1	\$750
High Temp Dishwashers	Single Tank Conveyor	229	\$1,500	0	\$0	0	\$0	0	\$0	0	\$0
High Temp Dishwashers	Multi Tank Conveyor	2,059	\$1,500	2	\$3,000	1	\$1,500	3	\$4,500	1	\$1,500
Kitchen Ventilation	DCKV	10,804	\$750	7	\$5,250	4	\$3,000	10	\$7,500	5	\$3,750
Totals		145,092		149	\$94,250	76	\$50,750	209	\$136,725	103	\$64,600

Table 63 Estimated Electric Standard Rebate Level Uptake and Energy Savings

Group	Category	Electric Inventory	Std Efficiency Energy Use, kWh/yr	Electric Energy Saving Potential, kWh/yr	Estimated Market Adoption Rate Potential in PY1	High Eff Uptake in PY1	Energy Saved in PY1 kWh/yr	High Eff Uptake in PY2	Energy Saved in PY2 kWh/yr	High Eff Uptake in PY3	Energy Saved in PY3 kWh/yr
Fryers	French Fryer	5,480	46,802,999	6,688,048	0.15%	8	9,764	11	13,425	13	15,866
Fryers	Large Vat	683	4,608,857	674,433	0.15%	1	987	1	987	1	987
Griddles	Double-Sided	349	4,253,677	1,216,406	0.15%	1	3,485	1	3,485	1	3,485
Griddles	Standard	7,057	98,357,986	28,161,123	0.15%	11	43,896	15	59,858	18	71,829
Ovens	Combi	640	15,912,492	6,161,516	0.15%	1	9,627	1	9,627	1	9,627
Ovens	Convection	11,575	60,774,364	15,190,641	0.15%	17	22,310	24	31,497	29	38,059
Steamers	Pressure Steamer	383	8,053,939	7,104,880	0.15%	1	18,551	1	18,551	1	18,551
Steamers	Pressureless Steamer	10,848	130,926,329	118,382,001	0.15%	16	174,605	22	240,081	26	283,733
Warming Equip	Holding Cabinet	8,733	13,833,937	9,918,989	0.15%	13	14,765	18	20,444	22	24,988
Hand Wrap Machine	Mechanical or Optical Control*	4,200	8,190,000	6,489,000	0.15%	6	9,270	8	12,360	10	15,450
Reach-in Refrigerators	Solid Door	25,171	41,783,927	10,637,553	0.15%	38	16,059	53	22,398	64	27,047
Reach-in Refrigerators	Glass Door	11,510	23,314,721	7,201,123	0.15%	17	10,636	24	15,015	29	18,144
Reach-in Freezers	Solid Door	13,194	60,471,042	17,694,978	0.15%	20	26,823	28	37,552	34	45,599
Reach-in Freezers	Glass Door	5,726	47,969,184	15,040,224	0.15%	9	23,640	13	34,147	16	42,026
Ice Machines	ENERGY STAR	21,735	318,330,810	49,686,210	0.15%	33	75,438	46	105,156	55	125,730
Ice Machines	CEE Tier 2 Advanced	5,434	79,586,364	21,377,356	0.15%	8	31,472	11	43,274	13	51,142
		132,718	963,170,628	321,624,481		200	491,328	277	667,857	333	792,263

* On-demand handwrap machines are not currently included in the Illinois TRM. These appliances were added with this report based on a new category that was launched in the PG&E and SCE programs in July 2017.

Table 64 Estimated Electric Optimal Rebate Level Uptake and Energy Savings

Group	Category	Electric Inventory	Optimal Rebates PY1	Elec Savings for Optimal Rebates PY1, kWh/yr	Optimal Rebates PY2	Elec Savings for Optimal Rebates PY2, kWh/yr	Optimal Rebates PY3	Elec Savings for Optimal Rebates PY3, kWh/yr
Fryers	French Fryer	5,480	11	13,425	15	18,307	18	21,968
Fryers	Large Vat	683	1	987	1	987	1	987
Griddles	Double-Sided	349	1	3,485	1	3,485	1	3,485
Griddles	Standard	7,057	11	43,896	15	59,858	18	71,829
Ovens	Combi, all sizes	640	1	9,627	1	9,627	1	9,627
Ovens	Convection	11,575	23	30,184	32	41,996	38	49,870
Steamers	Pressure Steamer	383	1	18,551	1	18,551	1	18,551
Steamers	Pressureless Steamer	10,848	22	240,081	22	240,081	26	283,733
Warming Equip	Holding Cabinet	8,733	17	19,309	18	20,444	22	24,988
Hand Wrap Machine	Mechanical or Optical Control	4,200	8	12,360	8	12,360	10	15,450
Reach-in Refrigerators	Solid Door	25,171	50	21,131	53	22,398	64	27,047
Reach-in Refrigerators	Glass Door	11,510	23	14,390	24	15,015	29	18,144
Reach-in Freezers	Solid Door	13,194	26	34,870	28	37,552	34	45,599
Reach-in Freezers	Glass Door	5,726	11	28,893	13	34,147	16	42,026
Ice Machines	ENERGY STAR	21,735	43	98,298	46	105,156	55	125,730
Ice Machines	CEE Tier 2 Advanced	5,434	11	43,274	11	43,274	13	51,142
Totals		132,718	260	632,761	289	683,238	347	810,176

Table 65 Estimated Electric Rebate Costs Using Standard Rebate Levels

Group	Category	Electric Inventory	Rebate \$	High Eff Uptake in PY1	Total Appliance Rebate Cost in PY1	High Eff Uptake in PY2	Total Appliance Rebate Cost in PY2	High Eff Uptake in PY3	Total Appliance Rebate Cost in PY3
Fryers	French Fryer	5,480	\$500	8	\$4,000	11	\$5,500	13	\$6,500
Fryers	Large Vat	683	\$500	1	\$500	1	\$500	1	\$500
Griddles	Double-Sided	349	\$250	1	\$250	1	\$250	1	\$250
Griddles	Standard	7,057	\$250	11	\$2,750	15	\$3,750	18	\$4,500
Ovens	Combi, all sizes	640	\$900	1	\$900	1	\$900	1	\$900
Ovens	Convection	11,575	\$400	17	\$6,800	24	\$9,600	29	\$11,600
Steamers	Pressure Steamer	383	\$1,000	1	\$1,000	1	\$1,000	1	\$1,000
Steamers	Pressureless Steamer	10,848	\$1,000	16	\$16,000	22	\$22,000	26	\$26,000
Warming Equip	Holding Cabinet	8,733	\$320	13	\$4,160	18	\$5,760	22	\$7,040
Hand Wrap Machine	Mechanical or Optical Control	4,200	\$100	6	\$600	8	\$800	10	\$1,000
Reach-in Refrigerators	Solid Door	25,171	\$45	38	\$1,710	53	\$2,385	64	\$2,880
Reach-in Refrigerators	Glass Door	11,510	\$45	17	\$765	24	\$1,080	29	\$1,305
Reach-in Freezers	Solid Door	13,194	\$45	20	\$900	28	\$1,260	34	\$1,530
Reach-in Freezers	Glass Door	5,726	\$45	9	\$405	13	\$585	16	\$720
Ice Machines	ENERGY STAR	21,735	\$100	33	\$3,300	46	\$4,600	55	\$5,500
Ice Machines	CEE Tier 2 Advanced	5,434	\$200	8	\$1,600	11	\$2,200	13	\$2,600
Totals		132,718		200	\$45,640	277	\$62,170	333	\$73,825

Table 66 Estimated Electric Rebate Costs Using Optimal Rebate Levels

Group	Category	Electric Inventory	Optimal Rebate \$	High Eff Uptake in PY1	Total Appliance Rebate Cost in PY1	High Eff Uptake in PY2	Total Appliance Rebate Cost in PY2	High Eff Uptake in PY3	Total Appliance Rebate Cost in PY3
Fryers	French Fryer	5,480	\$600	11	\$6,600	15	\$9,000	18	\$10,800
Fryers	Large Vat	683	\$600	1	\$600	1	\$600	1	\$600
Griddles	Double-Sided	349	\$600	1	\$600	1	\$600	1	\$600
Griddles	Standard	7,057	\$600	11	\$6,600	15	\$9,000	18	\$10,800
Ovens	Combi, all sizes	640	\$2,000	1	\$2,000	1	\$2,000	1	\$2,000
Ovens	Convection	11,575	\$600	23	\$13,800	32	\$19,200	38	\$22,800
Steamers	Pressure Steamer	383	\$1,500	1	\$1,500	1	\$1,500	1	\$1,500
Steamers	Pressureless Steamer	10,848	\$1,500	22	\$33,000	22	\$33,000	26	\$39,000
Warming Equip	Holding Cabinet	8,733	\$320	17	\$5,440	18	\$5,760	22	\$7,040
Hand Wrap Machine	Mechanical or Optical Control	4,200	\$150	8	\$1,200	8	\$1,200	10	\$1,500
Reach-in Refrigerators	Solid Door	25,171	\$75	50	\$3,750	53	\$3,975	64	\$4,800
Reach-in Refrigerators	Glass Door	11,510	\$75	23	\$1,725	24	\$1,800	29	\$2,175
Reach-in Freezers	Solid Door	13,194	\$200	26	\$5,200	28	\$5,600	34	\$6,800
Reach-in Freezers	Glass Door	5,726	\$200	11	\$2,200	13	\$2,600	16	\$3,200
Ice Machines	ENERGY STAR	21,735	\$150	43	\$6,450	46	\$6,900	55	\$8,250
Ice Machines	CEE Tier 2 Advanced	5,434	\$300	11	\$3,300	11	\$3,300	13	\$3,900
Totals		132,718		260	\$93,965	289	\$106,035	347	\$125,765

Projected Pilot Program Uptake

The start-up phase of a FSIP pilot, including promotion, onboarding, training program participants, and developing support infrastructure, takes about a year. During this initial startup phase, the number of incentives paid will be few until the participants become more familiar with the program requirements and can start marketing the program effectively to end-customers. This experience is consistent with previous program experience and research for other utilities. As cited in the National Restaurant Association *2010 Restaurant Industry Forecast*, the EPA noted that the time lag between awareness and purchasing can be long:

“While CFS programs can be operational within a two to four month period, given the diffuse nature of the distribution and purchasing patterns associated with this equipment, seeing significant progress in terms of program participation may take as long as one year”⁴¹

In our experience, pilot programs initially start slowly as Participants learn about the benefits of energy-efficient equipment and develop sales strategies to promote the qualifying models in their inventory. As a program builds momentum, it begins to impact the stocking behavior of the more fully invested participants. A challenge that has been encountered is that many participants are initially distrustful of a program and are unwilling to carry the cost of the customer incentive until reimbursement.

Distributor engagement and support is important for an upstream program. One of the most attractive features of a UFSIP is reducing the amount of paperwork for the end-customer. The ability to pay participants in a timely manner, combined with the positive impact on customer experience, will encourage participants to become more enthusiastic about the program as a tool to build their business and build customer relationships. From previous programs, we know that it can take a minimum of six months to recruit and train participants before there is significant program activity. We therefore expect that very few rebates will be paid during the first six months, but that activity will ramp up swiftly thereafter.

Table 67 and Figure 4 illustrate the projected uptake during an 18-month pilot program starting in January 2019.

⁴¹ National Restaurant Association, Research Department (US). 2010 Restaurant industry forecast [Internet]. Washington, DC: National Restaurant Association; 2009 Dec.

Table 67 Projected UFSIP Gas and Electric Uptake Rates by Month

Month	Gas Rebates by Month	Cumulative Gas Rebates	Electric Rebates by Month	Cumulative Electric Rebates
Jan-2019				
Feb-2019				
Mar-2019				
Apr-2019				
May-2019	2	2	3	3
Jun-2019	3	5	4	7
Jul-2019	4	9	5	12
Aug-2019	5	14	8	20
Sep-2019	8	22	9	29
Oct-2019	12	34	13	42
Nov-2019	16	50	17	59
Dec-2019	18	68	21	80
Jan-2020	22	90	24	104
Feb-2020	24	114	27	131
Mar-2020	26	140	29	160
Apr-2020	27	167	30	190
May-2020	28	195	34	224
Jun-2020	30	225	36	260

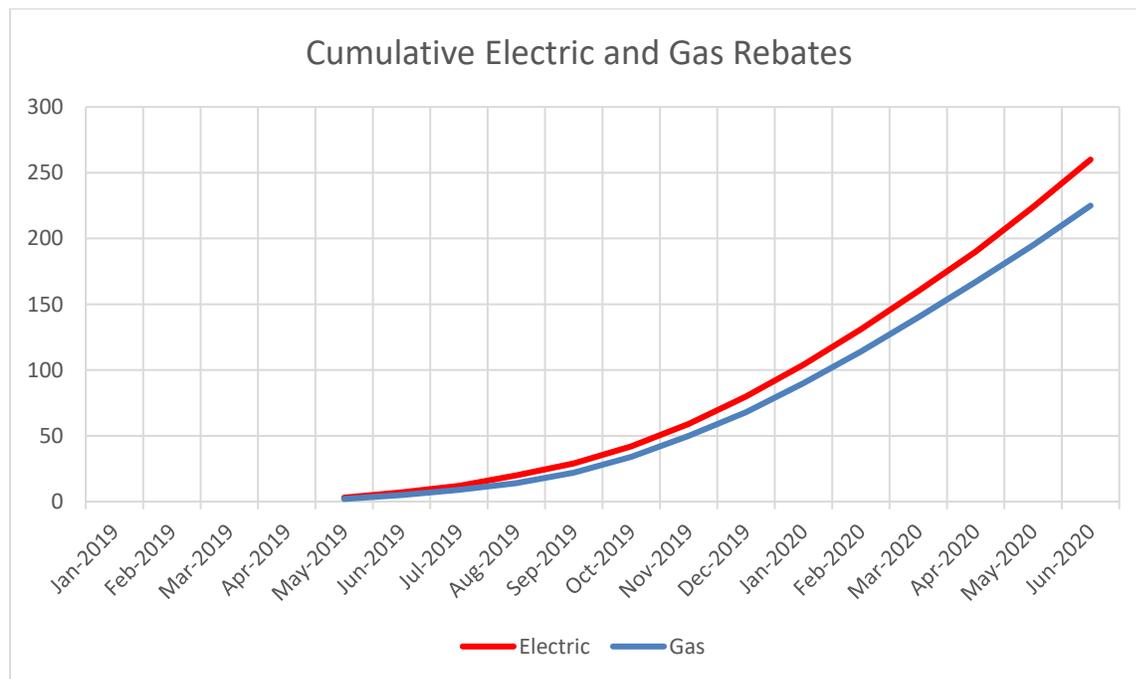


Figure 4 UFSIP Pilot Cumulative Electric and Gas Rebate Uptake

Incentives for Dealers and Other Market Actors

The primary focus of the UFSIP will be food service equipment dealers, chain KES and manufacturers (Participants) that sell direct to the customer. Dealers usually have customers who are independent restaurateurs or small chain operators. These customers are generally reactive with respect to equipment failures, meaning they don't plan, often delay maintenance, do not have capital replacement budgets, and consequently visit the dealer with an immediate need and desire to purchase for the lowest cost. In turn, dealers stock appliances that are in demand, i.e., less expensive standard-efficiency equipment. The KES can help promote the more efficient option to the chain franchisees that they support, instead of leaving it to the individual store managers to differentiate between standard and efficient models. Greater uptake of efficient equipment by individual franchisees will help lower the cost differential, which will help to increase the market adoption of effect equipment. Manufactures that provide direct-customer support can be influenced to upsell the more efficient offerings to targeted customers instead of focusing on value.

The intention of the program is that Participants stock and promote more high-efficiency appliances and be able to offer them at attractive prices. The rebates discussed above will assist the dealers in offering better prices for high-efficiency equipment, thus allowing them to increase their sales volume of high-cost appliances. Increased stocking should result, since their customers want to buy what they can see on the dealer floor. The rebates will be subtracted from the retail price at the point-of-sale ("POS"), thus reducing part of the "hassle" barrier encountered by food service operators in filling out downstream rebate applications. Participants will have to qualify customers by determining whether they are in the CNP service areas and that the appliance is on a program-provided qualified list. To ensure success, the program will provide targeted training for Participant sales representatives that outline the benefits of the different technologies and program operating procedures. To compensate these market actors for participating in the program, it is strongly recommended that the program include an incentive service fee for each qualifying appliance, that will scale based on the value of the rebate. Table 68 shows the proposed incentive levels, depending on the amount of the rebate by measure category.

Table 68 UFSIP Participant Incentive Fee Schedule

	Rebate Per Appliance
Appliance Rebate < 100	\$5
Appliance Rebate => 100 and < \$500	\$25
Appliance Rebate => \$500 and < \$1,000	\$50
Appliance Rebate => \$1,000	\$100

Other significant market influencers include the independent manufacturer’s sales representatives (Reps) and food service design consultants. These actors sway customer perceptions and purchasing decisions, as well as dealer stocking preferences. The more engaged Reps and Consultants are, the greater the impact of a UFSIP initiative.

Reps are essentially the “boots on the ground” sales team for manufacturers and are tasked with building manufacturer market share. They generally work with a number of non-competing brands covering a broad selection of equipment and supplies. As the local sales force representing their manufacturer lines, the Rep is essentially the primary marketing and training resource for manufacturers to promote products to dealers, design consultants, and end-use customers. The Reps are an essential part of the marketing for food service incentive programs, as they provide the primary talking points on the different equipment that they represent.

Foodservice design Consultants are specialists who provide designs for new and renovated facilities undertaken by non-commercial organizations. Their specifications for food service appliances are based on experience, customer preferences, and information from manufacturer’s reps. Food service projects for non-commercial organizations usually have long lead times due to the complexity of the design and procurement process. Capital budgets are under pressure just like those in the commercial sector, so paying the marginal additional cost of high-efficiency appliances is always a “value-engineering” target. Non-commercial organizations frequently have maintenance budgets and staff (or contractors) for kitchen equipment. Consequently, they have fewer instances of appliance failures that are unforeseen. These factors result in longer life for appliances and fewer opportunities for influencing decision makers with respect to the value of higher-efficiency appliances. It is recommended that further evaluation of the potential to engage Consultants as market influencers during the implementation phase.

Tables 69 and 70 summarize gas and electric rebate and dealer incentive costs for Pilot UFSIP.

Table 69 Summary of Estimated Gas Rebates and Costs for the Pilot UFSIP

Optimal Gas Rebate Plan	Number of Gas Rebates	Average Gas Rebate Cost	Total Gas Rebate Cost	Dealer Incentive Totals	Gas Savings, Therms	Cost per Therm
Nicor	149	\$680	\$94,250	\$7,090	53,548	\$1.893
PGL/NSG	76	\$716	\$50,750	\$3,670	27,932	\$1.948
Totals	225	\$692	\$145,000	\$10,760	81,480	\$1.912

Table 70 Summary of Estimated Electric Rebates and Costs for the Pilot UFSIP

Optimal Electric Rebate Plan	Number of Electric Rebates	Average Electric Rebate Cost	Total Electric Rebate Cost	Dealer Incentive Totals	Electric Savings, kWh	Cost per kWh
ComEd	260	\$361	\$93,965	\$8,015	632,761	\$0.161

Appendix A, Allocation of CFS Customers in Zip Codes Common to Nicor, PGL, and NSG

Zip Code	Utilities Sharing Zip Code	ComEd Non-Residential Accounts	Nicor Non-Residential Accounts	PGL/NSG Non-Residential Accounts	PGL or NSG	Total # CFS by Zip Code
60002	ComEd & Nicor & NSG	1,079	669	23	NSG	70
60010	ComEd & Nicor & NSG	2,312	1,753	1	NSG	92
60015	ComEd & Nicor & NSG	1,432	114	504	NSG	70
60030	ComEd & Nicor & NSG	1,310	82	894	NSG	61
60040	ComEd & Nicor & NSG	273	1	219	NSG	31
60045	ComEd & Nicor & NSG	1,044	1	599	NSG	41
60046	ComEd & Nicor & NSG	930	380	194	NSG	41
60047	ComEd & Nicor & NSG	1,675	1,138	14	NSG	92
60048	ComEd & Nicor & NSG	1,908	1	1,327	NSG	80
60060	ComEd & Nicor & NSG	1,559	181	1,081	NSG	89
60062	ComEd & Nicor & NSG	2,835	2,029	81	NSG	114
60069	ComEd & Nicor & NSG	597	2	307	NSG	25
60073	ComEd & Nicor & NSG	1,186	755	14	NSG	82
60085	ComEd & Nicor & NSG	2,729	2	1,793	NSG	124
60089	ComEd & Nicor & NSG	1,506	549	422	NSG	92
60090	ComEd & Nicor & NSG	1,658	1,584	15	NSG	70
60093	ComEd & Nicor & NSG	667	227	326	NSG	39
60202	ComEd & Nicor & NSG	1,295	1,170	1	NSG	67
60204	Nicor & NSG		12	1	NSG	1
60305	ComEd & Nicor & NSG	325	247	1	NSG	14
60422	ComEd & Nicor & NSG	302	202	1	NSG	11
60601	ComEd & Nicor & PGL	2,080	4	306	PGL	103
60602	ComEd & Nicor & PGL	1,055	1	321	PGL	48
60605	ComEd & Nicor & PGL	1,277	2	621	PGL	112
60607	ComEd & Nicor & PGL	2,561	3	1,954	PGL	207
60610	ComEd & Nicor & PGL	3,672	1	1,985	PGL	127
60611	ComEd & Nicor & PGL	2,958	1	770	PGL	218
60620	ComEd & Nicor & PGL	1,849	14	1,334	PGL	81
60625	ComEd & Nicor & PGL	2,678	1	1,691	PGL	181
60628	ComEd & Nicor & PGL	1,523	1	1,349	PGL	63
60629	ComEd & Nicor & PGL	1,835	17	1,381	PGL	106
60631	ComEd & Nicor & PGL	1,338	11	641	PGL	49
60633	ComEd & Nicor & PGL	421	96	184	PGL	23
60634	ComEd & Nicor & PGL	1,938	14	1,511	PGL	129
60638	ComEd & Nicor & PGL	1,699	434	945	PGL	109
60643	ComEd & Nicor & PGL	1,366	17	1,059	PGL	78
60644	ComEd & Nicor & PGL	1,286	1	938	PGL	37
60645	ComEd & Nicor & PGL	1,054	6	560	PGL	47
60646	ComEd & Nicor & PGL	953	4	692	PGL	69
60652	ComEd & Nicor & PGL	828	1	638	PGL	48
60655	ComEd & Nicor & PGL	478	9	367	PGL	32
60656	ComEd & Nicor & PGL	767	76	561	PGL	31
60661	ComEd & Nicor & PGL	1,113	1	413	PGL	88
60706	ComEd & Nicor & PGL	708	643	2	PGL	76
60707	ComEd & Nicor & PGL	1,153	723	406	PGL	75
60804	ComEd & Nicor & PGL	1,803	1,718	1	PGL	107
60805	ComEd & Nicor & PGL	638	499	1	PGL	31
60827	ComEd & Nicor & PGL	675	556	103	PGL	26