

# Miscellaneous Measures Cal TF Tier 2 Presentation



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**APRIL 2019**

# Measure Affirmation List

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No.	Measure Name	End Use	Status
2.20	Conveyor Broiler, Commercial	Food Service	New Measure
2.21	Refrigerated Chef Bases	Food Service	New Measure
7.13	Under Counter Type Dishwasher, Commercial	Appliance & Plug Loads	New Measure
7.36	Commercial Gas Dryer Modulating Valve	Appliance & Plug Loads	New Measure
6.29	Flow Control Valve, Res & Non-Res (Flow restriction adaptor)	Service & Domestic Hot Water	New Measure(s)
6.30	Dual Set Point Boiler Control for MF Space Heating	Service & Domestic Hot Water	New Measure
2.22	<i>Underfired Broiler</i>	<i>Food Service</i>	<i>New Measure</i>

# Measure Affirmation

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*“Cal TF affirms the subcommittee recommendations regarding ‘Stage 1 Issues’ for various Measures.”*

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- 2.20, Conveyor Broiler, Commercial
- 2.21, Refrigerated Chef Bases
- 2.19, Under Counter Type Dishwasher, Commercial
- 7.36, Gas Dryer Modulating Valve, Commercial
- 6.29, Flow Control Valve, Res & Non-Res
- 6.30, Dual Set Point Boiler Control for MF Space Heating

# Measure Consensus –

## 2.20 - Conveyor Broiler, Commercial

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- Offering

- Implementation: NR, NC
- Building Types: Any
- Climate zones: Any
- Norm Unit: Each

- Stage 1 Issues

- *Normalize to 365 days/yr to be consistent with other Food Service measures*
  - ✦ *This should also be consistent with the approach agreed upon through the current Food Service studies*
- Calculation methodology clarified.
- Added EUL ID of Cook-ConveyorBroiler.
- Small number of claims by Q3 2018.

- Measure Extension

- Add POUs and SDG&E

- Stage 2 Issues

- *Smaller quick service restaurants that utilize conveyor broilers have not yet been characterized.*
- *Workpaper plan for Food Service measures will likely be complete in Sept 2019; hours of operation should be consistent with findings from this study*



**Figure 4-9.**  
**Conveyor broiler.**

*Photo: Nieco Corporation*

# Measure Consensus –

## 2.20 - Conveyor Broiler, Commercial

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**Figure 4-9.**  
**Conveyor broiler.**

*Photo: Nieco Corporation*

- Savings

- Base Case

- ✦ Constant input rate between 600°F to 700°F.
    - ✦ Broilers do not differentiate between cooking and idle operation – the broiler operates at the same rate throughout the day.

- Measure Case

- ✦ Efficient units better control the input rate.
    - ✦ Advanced automatic conveyor broilers utilize a dual-stage gas valve which reduces the input rate during cooking conditions to prevent flare ups.
    - ✦ Advanced automatic batch broilers cycle gas burners on/off to maintain cooking cavity temperature.
    - ✦ Further insulating the cavity and actively recirculating hot air inside the cavity result in lower input rates.

# Input Consensus –

## 2.20 - Conveyor Broiler, Commercial

6

- Measure Permutations

		Measure Data Field			
Measure Data Field	Measure Value	PG&E	SCE	SDG&E	SCG
MeasureAppType	NR, NC	NR, NC			NR, NC
BldgType	Any	Any			Any
BldgVintage	New, Ex	New, Ex			New, Ex
BldgLoc	Any	Any			Any
NormUnit	Each	Each			Each
EUL ID	Cook-ConveyorBroiler	Cook-GasConvOven			Cook-GasConvOven
RUL ID	N/A	N/A			N/A
NTGR	Com-Default>2yrs, Ind-Default>2yrs, Agric-Default>2yrs	Com-Default>2yrs, Ind-Default>2yrs, Agric-Default>2yrs			Com-Default>2yrs, Ind-Default>2yrs, Agric-Default>2yrs
DeliveryType	DnDeemed	DnDeemed			DnDeemed
GSIA	Def-GSIA	Def-GSIA			Def-GSIA
Electric Load Shape	DEER:Indoor_Non-CFL_Ltg				
Gas Load Shape	Annual	Annual			Annual
Sector	Com, Ind, Ag	Com, Ind, Ag			Com, Ind, Ag
PA/POU	Any	Any			Any
BldgHVAC	cWtd	cWtd			cWtd
Use Category	FoodServ	FoodServ			FoodServ
SubUseCategory	Cooking	Cooking			Cooking
TechGroup	Cook equip	FoodService			FoodService
TechType	Broiler	Griddle			Griddle
Cost Adjustment Type	None	None			None
EnImpCalcType	Standard	Standard			Standard
MeasImpactType	Deem-WP	Deem-WP			Deem-WP

# Measure Consensus –

## 2.21 - Refrigerated Chef Bases

7

- Offering

- ❑ Implementation: NR, NC
- ❑ Building Types: Hsp, Htl, Mtl, Nrs, RFF, RSD
- ❑ Climate zones: Any
- ❑ Norm Unit: Each



- Stage 1 Issues

- ❑ *DEER2020 Peak Shift consistent with other Food Service Measures*
- ❑ Updated savings methodology
- ❑ No savings by Q3 2018

- Measure Extension

- ❑ Add POU's, PG&E, and SDG&E

- Stage 2 Issues

- ❑ *Establish additional efficiency tiers once more manufacturers are creating efficient products.*

# Measure Consensus –

## 2.21 - Refrigerated Chef Bases

8

### • Savings

#### □ ET Study results

	kWh/day/ft <sup>3</sup>	Peak kW/ ft <sup>3</sup>
Baseline	0.54	0.049
Measure	0.20	0.026



#### □ Energy variation by size category

Size category	Range of exterior length	%high or low of energy intensities relative to size 2
1	Between 35 – 54 inches	12%
2	Between 55 – 73 inches	0%
3	Between 74 – 89 inches	-12%
4	Between 90 – 120 inches	-13%

#### □ Measure Case

- ✦ Qualifying units are 50% better than code.
- ✦ Average high and depth used due to minor variation between products
- ✦ Annual energy calculated at 365 days/yr.



# Input Consensus –

## 2.21 - Refrigerated Chef Bases

9

### • Measure Permutations

		Measure Data Field			
Measure Data Field	Measure Value	PG&E	SCE	SDG&E	SCG
MeasureAppType	NR, NC		NR, NC		
BldgType	Hsp, Htl, Mtl, Nrs, RFF, RSD		Hsp, Htl, Mtl, Nrs, RFF, RSD		
BldgVintage	New, Ex		New, Ex		
BldgLoc	Any		Any		
NormUnit	Each		Each		
EUL ID	Cook-GDRef		Cook-GDRef		
RUL ID	N/A		N/A		
NTGR	Com-Default>2yrs		Com-Default>2yrs		
DeliveryType	DnDeemed, UpDeemed		DnDeemed, UpDeemed		
GSIA	Def-GSIA		Def-GSIA		
Electric Load Shape					
Gas Load Shape	Annual		Annual		
Sector	Com		Com		
PA/POU	Any		Any		
BldgHVAC	cWtd		cWtd		
HOU					
IE Factor	N/a		N/a		
IETableName	None		None		
Use Category	ComRefrig		ComRefrig		
SubUseCategory	KitchenApp		KitchenApp		
TechGroup	Ref_Storage		Ref_Storage		
TechType	Reachin		Reachin		
Cost Adjustment Type	None		None		
EnImpCalcType	Standard		Standard		
MeasImpactType	Deem-WP		Deem-WP		

# Measure Consensus –

## 2.19 - Under Counter Type Dishwasher, Commercial

10

- Offering

- ❑ Implementation: NR, NC
- ❑ Building Types: Any
- ❑ Climate zones: Any
- ❑ Norm Unit: Each

- Stage 1 Issues

- ❑ DEER2020 Peak Shift consistent with other Food Service Measures
- ❑ Savings are not climate zone dependent (consistent with Door-type Dishwasher)
- ❑ Savings include a blend of the market of gas (97%) and electric (3%) water heaters at commercial sites.
- ❑ *Confirm update of NTGR-ID: All-Default<=2yrs*
- ❑ No savings by Q3 2018.

- Measure Extension

- ❑ Add POU's, PG&E, and SDG&E

- Stage 2 Issues

- ❑ *Further field studies are recommended to improve the quality of water consumption data.*
- ❑ *Consider separate gas / electric water heater permutations.*



# Measure Consensus –

## 2.19 - Under Counter Type Dishwasher, Comm



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### • Savings

#### □ Base Case

- ✦ The Measure addresses both low temperature and high temperature undercounter dishwasher units.
- ✦ For low temperature machines, most of energy used is associated with primary water heating, with the remaining energy attributed to tank heaters and pumps.
- ✦ For high-temperature machines, less of the total energy consumption is for primary water heating with a significant portion for booster water heating, and the remaining is attributed to the motor, wash tank heater, controls, and standby energy.
  - Base = 1.0 gal/rack (high temp); 1.7 gal/rack (low temp)

#### □ Measure Case

- ✦ Water consumption, and therefore water heating requirements, does vary significantly between standard and high-efficiency units and constitutes the measure energy savings.
- ✦ By using strategies such as waste air heat recovery, drain heat recovery, rinse water re-use, double-walled insulated construction, high efficiency anti-clogging nozzles, continuous filtering, and efficient boost heaters, water consumption can be reduced
- ✦ For gas savings, both units reduce water consumption:
  - Tier 1 = 0.86 gal/rack (high temp); 1.19 gal/rack (low temp)
  - Tier 2 = 0.73 gal/rack (high temp); 1.01 gal/rack (low temp)
- ✦ High temp machines also reduce Idle Energy Rate for electric savings.

# Input Consensus –

## 2.19 - Under Counter Type Dishwasher, Commercial

12

- Measure Permutations

		Measure Data Field			
Measure Data Field	Measure Value	PG&E	SCE	SDG&E	SCG
MeasureAppType	NR, NC				NR, NC
BldgType	Any				Any
BldgVintage	Any				Any
BldgLoc	Any				Any
NormUnit	Each				Each
EUL ID	Appl-DW-UnderCounter				Appl-DW-UnderCounter
RUL ID	N/A				
NTGR	All-Default<=2yrs				All-Default<=2yrs
DeliveryType	DnDeemed, DnDeemDI, UpDeemed				DnDeemed
GSIA	Def-GSIA				Def-GSIA
Electric Load Shape	DEER:Indoor_Non-CFL_Ltg				DEER:Indoor_Non-CFL_Ltg
Gas Load Shape	Annual				Annual
Sector	Com, Ind, Ag				Com, Ind, Ag
PA/POU	Any				Any
BldgHVAC	cWtd				cWtd
Use Category	FoodServ				FoodServ
SubUseCategory	Cleaning				Cleaning
TechGroup	Clean equip				Clean equip
TechType	DishWash				DishWash
Cost Adjustment Type	None				None
EnImpCalcType	Standard				Standard
MeasImpactType	Deem-WP				Deem-WP

# Measure Consensus –

## 7.36 - Gas Dryer Modulating Valve, Commercial

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### ● Offering

- Implementation: AOE
- Building Types:
  - ✦ Com, Htl, MFm, Mtl, Nrs, **RtS**, ~~COL~~
- Climate zones: Any
- Norm Unit: Each

### ● Stage 1 Issues

- *Confirm that EUL is appropriate; equipment may not be*
- *Confirm that EUL sector is appropriate (for MFm = Res)*
  - ✦ *Currently using “Com-GasDryer”*
  - ✦ *MFm dryer is also commercial grade; propose using “MF-GasDryer”*
- SCG savings Q1-Q3 2018: 108,000 therms; PG&E savings (75,000 therms)

### ● Measure Extension

- Add PG&E, and SDG&E

### ● Stage 2 Issues

- Studies in smaller size unit (20 lb range) will help evaluate the modulating valve in the multifamily sector
- Material cost data
- Consider additional IOU studies to validate savings
- Operation will reduce heat at the end of cycle; actual practices in laundromats may involve manual manipulation of the loads

	Sum of First Year Gross Therm
<b>PGE</b>	<b>75,426</b>
Health/Medical - Clinics	3,067
Health/Medical - Nursing Home	1,450
Lodging - Hotel	2,064
Lodging - Motel	344
Retail - Small	68,501
<b>SCG</b>	<b>108,219</b>
Commercial	94,061
Lodging - Hotel	9,978
Residential Multi-family	4,181
<b>Grand Total</b>	<b>183,646</b>

# Measure Consensus –

## 7.36 - Gas Dryer Modulating Valve, Commercial

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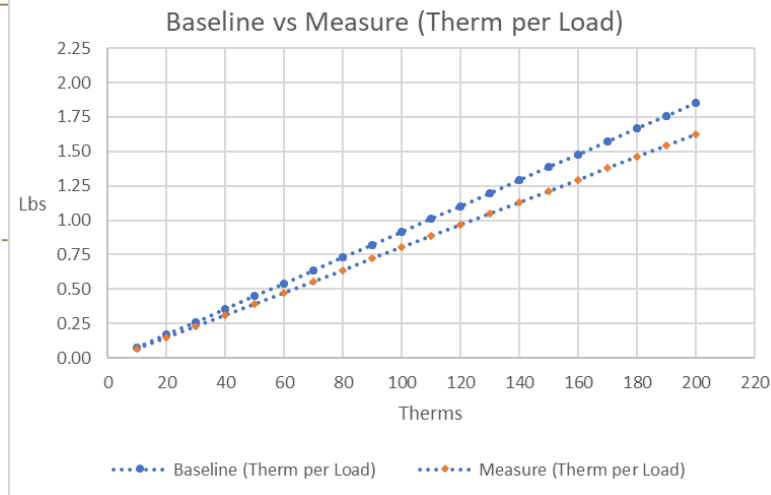
### ● Savings

#### □ Base Case

- ✦ Coin Operated and MFm: Custom project data establishes burner on-time and regression curve (not shown)
- ✦ Com, Htl, Mtl, Nrs: PG&E, SCG and Nicor studies/projects used to establish “therms/lb/drying cycle” regression curve (above) – larger usage/more conservative
- ✦ Drying cycle/year calculated from Commercial Dryer-OPL Market Survey based upon building type

#### □ Measure Case

- ✦ During the later stages of the cycle, the moisture content has been reduced and a higher fire rate creates more than necessary heat. A modulating valve allows for the lower fire rate to function when the moisture content has been reduced from maximum.
- ✦ Temperature sensor located in the flue exhaust.
- ✦ Nicor ET pilot documents 12.4% reduction in gas (5 sites / 11 dryers)



# Input Consensus –

## 7.36 - Gas Dryer Modulating Valve, Commercial

15

### • Measure Permutations

		Measure Data Field			
Measure Data Field	Measure Value	PG&E	SCE	SDG&E	SCG
MeasureAppType	AOE				AOE
BldgType	Com, Htl, MFm, Mtl, Nrs, RtS				COL, Com, Htl, MFm, Mtl, Nrs
BldgVintage	Ex				Ex
BldgLoc	Any				Any
NormUnit	Each				Each
EUL ID	Com-GasDryer				Com-GasDryer
RUL ID	Com-GasDryer, MF-GasDryer				Com-GasDryer
NTGR	Com-Default>2yr, Res-Default>2yr				Com-Default>2yr, Res-Default>2yr
DeliveryType	DnDeemed				DnDeemed
GSIA	Def-GSIA				Def-GSIA
Electric Load Shape					
Gas Load Shape	Any				Any
Sector	Com, Res				Com, Res
PA/POU	Any				Any
BldgHVAC	cWtd, rWtd				cWtd, rWtd
Use Category	AppPlug				AppPlug
SubUseCategory	Laundry				Laundry
TechGroup	Clean_equip				Clean_equip
TechType	LaundryDryer				LaundryDryer
Cost Adjustment Type	None				None
EnImpCalcType	Standard				Standard
MeasImpactType	Deem-WP				Deem-WP

# Measure Consensus

## 6.29 - Flow Control Valve

16

- Offering

- Implementation: AOE
- Building Types: Any (Res and Non-Res)
- Climate zones: CZ01-CZ16
- Norm Unit: Each

- Stage 1 Issues

- Measure case flow reduction accomplished by reducing the water flow while maintaining pressure through its converging-diverging structure in which the area is reduced at the throat to lower the flow rate.
- Savings match existing values from aerator / showerhead measures
  - ✦ Plan to re-submit the existing 4 flow restrictor measures to add these offerings (because savings methodology is the same)
- No savings by Q3 2018.

- Measure Extension

- Add PG&E and SDG&E

- Stage 2 Issues

- *Consider adding offering to temperature-initiated shower flow restriction valve (TSV).*





# Input Consensus

## 6.29 - Flow Control Valve

17

- Measure Permutations
  - ❑ *Same as flow restrictor workpapers*
  - ❑ SWWH001-01 EAD - Faucet Aerator, Residential
  - ❑ SWWH002-01 EAD - Low-flow Showerhead, Residential
  - ❑ SWWH019-01 EAD - Faucet Aerator, Commercial
  - ❑ SWWH020-01 EAD - Low-flow Showerhead, Commercial

# Measure Consensus

## 6.30 - Dual Set Point Boiler Control for Space Heating, Multifamily

18

- Offering

- Implementation: AOE
- Building Types: MFm
- Climate zones: CZ01-CZ16
- Norm Unit: Household

- Stage 1 Issues

- *Measure parameters and structure matches other MFm water heating controls measures*
  - ✦ Other measures used an average values, but were focused on domestic water heating. Separate climate zones permutations will be kept since this includes space heating.
  - ✦ Other measures use a fixed total measure cost that scales based upon number of dwelling units
- EUL update to “SHW-EMS” (15 yrs); actual life will be set by the RUL of the host equipment, “WtrHt-Intant-Res” ( $1/3 \times 20 \text{ yrs} = 6.7 \text{ yrs}$ )
- Include Energy Plus models in documentation package
- No savings by Q3 2018.

- Measure Extension

- Add PG&E and SDG&E

- Stage 2 Issues

- Consider running another model with higher heating degree days (rather than only extremes).

BEFORE



AFTER



# Measure Consensus

## 6.30 - Dual Set Point Boiler Control for Space Heating, Multifamily

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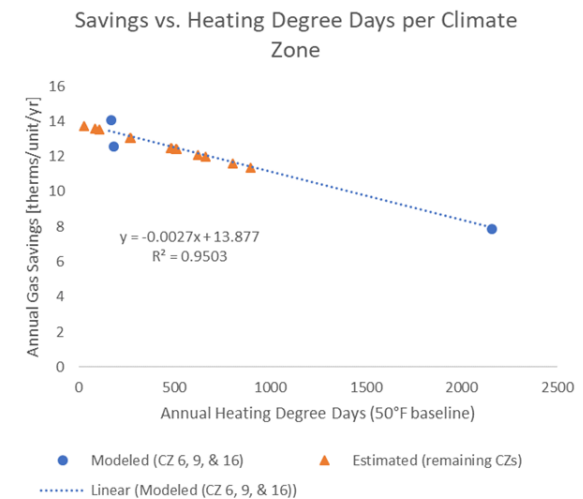
### ● Savings

#### □ Base Case

- ✦ Central hot water boiler with a basic aquastat controls serving an existing hydronic system in multi-family building.
- ✦ Combined space heating and domestic hot water
- ✦ Energy Plus model using the DOE Building Prototype as a basis
  - eQUEST did not support combination boilers with supply water outdoor air temperature reset.
  - Building geometry, materials, water heating systems, and HVAC systems were then manually modified to match the properties of the MASControl2 eQuest model
  - Baseline: 135°F

#### □ Measure Case

- ✦ Proposed: 135°F/120°F (at 55°F/75°F ambient hourly)
- ✦ Savings modeled for 3 climate zones (6, 9 and 16)
  - Scaled to all climate zones using Heating Degree Days



# Input Consensus

## 6.30 - Dual Set Point Boiler Control for Space Heating, Multifamily

20

### • Measure Permutations

### Measure Data Field

Measure Data Field	Measure Value	PG&E	SCE	SDG&E	SCG
MeasureAppType	AOE				AOE
BldgType	MFm				MFm
BldgVintage	Any				Any
BldgLoc	CZ01,CZ02,CZ03,CZ04,CZ05,CZ06, CZ07,CZ08,CZ09,CZ10,CZ11,CZ12, CZ13,CZ14,CZ15,CZ16				CZ01,CZ02,CZ03,CZ04,CZ05,CZ06, CZ07,CZ08,CZ09,CZ10,CZ11,CZ12, CZ13,CZ14,CZ15,CZ16
NormUnit	Household				Household
EUL ID	SHW-EMS				WtrHt-Instant-Res
RUL ID	WtrHt-Instant-Res				WtrHt-Instant-Res
NTGR	ET-Default				ET-Default
DeliveryType	DnDeemed, DnDeemDI				DnDeemed, DnDeemDI
GSIA	Def-GSIA				Def-GSIA
Electric Load Shape	DEER:Res_ClothesDishWasher				DEER:Res_ClothesDishWasher
Gas Load Shape	Annual				Annual
Sector	Res				Res
PA/POU	Any				Any
IETableName	None				None
Use Category	SHW				SHW
SubUseCategory	Heating				Heating
TechGroup	WaterHtg_eq				WaterHtg_eq
TechType	TempReset				TempReset
Cost Adjustment Type	None				None
EnImpCalcType	Standard				Standard
MeasImpactType	Deem-WP				Deem-WP

# Measure Affirmation

21

*“Cal TF affirms the subcommittee recommendations regarding ‘Stage 1 Issues’ for various Measures.”*

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- 2.21, Refrigerated Chef Bases
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# Back-up Slides

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