

Subcommittee Process Technology Overview Food Service



AYAD AL-SHAIKH
JULY 2017

Information Sources

2

- Savings Data:
 - EESStats, 2016 CA IOU data (portfolio level data)
 - Claims, 2016 CA IOU data (deemed savings)
- Workpaper Information:
 - Posted at DropBox Library:
 - ✦ <https://www.dropbox.com/sh/df86syucqjsee45/AAAzpliKE-JeKPKhfCj6xzwma?dl=0>
 - POU TRM (posted in DropBox library)
 - Ex Ante Table consolidation

Technology Overview Contents

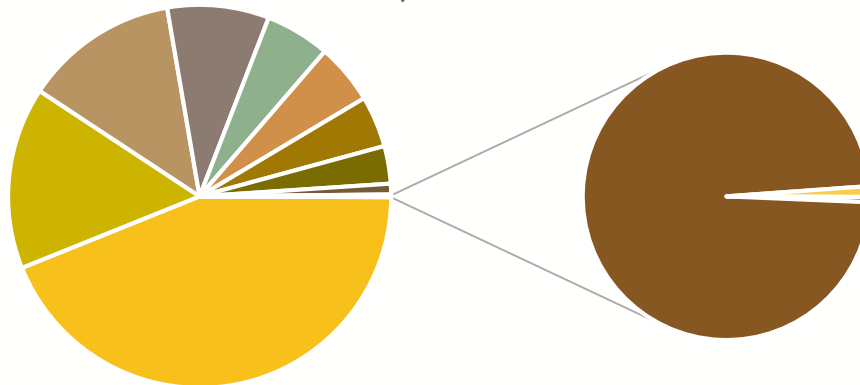
3

- Savings Perspective
 - Slides 4 – 9
- “Technology Summary File” Explanation
 - Slides 11 – 19
- Cross Cutting Issues
 - Slides 20 – 22
- Framing of Savings Issues
 - Slides 24 – 45
 - Blue Text = POU differences
 - Red Text = Items needing subcommittee judgement

Food Services Category

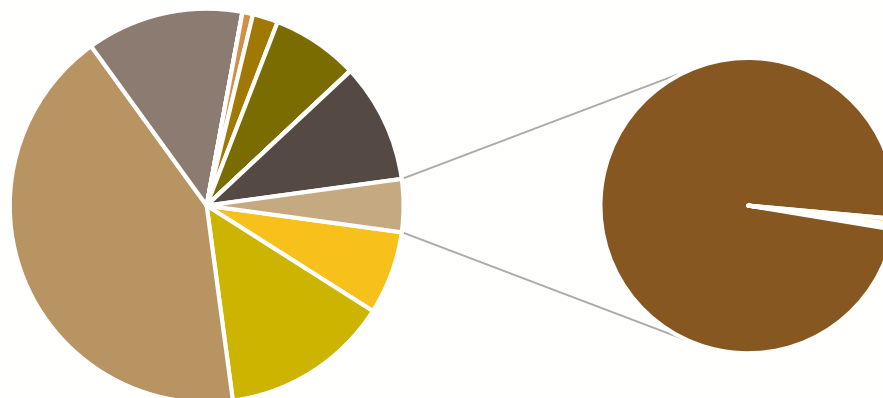
4

2013-15 - EESat Data
Total: 5,413.2 GWh



**Food Service
Commercial,
7.359 GWh,
0.14%**

2013-15 - EESat Data
Total: 131.586 MMTh



**Food Service
Commercial,
6.515 MMTh,
4%**

2016 Data:
0.18% of GWh
8.4% of Therms

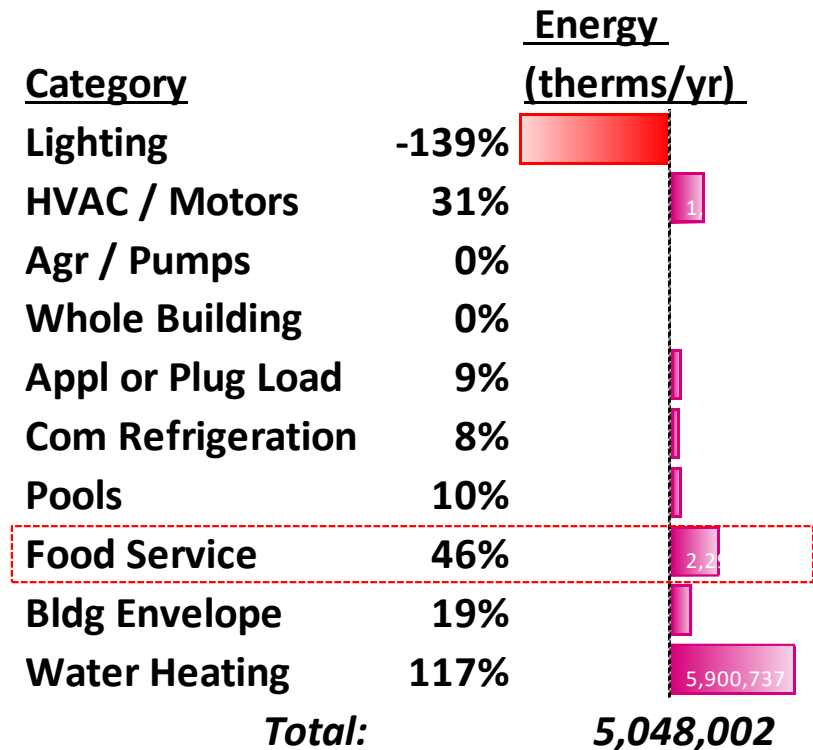
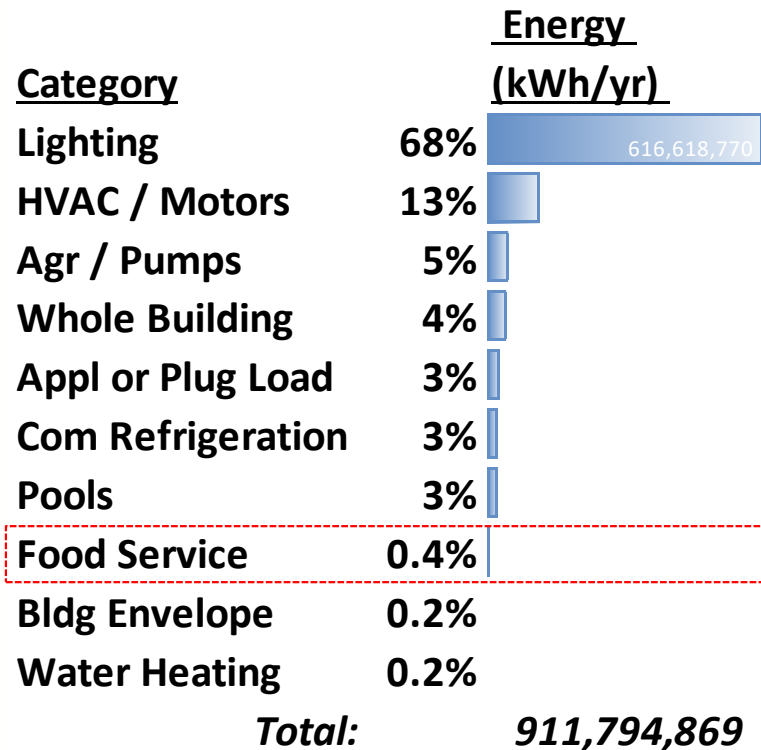
Participation Primarily Through Core Deemed Programs

5

EndUse	PA	ProgramName	Sum of Gross GWh	Sum of Gross MW	Sum of Gross MMTh
Food Service	SDGE	SW-COM Direct Install	-	-	0.00
		SW-COM-Deemed Incentives-Commercial Rebates	0.04	0.01	0.07
		SW-IND-Deemed Incentives	0.00	0.00	-
	SCG	3P-IDEEA365-Instant Rebates! Point-of-Sale Foodservice	-	-	0.59
		3P-PREPPS	-	-	0.01
		COM-Deemed Incentives	-	-	0.87
		IND-Deemed Incentives	-	-	0.03
		RES-MFEER	-	-	0.00
		RES-Plug Load and Appliances	-	-	0.00
		RES-Plug Load and Appliances - POS	-	-	0.02
	SCE	Commercial Calculated Program	0.11	0.02	-
		Commercial Deemed Incentives Program	1.38	0.29	-
		Savings By Design	0.18	0.05	-
	PGE	Agricultural Deemed Incentives	0.01	0.00	0.01
		Commercial Deemed Incentives	0.74	0.14	0.63
		Hospitality Program	0.22	0.03	0.01
		School Energy Efficiency	-	-	0.01
Grand Total			2.68	0.53	2.25

Food Services Category

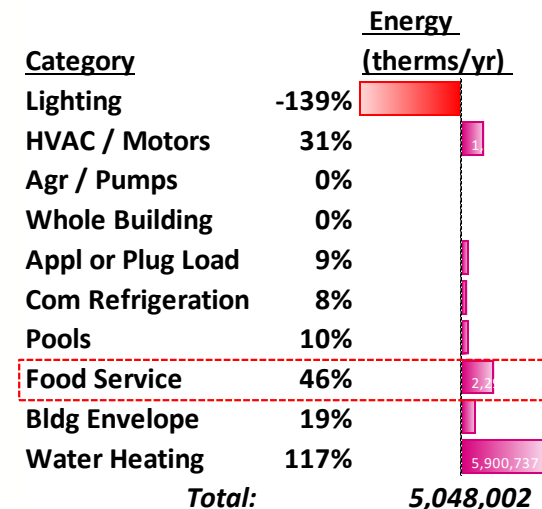
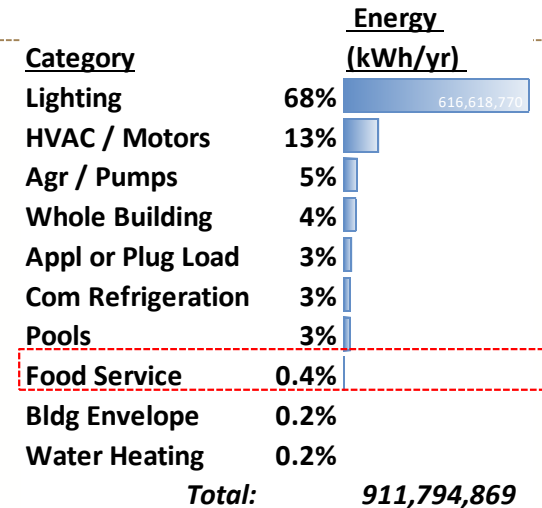
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Food Services Category

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Ref No	Name	Units Installed	Total Energy (kWh/yr)	Total Energy (therm/yr)
2.01	Commercial Convection Oven	716	65,206	232,905
2.02	Commercial Dishwashers	1,037	0	34,221
2.03	Commercial Combination Oven	244	1,279,694	145,140
2.04	Commercial Griddles	162	33,050	17,258
2.05	Commercial Steamers	37	373,932	66,727
2.06	Commercial Ice Machines	408	479,875	0
2.07	Insulated Hot Food Holding Cabinets	354	752,758	0
2.08	Commercial Conveyor Oven-Gas	14	0	12,376
2.11	Gas & Electric Fryers	2,288	18,747	1,535,209
2.12	Exhaust Hood Demand Controlled Ventilation	218	936,077	21,772
2.13	Low-Flow Pre-Rinse Spray Valves Direct Instal	1,328	0	48,395
2.14	Rack Oven	104	0	218,816
2.16	Reach in RefFreezer	6,004	5,052,745	0
Grand Total		1,594,703	1,399,584	4,988,132



Food Services Category

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★ 2.01	Commercial Convection Oven	716	65,206	232,905
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★ 2.07	Insulated Hot Food Holding Cabinets	354	752,758	0
★ 2.08	Commercial Conveyor Oven-Gas	14	0	12,376
★ 2.09	Commercial Electric Deck Oven			
★ 2.10	Commercial Hand Wrap Machines			
★ 2.11	Gas & Electric Fryers	2,288	18,747	1,535,209
★ 2.12	Exhaust Hood Demand Controlled Ventilation	218	936,077	21,772
★ 2.13	Low-Flow Pre-Rinse Spray Valves Direct Insta	1,328	0	48,395
★ 2.14	Rack Oven	104	0	218,816
★ 2.15	Finned-Bottom Stock Pot			
★ 2.16	Reach in RefFreezer	6,004	5,052,745	0
★ 2.17	Commercial Pressure Fryer			
★ 2.18	Com High Density Universal Holding Cabinets			
Grand Total		1,594,703	1,399,584	4,988,132

Question:
Should Commercial Reach-In Refrigerators / Freezers be included in this category or in Appliance / Plug Loads? Thoughts?



Food Services Savings

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	PGE		SCE		SCG		SDGE		Total Sum of Gross GWh	Total Sum of Gross MMTh
Row Labels	Sum of Gross GWh	Sum of Gross MMTh	Sum of Gross GWh	Sum of Gross MMTh	Sum of Gross GWh	Sum of Gross MMTh	Sum of Gross GWh	Sum of Gross MMTh		
Commercial										
Food Service										
3P-IDEEA365-Instant Rebates! Point-of-Sale Foodservice Rebate Program				-	0.617				-	0.617
3P-PREPS				-	0.001				-	0.001
Commercial Calculated Incentives	-	0.004							-	0.004
Commercial Calculated Program			0.706	-					0.706	-
Commercial Deemed Incentives	4.280	2.717							4.280	2.717
Commercial Deemed Incentives Program			1.564	-					1.564	-
Napa County	-	0.002							-	0.002
Redwood Coast	-	0.001							-	0.001
Savings By Design			0.110	-					0.110	-
School Energy Efficiency	0.051	0.002							0.051	0.002
SW-COM-Calculated Incentives				-	0.192				-	0.192
SW-COM-Calculated Incentives-Calculated						0.021	0.003	0.021	0.003	
SW-COM-Deemed Incentives				-	2.537				-	2.537
SW-COM-Deemed Incentives-Commercial Rebates						0.622	0.379	0.622	0.379	
SW-IND-Deemed Incentives				-	0.046	-	0.014	-	-	0.060
Food Service Total	4.331	2.726	2.380	-	-	3.393	0.643	0.397	7.355	6.515
Refrigeration Ice Machine										
Commercial Deemed Incentives Program			0.004	-					0.004	-
Refrigeration Ice Machine Total			0.004	-					0.004	-
Commercial Total	4.331	2.726	2.384	-	-	3.393	0.643	0.397	7.359	6.515

Intro to “Technology Summary” File

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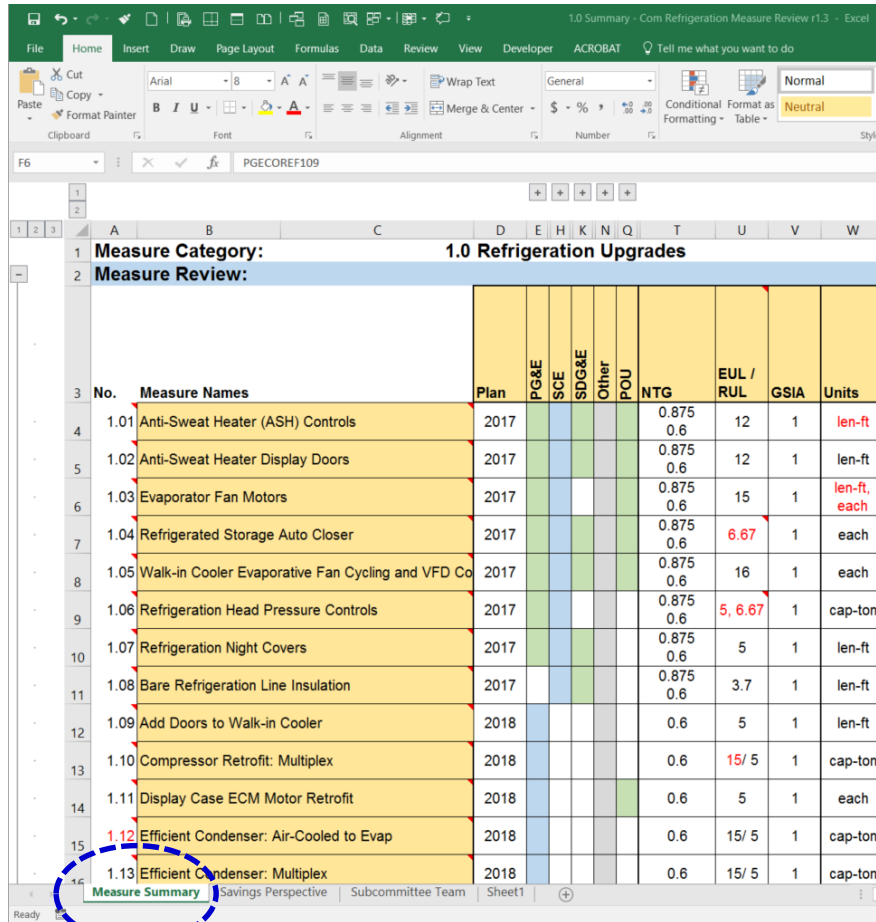
Subcommittee Materials

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- Category Summary File
 - Measure Review
 - Cross-Cutting Issues
 - Measure-Specific Issues
- Category Savings Perspective
- Subcommittee Team List
- Library of Workpapers (*in progress*)
- Ex Ante Data Pivot Tables (*in progress*)

Category Summary File

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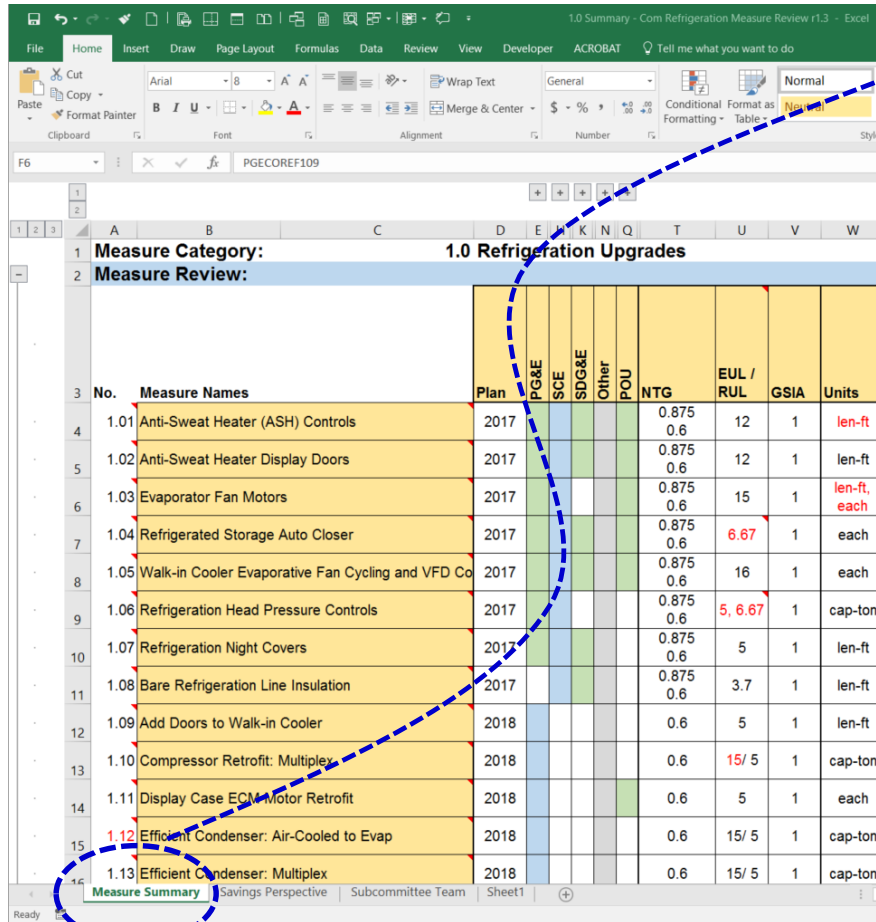
No.	Measure Names	Plan	PG&E	SCE	SOG&E	Other	POU	NTG	EUL / RUL	GSIA	Units
1.01	Anti-Sweat Heater (ASH) Controls	2017						0.875 0.6	12	1	len-ft
1.02	Anti-Sweat Heater Display Doors	2017						0.875 0.6	12	1	len-ft
1.03	Evaporator Fan Motors	2017						0.875 0.6	15	1	len-ft, each
1.04	Refrigerated Storage Auto Closer	2017						0.875 0.6	6.67	1	each
1.05	Walk-in Cooler Evaporative Fan Cycling and VFD Co	2017						0.875 0.6	16	1	each
1.06	Refrigeration Head Pressure Controls	2017						0.875 0.6	5, 6.67	1	cap-ton
1.07	Refrigeration Night Covers	2017						0.875 0.6	5	1	len-ft
1.08	Bare Refrigeration Line Insulation	2017						0.875 0.6	3.7	1	len-ft
1.09	Add Doors to Walk-in Cooler	2018						0.6	5	1	len-ft
1.10	Compressor Retrofit: Multiplex	2018						0.6	15/ 5	1	cap-ton
1.11	Display Case ECM Motor Retrofit	2018						0.6	5	1	each
1.12	Efficient Condenser: Air-Cooled to Evap	2018						0.6	15/ 5	1	cap-ton
1.13	Efficient Condenser: Multiplex	2018						0.6	15/ 5	1	cap-ton

- Category Summary File
 - Measure Review
 - Cross-Cutting Issues
 - ✦ **Intent:** Higher level concern that effects multiple Measures
 - Policy Issues
 - Technical Issues
 - Technical Questions
 - Etc...
 - Measure-Specific Issues
 - ✦ **Intent:** Detailed issue that needs resolution before consolidation.

Note: Some Cross-Cutting issues are turning out to be Global Issues.

Category Summary File

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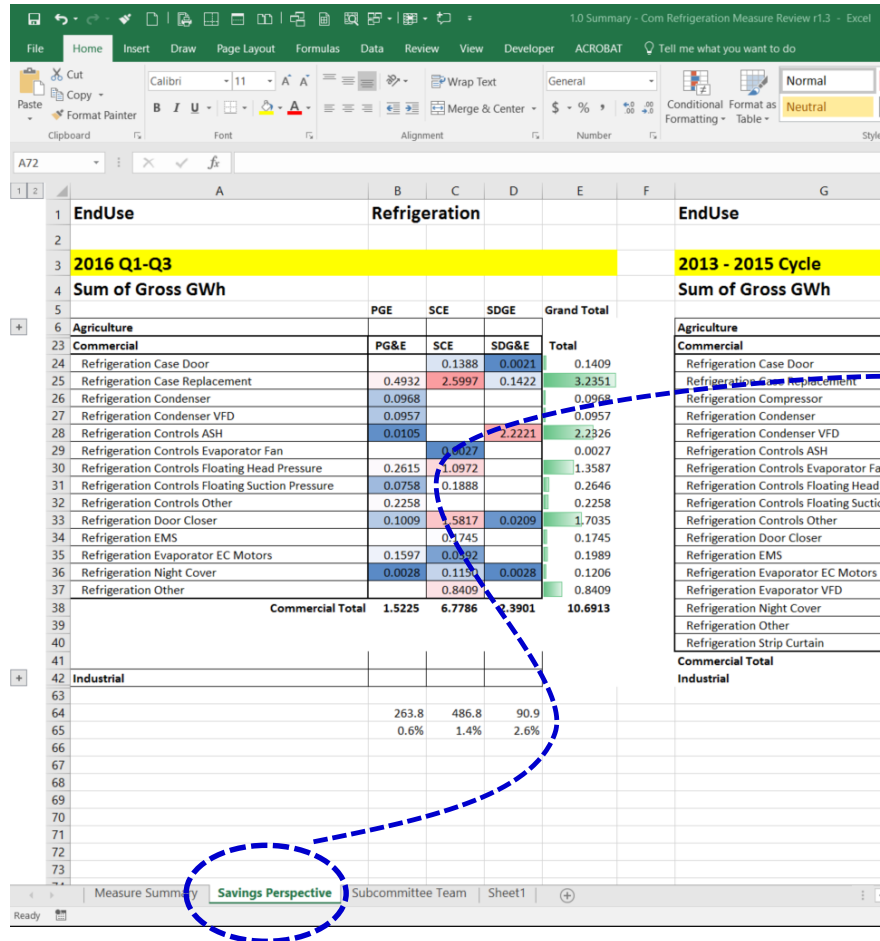


No.	Measure Names	Plan	PG&E	SCE	SDG&E	Other	POU	NTG	EUL / RUL	GSIA	Units
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- Category Summary File
 - Measure Review
 - Cross-Cutting Issues
 - Measure-Specific Issues
- Category Savings Perspective
- Subcommittee Team List

Category Summary File

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EndUse	Refrigeration				EndUse
2016 Q1-Q3					2013 - 2015 Cycle
Sum of Gross GWh					Sum of Gross GWh
	PGE	SCE	SDGE	Grand Total	
Agriculture					Agriculture
Commercial	PG&E	SCE	SDG&E	Total	Commercial
Refrigeration Case Door		0.1388	0.0021	0.1409	Refrigeration Case Door
Refrigeration Case Replacement	0.4932	2.5997	0.1422	3.2351	Refrigeration Case Replacement
Refrigeration Condenser	0.0968			0.0968	Refrigeration Compressor
Refrigeration Condenser VFD	0.0957			0.0957	Refrigeration Condenser
Refrigeration Controls ASH	0.0105		2.2221	2.2326	Refrigeration Condenser VFD
Refrigeration Controls Evaporator Fan		0.0027		0.0027	Refrigeration Controls ASH
Refrigeration Controls Floating Head Pressure	0.2615	1.0972		1.3587	Refrigeration Controls Evaporator Fan
Refrigeration Controls Floating Suction Pressure	0.0758	0.1888		0.2646	Refrigeration Controls Floating Head P
Refrigeration Controls Other	0.2258			0.2258	Refrigeration Controls Floating Suction
Refrigeration Door Closer	0.1009	0.5817	0.0209	1.7035	Refrigeration Controls Other
Refrigeration EMS		0.0745		0.0745	Refrigeration Door Closer
Refrigeration Evaporator EC Motors	0.1597	0.0092		0.1689	Refrigeration EMS
Refrigeration Night Cover	0.0028	0.1150	0.0028	0.1206	Refrigeration Evaporator EC Motors
Refrigeration Other		0.8409		0.8409	Refrigeration Evaporator VFD
Commercial Total	1.5225	6.7786	2.3901	10.6913	Commercial Total
Industrial					Industrial
	263.8	486.8	90.9		
	0.6%	1.4%	2.6%		

- Category Summary File
 - Measure Review
 - Cross-Cutting Issues
 - Measure-Specific Issues
- Category Savings Perspective
- Subcommittee Team List

Overview

Category Summary File

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1.0 Summary - Com Refrigeration Measure Review r1.3 - Excel

FileHomeInsertDrawPage LayoutFormulasDataReviewViewDeveloperACROBATTell me what you want to do

F6PGECOREF109

Measure Category:		1.0 Refrigeration Upgrades										Characterized as commercial refrigeration upgrades.												
Measure Review:		Type:										Number of:												
No.	Measure Names	Plan	PAGE	SCE	SDG&E	Other	POU	NTG	EUL / RUL	GSIA	Units	Measure Application	Delivery	Calc	Measure App Ty	Delivery Types	Buildings	Vintage	Locations	Permutations	Offerings	Offering Description:	Baseline	Measure
1.01	Anti-Sweat Heater (ASH) Controls	2017						0.875 0.6	12	1	len-ft	REA	DirInstall PreRebDown	3	1	2	1	1	16	64	2	Low / Medium Temp	2	1
1.02	Anti-Sweat Heater Display Doors	2017						0.875 0.6	12	1	len-ft	ROB, REF	DirInstall PreRebDown	3	1	2	1	1	16	64	2	Doors only / New case with doors	2	1
1.03	Evaporator Fan Motors	2017						0.875 0.6	15	1	len-ft, each	RET	DirInstall PreRebDown	3	1	2	1	1	16	192	6	Display case / Walk-ins (Shaded/PSC); Coolers / Freezers	6	1
1.04	Refrigerated Storage Auto Closer	2017						0.875 0.6	6.67	1	each	REA	DirInstall PreRebDown	3	1	2							2	1
1.05	Walk-in Cooler Evaporative Fan Cycling and VFD Co	2017						0.875 0.6	16	1	each	REA	DirInstall PreRebDown	3	1	2							1	2

Ayad Al-Shaikh:
This work paper focuses on ASH controls based on humidity to prevent condensation ("sweating") on the glass surface of refrigerated display cases. ASHs are electric resistance heaters installed at the following locations:
• Case mullion to prevent condensation on metal surfaces (Figure 1 ASH Locations Green)
• Door frame to prevent condensation on metal surfaces (Figure 1 ASH Locations Red)
• Glass edge to prevent condensation on the glass (Figure 1 ASH Locations Blue)
A grocery store's RH is closely related to the outdoor dew point (DP) temperature. Condensation occurs when the air temperature drops to the DP temperature. On warmer days when a customer opens the refrigerated display case glass door, warm moist air comes into contact with the cold glass surface which leads to condensation on the surface of the glass door. ASHs are used to evaporate this moisture from the glass surface, door frame and mullion of the cases.
In standard installations, the ASHs operate at full power 100% of the time. ASH controllers monitor the DP temperature of ambient air and adjust the duty cycle of the heaters accordingly. For example, when the air is dry and its dew point is low, the ASHs operate at a low duty cycle and surface is allowed to get cold since condensation will not form. On the other hand, when the air is humid and dew point is high, the ASHs operate at 100% duty cycle to keep the surface warm and above the dew point temperature. Between these extremes, the duty cycle is adjusted according to the measured DP.
Some of the heat generated by ASHs ends up as a load on the refrigeration system. Therefore, any reduction in ASH power not only will reduce the ASH electric demand, but also result in lower refrigeration loads. As a result, compressor run time and energy consumption are reduced. However, there will be a penalty incurred from the increased space heating energy use.

This measure applies to ASHs on both low temperature (freezer - below 32°F) and medium temperature (cooler - above 32°F) glass doors. Calculations for both coolers and freezers were carried out for all 16 California climate zones.

- Category Measure Number
 - Commercial Refrigeration
 - Food Service
 - Agriculture / Pumping
 - Water Heating
- Consolidation Plan Year (2017, 2018, n/a)
- Note: Comments available to give workpaper "Technical Description"

Category Summary File

17

1.0 Summary - Com Refrigeration Measure Review r1.3 - Excel

FileHomeInsertDrawPage LayoutFormulasDataReviewViewDeveloperACROBATTell me what you want to do

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Workpaper Details

- Green Shading designates the lead workpaper that is referenced
- Blue Shading designates that a workpaper exists in the library
- Red Shading designates that the workpaper exists, but we don't have a copy (yet)
- Groups can be opened to show workpaper number and current revision
 - For POU's, this shows the reference within the CA TRM, if applicable.

Category Summary File

18

1.0 Summary - Com Refrigeration Measure Review r1.3 - Excel

FileHomeInsertDrawPage LayoutFormulasDataReviewViewDeveloperACROBAT

Tell me what you want to do

F6PGECOREF109

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Measure Characteristics Comparison

- Net to Gross (NTG)
- Effective Useful Life / Remaining Useful Life (EUL/RUL)
- Gross Savings and Installation Adjustment (GSIA...similar to IR)
- Units
- Measure Application Type (ER, NC, RC, REA, RET, ROB, or ROBNC)
- Delivery Type
- Calculation Type (1=simple calculation; 2=complex calculation; 3=modelled result)

- Note: Red values indicate some type of discrepancy between workpapers

Category Summary File

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1.0 Summary - Com Refrigeration Measure Review r1.3 - Excel

File Home Insert Draw Page Layout Formulas Data Review View Developer ACROBAT Tell me what you want to do

F6 PGECOREF109

Measure Category:		1.0 Refrigeration Upgrades										Characterized as commercial refrigeration upgrades												
Measure Review:		Type:										Number of:												
No.	Measure Names	Plan	PG&E	SCE	SDG&E	Other	POU	NTG	EUL / RUL	GSIA	Units	Measure Application	Delivery	Cal	Measure App Ty	Delivery Types	Buildings	Vintage	Locations	Permutations	Offerings	Offering Description:	Baseline	Measure
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- Permutations
 - Building Type (26 types, Res, Com, Any)
 - Vintage
 - Location (16 Climate Zones or IOU)
- Offerings

Supporting Material for Issues

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Cross-Cutting Issues

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1. EULs are referenced almost exclusively to DEER, which is 12 years for most equipment.
 - EUL may vary significantly across markets (restaurants vs schools).
2. Disposition to de-rate savings by 30% requires supporting documentation of inputs.
3. Peak times are changing. How does this effect the standard 0.9 CDF (coincident diversity factor) that is applied to this category?
4. Water savings measures are captured (currently) when linked to hot water savings.
5. Cost analysis includes 50% discount of Measure case to estimate Base case.
6. Discuss standard Measure Application Types for this sector.

EUL Issue

22

EUL_ID	EUL_	RUL_	Description	Version	VersionSource	Comment
Cook-ElecCombOven	12	4	Combination Oven - Electric	DEER2014	D08 v2.05	
Cook-ElecConvOven	12	4	Convection Oven - Electric	DEER2014	D08 v2.05	
Cook-ElecFryer	12	4	Electric Fryer	DEER2014	D08 v2.05	
Cook-ElecGriddle	12	4	Griddle - Electric	DEER2014	D08 v2.05	
Cook-ElecStmCooker	12	4	Steam Cooker (electric)	DEER2014	D08 v2.05	
Cook-GasCombOVen	12	4	Combination Oven - Gas	DEER2014	D08 v2.05	
Cook-GasConvOven	12	4	Convection Ovens - Gas	DEER2014	D08 v2.05	
Cook-GasFryer	12	4	Gas Fryer	DEER2014	D08 v2.05	
Cook-GasGriddle	12	4	Griddle - Gas	DEER2014	D08 v2.05	
Cook-GasRackOven	12	4	Commercial Gas Rack Ovens	DEER2014	D08 v2.05	
Cook-GasStmCooker	12	4	Steam Cooker (gas)	DEER2014	D08 v2.05	
Cook-GDRef	12	4	Commercial Reach-In Refrigerator / Freezer	DEER2014	D08 v2.05	
Cook-HoldCab	12	4	Commercial Insulated Holding Cabinet	DEER2014	D08 v2.05	
Cook-IceMach	10	3.3	Ice Machine	DEER2014	D08 v2.05	
Cook-SDFreez	12	4	Commercial Reach-In Refrigerator / Freezer	DEER2014	D08 v2.05	
Cook-SDRef	12	4	Commercial Reach-In Refrigerator / Freezer	DEER2014	D08 v2.05	
Cook-StockPot	3	1	Fin bottomed stock pot	ExAnte2013	IOU Workpaper	proposed in PGECOFST122
Cook-VatFryer	12	4	Vat Fryer	DEER2014	D08 v2.05	

Cross-Cutting Issues

Existing Dispositions

- 30% Reduction of Savings
 - D-11-07-030, Attachment A-B, “Summary of final determinations of Non-DEER Ex Ante Energy Savings values for High Impact energy efficiency measures for Utility 2010-2012 Portfolios.” (7/14/11)

PGE PGECOFST101 Convection Oven	Approval upon inclusion of the following revisions: 1. Energy Division believes that operating hours, food production rates and baseline efficiencies contribute to overly optimistic UES calculations and recommend a 30% reduction in UES values for this group of measures.
SCG SCGWP080331B Conveyor Oven	
PGE PGECOFST102 Fryer - Electric and Gas	
PGE PGECOFST104 Steam Cookers	

- Same decision from 2011 is starting to impact new measures that are under review by Ex Ante Team.
- Some ET/PIER studies coming to help solve 30% issue for:
 - Convection Oven, Griddle, Fryer, Broiler, Combination Oven

Energy Savings Comparison

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2.01 – Convection Oven

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- IOU savings methodology and numbers match.
- POU TRM electric savings methodology is also identical except that the 30% reduction is not included.
 - ❑ The gas offering is not included in the TRM currently.
- Expecting a CEC Study to be produced (roughly early 2018). **Does anyone know the status of this study?**



2.02 Commercial Dishwasher

PA	BldgLoc	EnergyImpactID	BldgType	BldgVint	BldgHVAC	NormUnit	SourceDesc	No. (kWh)	BL1-kWh	BL2-kWh	BL1-Th	BL2-Th
PGE	Any	FS004	Com	Any	cWtd	Each	PGECOFST126-R0	1	-	1,124	-	95
		FS005	Com	Any	cWtd	Each	PGECOFST126-R0	1	-	2,421	-	206
		FS006	Com	Any	cWtd	Each	PGECOFST126-R0	1	-	142	-	193
		FS007	Com	Any	cWtd	Each	PGECOFST126-R0	1	-	206	-	280
SCG	Any	PGECOFST126-Rev00-Msr001	Any	Ex	Any	Each	PGECOFST126-Rev00	1	-	1,124	-	95
		PGECOFST126-Rev00-Msr002	Any	Ex	Any	Each	PGECOFST126-Rev00	1	-	2,421	-	206
		PGECOFST126-Rev00-Msr003	Any	Ex	Any	Each	PGECOFST126-Rev00	1	-	142	-	193
		PGECOFST126-Rev00-Msr004	Any	Ex	Any	Each	PGECOFST126-Rev00	1	-	206	-	280

- No commercial claims in 2016
- IOU savings are consistent.
 - ❑ Methodology and assumptions need to be checked – very different than POU savings
 - ✦ Number of Racks washed per year is 2x. What should this be? This variable is correlated to building type.
 - ❑ Varies by climate zone (due to water temperature)
 - ✦ Savings are already averaged across climate zones for PG&E.
 - ✦ Recommend averaging across all climate zones; minor change.
 - ❑ Varies by offering: Low / High Temp; Tier 1 / Tier 2
- POU Savings
 - ❑ More Offerings (see next slide);
 - ❑ Greater savings (based upon Nov 2013 Energy Star Calculator)



2.02 Dishwasher – POU Offerings

27

- Red boxes are most similar to IOU offering
- Blue Box is being proposed

Dishwasher & Fuel Type	Annual kWh	Annual Therms	Water (Gallons)
Low temp. undercounter, gas heat	N/A	106	14,783
Low temp. undercounter, elec. heat	2,540	N/A	14,783
High temp. undercounter, gas heat, gas booster	1,471	71	6,296
High temp. undercounter, gas heat, electric booster	2,089	45	6,296
High temp. undercounter, electric heat, gas booster	2,553	26	6,296
High temp. undercounter, electric heat, electric booster	3,171	N/A	6,296
Low temp. door-type, gas heat	N/A	675	94,024
Low temp. door-type, electric heat	10,153	N/A	94,024
High temp. door-type, gas heat, gas booster	827	461	40,880
High temp. door-type, gas heat, electric booster	4,840	294	40,880
High temp. door-type, electric heat, gas booster	7,850	168	40,880
High temp. door-type, electric heat, electric booster	11,863	N/A	40,880
Low temp. single-tank conveyor, gas heat	584	545	75,920
Low temp. single-tank conveyor, electric heat	13,626	N/A	75,920
High temp. single-tank conveyor, gas heat, gas booster	2,511	280	24,820
High temp. single-tank conveyor, gas heat, electric booster	4,948	178	24,820
High temp. single-tank conveyor, electric heat, gas booster	6,775	102	24,820
High temp. single-tank conveyor, electric heat, electric booster	9,212	N/A	24,820
Low temp. multi-tank conveyor, gas heat	N/A	786	109,500
Low temp. multi-tank conveyor, electric heat	18,811	N/A	109,500
High temp. multi-tank conveyor, gas heat, gas booster	1,986	1,063	94,170
High temp. multi-tank conveyor, gas heat, electric booster	11,230	676	94,170
High temp. multi-tank conveyor, electric heat, gas booster	18,163	386	94,170
High temp. multi-tank conveyor, electric heat, electric booster	27,408	N/A	94,170

2.02 Dishwasher – POU Offerings

28

- Red boxes are most similar to IOU offering

Dishwasher & Fuel Type	Annual kWh	Annual Therms	Water (Gallons)
Low temp. undercounter, gas heat	N/A	106	14,783
Low temp. undercounter, elec. heat	2,540	N/A	14,783
High temp. undercounter, gas heat, gas booster	1,471	71	6,296
High temp. undercounter, gas heat, electric booster	2,089	45	6,296
High temp. undercounter, electric heat, gas booster	2,553	26	6,296
High temp. undercounter, electric heat, electric booster	3,171	N/A	6,296
Low temp. door-type, gas heat	N/A	675	94,024
Low temp. door-type, electric heat	16,153	N/A	94,024
High temp. door-type, gas heat, gas booster	827	461	40,880
High temp. door-type, gas heat, electric booster	4,840	294	40,880
High temp. door-type, electric heat, gas booster	7,850	168	40,880
High temp. door-type, electric heat, electric booster	11,863	N/A	40,880

Low Temp:

Tier 1: 130 kWh; 180 therms

Tier 2: 200 kWh; 270 therms

Assumes:

97% gas heater

3% electric heater

High Temp:

Tier 1: 1,100 kWh; 90 therms

Tier 2: 2,400 kWh; 200 therms

Assumes:

97% gas heater / 5% gas booster

3% electric heater / 95% electric booster

2.02 Dishwasher – IOU Savings

29

		High Temp		High Temp			Low Temp		Low Temp	
		Tier 1		Tier 2			Tier 1		Tier 2	
		Gas (Therm)	Elec (kWh)	Gas (Therm)	Elec (kWh)		Gas (Therm)	Elec (kWh)	Gas (Therm)	Elec (kWh)
CZ01 CZ02 CZ03 CZ04 CZ05 CZ06 CZ07 CZ08 CZ09 CZ10 CZ11 CZ12 CZ13 CZ14 CZ15 CZ16	51.4	103	1,130	221	2,432		208	153	302	222
	57.3	96	1,125	207	2,422		194	143	282	207
	57.1	96	1,125	208	2,422		195	143	283	208
	59.5	94	1,123	202	2,418		189	139	275	202
	55.8	98	1,126	211	2,424		198	145	287	211
	61.8	91	1,121	196	2,414		183	135	267	196
	62.6	90	1,120	194	2,412		182	133	264	194
	63.7	89	1,119	191	2,410		179	132	261	191
	63.8	89	1,119	191	2,410		179	131	260	191
	64.1	88	1,119	190	2,410		178	131	259	190
	63.2	89	1,120	193	2,411		180	132	262	193
	60.9	92	1,122	198	2,415		186	136	270	198
	64.1	88	1,119	190	2,410		178	131	259	190
	62.7	90	1,120	194	2,412		181	133	264	194
	75.5	76	1,110	163	2,389		151	111	220	162
	51.8	102	1,129	220	2,432		207	152	301	221
PG&E	57.9	95	1,124	206	2,421		193	142	280	206
SoCalGas	62.3	90	1,121	195	2,413		182	134	265	195
SDG&E	63.0	90	1,120	193	2,412		181	133	263	193
SCE	63.4	89	1,120	192	2,411		180	132	262	192

Average	92	1,122	198	2,415		185	136	270	198
Std Dev	6.5	4.8	14.0	10.3		13.4	9.9	19.5	14.3
Std Dev (%)	7.1%	0.4%	7.1%	0.4%		7.2%	7.2%	7.2%	7.2%



2.03 Combination Oven

30

PA	BldgLoc	Version	EnergyImpactID	BldgType	BldgVint	BldgHVAC	NormUnit	Average		Average		Average	
								Count of	of	Count of	of	Count of	of
APreWBk	APreWBk	AStdWBk	APreWBt	AStdWBt	herm	herm							
PGE	Any	ExAnte2014	HA16	Any	Any	cWtd	Each	1	0	11501	1	0	
			F100	Any	Any	cWtd	Each	1	0	15095	1	0	
			HA19	Any	Any	cWtd	Each	1	0	22045	1	0	
			HA48	Any	Any	cWtd	Each	1	0	0	1	798	
			F101	Any	Any	cWtd	Each	1	0	0	1	1120	
			HA49	Any	Any	cWtd	Each	1	0	0	1	1573	
SCE	Any	ExAnte2016	FS-14121	Any	Any	Any		1	0	11182	1	0	
			FS-30956	Any	Any	Any		1	0	14661	1	0	
			FS-20134	Any	Any	Any		1	0	21406	1	0	
SCG	Any												
		ExAnte2014	PGECOFST100-Rev06-Ms	Any	Any	Any		1	0	0	1	798	
			PGECOFST100-Rev06-Ms	Any	Any	Any		1	0	0	1	1120	
			PGECOFST100-Rev06-Ms	Any	Any	Any		1	0	0	1	1573	
SDG	IOU												
		ExAnte2016	301	Com	Ex	Any		1	11501	11501	1	0	
			302	Com	Ex	Any		1	15095	15095	1	0	
			303	Com	Ex	Any		1	22045	22045	1	0	
			304	Com	Ex	Any		1	0	0	1	798	
			305	Com	Ex	Any		1	0	0	1	1120	
			306	Com	Ex	Any		1	0	0	1	1573	

Difference only due to assumption:

- Operating days / year (see calc tool)
- Recommend a weighted average approach

POU savings match IOUs
POUs only offer deemed electric

2.04 - Griddle

31

PA	BldgLoc	Version	EnergyImpactID	BldgType	BldgVint	BldgHVAC	NormUnit (kWh)	No.	BL1-kWh	BL2-kWh	BL1-Th	BL2-Th
PGE	Any	ExAnte2014	FS002	Any	Any	cWtd	Len-ft	1	-	1,322	-	-
			FS003	Any	Any	cWtd	Len-ft	1	-	-	-	126
SCE	Any	ExAnte2016	FS-61445	Any	Any	Any		1	-	1,290	-	-
SCG	Any	ExAnte2015	PGECOFST103-Rev06-Msr001	Any	Any	Any		1	-	-	-	126
SDG	IOU	ExAnte2016		316	Com	Ex	Any	1	1,322	1,322	-	-
				317	Com	Ex	Any	1	-	-	126	126
Grand Total								9	589	879	56	126

Differences due to assumptions:

- Normalized Idle Energy Rate (W/ft2)
- Operating days / year

POU offering is based upon “per Griddle”

- POU online calc has an error, but not used.
- Assumptions use:
 - 365 days/yr (like PG&E)
 - 355 W/ft2 for Norm Idle Energy Rate (like SCE)



2.05 - Steamer

32

PA	BldgLoc	Version	EnergyImpactID	BldgType	BldgVint	BldgHVAC	NormUnit (kWh)	No.	BL1-kWh	BL2-kWh	BL1-Th	BL2-Th
PGE	Any	ExAnte2014	F108	Any	Any	cWtd	Each	1	-	21,109	-	-
			F109	Any	Any	cWtd	Each	1	-	-	-	2,595
SCE	Any	ExAnte2016	FS-38502	Any	Any	Any		1	-	30,156	-	-
SCG	Any	ExAnte2016	PGECOFST104-Rev06-Msr001	Any	Any	Any		1	-	-	-	2,595
SDG	Any	ExAnte2016		270	Com	Ex	Any	1	-	-	2,595	2,595
	IOU	ExAnte2016		269	Com	Ex	Any	1	21,109	21,109	-	-
Grand Total								11	7,402	12,062	910	1,719

IOU Differences due to the application of the disposition:

- 30% Loss
- Review report to help document assumptions,
 “Connectionless_Steamer_Field_Study_(revised).pdf”

POU Differences are larger and need to be investigated.

- Comment in TRM: “In PG&E calcs, this factor [Unknown Standby Loss] disappears w/o explanation in the EE model calculations and is the source of the discrepancy between the revised ERS figures and PG&E figures.”



2.06 – Ice Machines

33



No.												
PA	BldgLoc	Version	EnergyImpactID	BldgType	BldgVint	BldgHVAC	NormUnit (kWh)	BL1-kWh	BL2-kWh	BL1-Th	BL2-Th	
PGE	Any	ExAnte2016	F200	Com	Any	cWtd	Each	1	-	805	-	-
			F201	Com	Any	cWtd	Each	1	-	1,117	-	-
			F202	Com	Any	cWtd	Each	1	-	1,868	-	-
			F203	Com	Any	cWtd	Each	1	-	2,601	-	-
			F204	Com	Any	cWtd	Each	1	-	3,641	-	-
SCE	Any	ExAnte2016	FS-29492	Any	Any	Any	Each	1	-	805	-	-
			FS-34026	Any	Any	Any	Each	1	-	1,117	-	-
			FS-46758	Any	Any	Any	Each	1	-	1,807	-	-
			FS-15494	Any	Any	Any	Each	1	-	2,601		
			FS-93521	Any	Any	Any	Each	1	-	3,641	-	-
SDG	IOU	ExAnte2016	286	Com	Ex	Any	Each	1	805	805	-	-
			287	Com	Ex	Any	Each	1	805	805	-	-
			288	Com	Ex	Any	Each	1	1,117	1,117	-	-
			289	Com	Ex	Any	Each	1	1,117	1,117	-	-
			290	Com	Ex	Any	Each	1	1,868	1,868	-	-
			291	Com	Ex	Any	Each	1	2,601	2,601	-	-
			292	Com	Ex	Any	Each	1	3,641	3,641	-	-

- SCE references the PG&E workpaper; this values comes from Rev 4; **the SCE value matches the POU savings.**
 - Recommend updating savings to the Rev 5 value to 1,868 kWh/yr.**
- Question: What update for Energy Star, version 3 (for 1/1/18).**

2.06 – Ice Machines – POU TRM

34

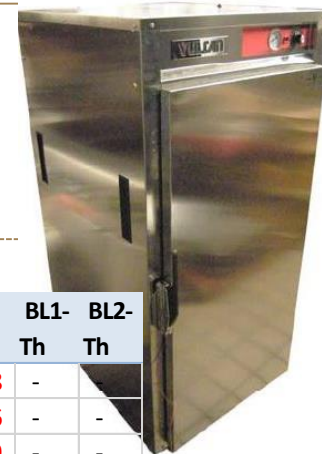
Performance	IHR	IHR	IHR	IHR	IHR
Ice Harvest Rate (IHR) (lbs per 24 hrs.)	101-300	301-500	501-1,000	1,001-1,500	> 1,500
Average IHR Used in Energy Calculations (lbs/day)	200	400	750	1,250	1,750
Baseline Model Energy Usage (kWh/100 lbs)	9.8	6.82	6.065	5.1	5.1
Energy Efficient Model Energy Usage (kWh/100 lbs)	8.33	5.8	5.16	4.34	4.34
Baseline Model Daily Energy Consumption (kWh)	14.7	20.5	34.12	47.8	66.9
Energy Efficient Model Daily Energy Consumption (kWh)	12.5	17.4	29.00	40.7	57
Baseline Model Average Demand (kW)	0.613	0.853	1.895	1.992	2.789
Energy Efficient Model Average Demand (kW)	0.521	0.725	1.611	1.695	2.373
Estimated Demand Reduction (kW)	0.092	0.128	0.256	0.297	0.416
Baseline Model Annual Energy Consumption (kWh/yr)	5,366	7,468	12,452	17,452	24,432
Energy Efficient Model Annual Energy Consumption (kWh/yr)	4,561	6,351	10,584	14,851	20,791
Estimated Annual Energy Savings (kWh/yr)	805	1,117	1,868	2,601	3,641

Red values differ from PG&E calculations for POU and SCE.

Confirm this value for Measure Case Energy Usage (kWh/100 lbs).

2.07 Insulated Holding Cabinet

35



PA	BldgLoc	EnergyImpa	BldgType	BldgVint	BldgHVAC	NormUnit	SourceDesc	No. (kWh)	BL1-kWh	BL2-kWh	BL1-Th	BL2-Th
PGE	Any	F110	Any	Any	cWtd	Each	PGECOFST105-R5	1	-	3,928	-	-
		F111	Any	Any	cWtd	Each	PGECOFST105-R5	1	-	1,916	-	-
SCE	Any	FS-20224	Any	Any	Any	Each	SCE13CC003.2	1	-	4,129	-	-
		FS-31559	Any	Any	Any	Each	SCE13CC003.2	1	-	1,593	-	-
SDG	IOU	322	Com	Ex	Any	Each	WPSDGENRCC0018	1	2,190	2,190	-	-
		323	Com	Ex	Any	Each	WPSDGENRCC0018	1	1,095	1,095	-	-
		324	Com	Ex	Any	Each	WPSDGENRCC0018	1	1,643	1,643	-	-
Grand Total								7	704	2,356	-	-

PG&E / SCE: Differences due to assumptions:

- Cabinet Volume (ft3)
- Normalized Idle Rate Energy (W/ft3)

SDG&E: Differences due to assumptions:

- Idle Rate demand (kW) (from PG&E, for baseline and measures cases)

POU: Differences due to assumption:

- Normalized Idle Rate Energy (W/ft3) (from PG&E, half-sized only)

Question: When will Energy Star specification change in 2018?

2.08 – Conveyor Gas Oven

36

PA	BldgLoc	EnergyImpactID	BldgType	BldgVint	BldgHVAC	NormUnit	SourceDesc	No. (kWh)	BL1-kWh	BL2-kWh	BL1-Th	BL2-Th
PGE	Any	F208	Com	Any	cWtd	Each	PGECOFST117-R6	1	-	-	-	884
SCG	Any	PGECOFST117-Rev05-Msr001	Any	Any	Any	Each	PGECOFST117-Rev05	1	-	-	-	884
SDG	IOU		314 Com	Ex	Any	Deck	WPSDGENRCC0015	1	-	-	733	733
			315 Com	Ex	Any	Deck	WPSDGENRCC0015	1	-	-	884	884
Grand Total								5	-	-	500	854

IOU Savings match.

SDG&E has an additional offering that uses the same methodology (Half Oven) but this offering does not have any claims against it in 2016.

Recommend removing the Half Oven offering

- (*topic of discussion for our 2nd meeting*).

Assumptions should be validated.

- Discuss whether we have good supporting documentation for all assumptions.

POUs do not have this gas offering.

XLT X3F 3240 Conveyor Oven



2.09 - Commercial Electric Deck Oven

37

- Only one calculation from SCE.
- Assumptions should be validated. Discuss whether we have good supporting documentation for all assumptions.
- Calculation is available.
- POU's do not have this measure.



2.10 - Commercial Hand Wrap Machines

38



- Only one calculation from SCE.
- Assumptions should be validated.
 - ❑ Calculation is taken from an ET Study result / measured data.
 - ❑ Discuss whether we have good supporting documentation for all assumptions.
- CDF handled differently than other measures.
 - ❑ Discuss if this data source meets the intent to by-pass the 0.9 CDF reduction factor.
- POU's do not have this measure.

2.11 - Fryer

39



PA	BldgLoc	EnergyImpactID	BldgType	BldgVint	BldgHVAC	NormUnit	SourceDes	No. (kWh)	BL1-kWh	BL2-kWh	BL1-Th	BL2-Th
PGE	Any	F205	Any	Any	cWtd	Each	PGECOFST	1	-	2,083	-	-
		F206	Any	Any	cWtd	Each	PGECOFST	1	-	-	-	548
SCE	Any	FS-57892	Any	Any	Any	Each	SCE13CCO	1	-	3,066	-	-
SCG	Any	PGECOFST102-Rev04-Msr001	Com	Ex	Any	Each	PGECOFST	1	-	-	809	809
		PGECOFST102-Rev05-Msr001	Any	Any	Any	Each	PGECOFST	1	-	-	-	809
		PGECOFST102-Rev06-Msr001	Any	Any	Any	Each	PGECOFST	1	-	-	-	548
SDG	IOU	310	Com	Ex	Any	Vat	WPSDGEN	1	2,083	2,083	-	-
		311	Com	Ex	Any	Each	WPSDGEN	1	-	-	548	548
		312	Com	Ex	Any	Each	WPSDGEN	1	2,083	2,083	-	-
		313	Com	Ex	Any	Each	WPSDGEN	1	-	-	548	548
Grand Total								10	417	932	191	381

IOU Savings differences due to assumption and disposition reduction:

- Baseline Production Capacity (lbs/hr) – why not match measure case for PG&E?
- 30% reduction factor
 - Review report to help document assumptions (“fsec_fryercasestudy.021 - Energy Star Gas Fired Fryers Field Evaluation Report.pdf”)

POUs only have electric offering; matches SCE assumptions.

- TRM text issue (12 h/d -> 14 h/d)

2.12 - Exhaust Hood Demand Controlled Ventilation

40



- Discuss current approach for this measure as a subcommittee.

Row Labels	Count of Exhaust Fan Nameplate HP	Average of Exhaust Fan Nameplate HP2	Average of Exhaust Air CFM	Average of hrs/yr	Average of DVC System Installed Cost (\$)
Campus	13	19.0	15,933	5,160	\$ 33,631
Hotel	9	18.7	20,557	8,056	\$ 33,022
Restaurant	47	11.7	11,497	5,671	\$ 26,760
Supermarket	3	25.0	17,552	4,837	\$ 19,332
Grand Total	72	14.3	13,713	5,845	\$ 28,474

- Significant variation noted in sensitive parameters.
 - Hours / year
 - Cost / system (*discussion for future meeting*)
- POU savings matches IOU approach.
- Verify that CDF used correctly across all IOUs.

2.13 – Pre-Rinse Spray Valve

41



No.									
PA	BldgLoc	BldgType	BldgVint	BldgHVAC	NormUnit (kWh)	BL1-Th	BL2-Th	Baseline	
PGE	Any	Com	Any	cWtd	Each	1	-	33	1.15
SCG	IOU	Any	Any	cWtd	Fixture	1	52	-	1.07
		Any	Any	cWtd	Fixture	1	44	-	1.15
		Any	Any	cWtd	Fixture	1	31	-	1.28
SDG	CZ06	Com	Ex	Any	Each	1	60	60	1.07
		Com	Ex	Any	Each	1	35	35	1.28
		Com	Ex	Any	Each	1	50	50	1.15
	CZ07	Com	Ex	Any	Each	1	59	59	1.07
		Com	Ex	Any	Each	1	34	34	1.28
		Com	Ex	Any	Each	1	49	49	1.15
	CZ08	Com	Ex	Any	Each	1	57	57	1.07
		Com	Ex	Any	Each	1	33	33	1.28
		Com	Ex	Any	Each	1	48	48	1.15
	CZ10	Com	Ex	Any	Each	1	57	57	1.07
		Com	Ex	Any	Each	1	33	33	1.28
		Com	Ex	Any	Each	1	48	48	1.15
	CZ14	Com	Ex	Any	Each	1	59	59	1.07
		Com	Ex	Any	Each	1	34	34	1.28
		Com	Ex	Any	Each	1	49	49	1.15
	CZ15	Com	Ex	Any	Each	1	44	44	1.07
		Com	Ex	Any	Each	1	26	26	1.28
		Com	Ex	Any	Each	1	37	37	1.15

Savings vary due to:

1. Multiple baselines/offering
2. Assumptions:
 - Hours of usage per day varies by IOU but also by baseline
 - Baseline flow
3. Methodology for SDG&E – needs to be reviewed.
 - Climate Zone that affects ground water temperature only for SDG&E

POUs do not offer this deemed measure.

2.13 – Pre-Rinse Spray Valves

Methodologies Match / Assumptions Differ

42

PG&E

1

2

Hours / day assumption & baseline

	gpm	Hours/Day	Days/yr	Mix H ₂ O °F	Supply H ₂ O °F	Water heater efficiency	Therms/yr	Savings Therms/yr
Baseline	1.4	1	365	114.1	63.2	0.7	185.7	-
Qualifying Measure	1.15	1	365	114.1	63.2	0.7	152.5	33.2

Issue 1:
1 Measure Case

SCG

	GPM	Hours/Day	Days/yr	Mix H ₂ O °F	Supply H ₂ O °F	eff	Therms/yr	Savings Therms/yr
Baseline	1.6	0.964	365	114.1	68	0.7	185.3	N/A
Qualifying Measure	1.28	1.007	365	114.1	68	0.7	154.9	30.4

3 Measure Cases that vary flow rate

SDG&E

CZ06	GPM	Hours/Day	Days/yr	Mix H ₂ O °F	SDG&E Supply H ₂ O °F	SDG&E Savings Therms/yr		
Base, Pre-Rinse Spray Valve	1.6	1	365	114.1	61.7	0.7	218.5	
Low Flow Pre-Rinse Spray Valve, 1.07 GPM	1.07	1	365	114.1	61.7	0.7	146.1	72.4
Low Flow Pre-Rinse Spray Valve, 1.28 GPM	1.28	1	365	114.1	61.7	0.7	174.8	43.7
Low Flow Pre-Rinse Spray Valve, 1.15 GPM	1.15	1	365	114.1	61.7	0.7	157.0	61.5

18 Measure Cases that vary flow rate and 6 CZs

2.14 – Rack Oven

43

PA	BldgLoc	EnergyImpactID	BldgType	BldgVint	BldgHVAC	NormUnit	SourceDesc	No. (kWh)	BL1-kWh	BL2-kWh	BL1-Th	BL2-Th
PGE	Any	F207	Com	Any	cWtd	Each	PGECOFST109-R6	1	-	-	-	2,104
SCG	Any	PGECOFST109-Rev05-Msr002	Any	Any	Any	Each	PGECOFST109-Rev05	1	-	-	-	2,104
SDG	IOU	309	Com	Ex	Any	Each	WPSDGENRCC0011	1	-	-	2,104	2,104
Grand Total								4	-	-	1,052	2,104

Savings and methodology match.

Assumptions should be validated.

- Discuss whether we have good supporting documentation for all assumptions.

POUs do not offer this deemed measure.



2.16 – Pressure Fryer

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PA	BldgLoc	EnergyImpactID	BldgType	BldgVint	BldgHVAC	NormUnit	SourceDesc	No. (kWh)	B1-kWh	BL2-kWh
SCE	Any	FS-97850	Any	Any	Any	Each	SCE13CC013.1	1	-	3,633
							SCE13CC013.2	1	-	3,633
	CZ06	FS-97850	Any	Any	Any	Each	SCE13CC013.2	1	-	3,633
Grand Total								3	-	3,633

- Calculations not checked.
- Requested workpaper from SCE; Retired due to ISP issues (AW/SCE) – *received*.
- Note: Received comments back from ED; same questions as other Food Services WP reductions; on hold - not statewide
- Review report to help document assumptions (tbd)

2.17 - HD Holding Cabinet

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PA	BldgLoc	EnergyIm	BldgType	BldgVint	BldgHVAC	NormUnit	SourceDe	No. (kWh)	BL1-kWh	BL2-kWh	BL1-Th	BL2-Th
SCE	Any	FS-50407	Any	Any	Any	System	SCE13CC0	2	-	8,130	-	-
		FS-95803	Any	Any	Any	System	SCE13CC0	2	-	7,577	-	-
SDG	IOU	320	Com	Ex	Any	Each	WPSDGEN	1	8,436	8,436	-	-
		321	Com	Ex	Any	Each	WPSDGEN	1	8,840	8,840	-	-
Grand Total								6	2,879	8,115	-	-

Savings methodology is identical in following the ET Study results.

- For SCE, data comes directly from study averages.
- For SDG&E, data based upon average measured in-field savings from both approved supplier models, but needs to be verified.
- Which approach uses the best available data?

Note: Received comments back from ED; same questions as other Food Services WP reductions or include 30% reduction.

- Calculation inputs must be documented to address this concern.

POUs do not offer this measure.



Additional Information / Background



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Measure Specific Issues

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- Need consensus on calculation assumptions for:
 - ❑ Combination Oven (2.03)
 - ❑ Griddle (2.04)
 - ❑ Steamer (2.05)
 - ❑ Ice Machines (2.06)
 - ❑ Insulating Holding Cabinet (2.07)
 - ❑ Gas / Electric Fryers (2.11)
 - ❑ Exhaust Hood Demand Controlled Ventilation (DCV) (2.12)
 - ❑ Pre-Rinse Spray Valves (2.13)
- Changing Measures:
 - ❑ New: Under-counter Dishwasher (POUs have additional offerings)
 - ❑ Code: Commercial Ice Machines (Energy Star version 3)