

Whitepapers Prioritization



CALIFORNIA
TECHNICAL FORUM

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Whitepapers – Emerging Measure Types

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- High-level review of known types
 1. Fuel substitution measures
 2. Procedural measures (ex post savings)
 3. Targeted measures
 4. Existing conditions / flexible baseline / whole building
 - ✦ AB 802 Measures
 5. NMEC measures
 6. Simple measure bundles related to statewide policy objectives
 - ✦ ZNE and decarbonization
 7. Non-widget-based measures
 - ✦ Behavioral / retro-commissioning
 8. Codes and Standards measures
- Break down into three groups
- General Timeline and Scope

Whitepapers – Fuel Substitution Measures

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- Existing Measure Examples

SW Measure ID	Measure Names	End Use
SWWH025-01	Heat Pump Water Heater, Residential, Fuel Substitution	Water Heating
SWHC046-01	Packaged Heat Pump Air Conditioner, Fuel Substitution	HVAC
SWHC044-01	Ductless HVAC, Residential, Fuel Substitution	HVAC
SWFS022-01	Commercial Convection Oven, Fuel Substitution	Food Service
SWFS021-01	Commercial Fryer, Fuel Substitution	Food Service
SWAP014-01	Clothes Dryer, Residential, Fuel Substitution	Appliance or Plug Load
SWAP013-01	Induction Cooktop, Residential, Fuel Substitution	Appliance or Plug Load

Types of Measures

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- Have gas-to-gas and electric-to-electric offerings within the same Measure ID today:

Clothes Dryer, Residential, Fuel Substitution	Calculated, SWAP003
Commercial Fryer, Fuel Substitution	Calculated, SWFS011
Commercial Convection Oven, Fuel Substitution	Calculated, SWFS001

- Do **not** have both gas-to-gas and electric-to-electric offerings within the same Measure ID today:

Heat Pump Water Heater, Residential, Fuel Sub	Separate gas/elec, SWWH014(e), SWWH012(g)
Induction Cooktop, Residential, Fuel Substitution	New measure, calculated, SWAP013(e)
Packaged Heat Pump AC, Commercial, Fuel Sub	Separate gas/electric, SWHC031(g)
Ductless HVAC, Residential, Fuel Substitution	New measure,

Convection Oven, SWFS001

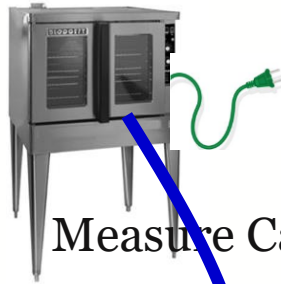
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Electric



Base Case

Electric



Measure Case

Electric

Performance

Preheat Time (min)
Preheat Energy (kWh)
Idle Energy Rate (kW)
Heavy Load Cooking Energy Efficiency (%)
Production Capacity (lbs/hr)
Operating Hours/Day
Operating Days/Year
Number of Preheats per Day
Pounds of Food Cooked per Day
Conversion
ASTM Energy to Food (kWh/lb)

Full	Full	
	Baseline Model	Energy Efficient Model
Preheat Time (min)	15	15
Preheat Energy (kWh)	1.50	1.00
Idle Energy Rate (kW)	2.00	1.40
Heavy Load Cooking Energy Efficiency (%)	65%	73%
Production Capacity (lbs/hr)	70	82
Operating Hours/Day	12	12
Operating Days/Year	365	365
Number of Preheats per Day	1	1
Pounds of Food Cooked per Day	100	100
Conversion		3412
ASTM Energy to Food (kWh/lb)		0.07327

Gas

Performance

Preheat (min)
Preheat Energy (Btu)
Idle Energy Rate (Btu/hr)
Cooking-Energy Efficiency (%)
Production Capacity (lb/hr)
Operating Hours/Day
Operating Days/Year
Number of Preheats per Day
Pounds of Food Cooked per Day
ASTM Energy to Food (Btu/lb)^a
Daily Energy Consumption (Btu)
Annual Energy Consumption (therms)^b
Estimated Energy Savings (therms/yr)

Full	Full	
	Base Model	Energy Efficient Model
Preheat (min)	15	15
Preheat Energy (Btu)	19,000	11,000
Idle Energy Rate (Btu/hr)	18,000	11,758
Cooking-Energy Efficiency (%)	30%	45%
Production Capacity (lb/hr)	70	83
Operating Hours/Day	12	12
Operating Days/Year	365	365
Number of Preheats per Day	1	1
Pounds of Food Cooked per Day	100	100
ASTM Energy to Food (Btu/lb) ^a	250	250
Daily Energy Consumption (Btu)	288,119	190,546
Annual Energy Consumption (therms) ^b	1,052	695
Estimated Energy Savings (therms/yr)		356

Equivalent full load hours
Time cooking (hrs/day)
Cooking idle time (hrs/day)

Equivalent full load hours	1.43	1.22
Time cooking (hrs/day)	11.75	11.75
Cooking idle time (hrs/day)	10.32	10.53

Cooking energy (kWh/day)
Steam mode idle energy (kWh/day)
Warmup energy (kWh/day)

Cooking energy (kWh/day)	11.27	10.04
Steam mode idle energy (kWh/day)	20.64	14.74
Warmup energy (kWh/day)	1.50	1.00

Total daily energy usage (kWh/day)
Average demand (kW)
Annual energy savings (kWh/yr)

Total daily energy usage (kWh/day)	33.4	25.8
Average demand (kW)	2.8	2.1
Annual energy savings (kWh/yr)		2,787

Coincidence Factor (CDF)
Demand savings (kW)

Coincidence Factor (CDF)		90%
Demand savings (kW)		0.573

Derated savings (disposition)
Demand savings (kW)
Annual energy savings (kWh/yr)

Derated savings (disposition)		30%
Demand savings (kW)		0.401
Annual energy savings (kWh/yr)		1,951

Derated savings (disposition)

Annual energy savings (therms/yr)

Derated savings (disposition)	30%
Annual energy savings (therms/yr)	249

Gas



Base Case

Gas



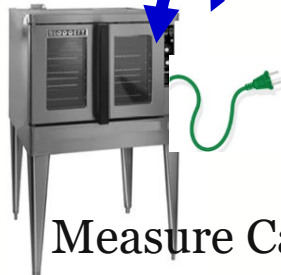
Measure Case

Gas



Base Case

Electric



Measure Case

(Similarly, cost data overlaps)

Whitepapers – Procedural Measures

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- Description

- All of the data specification parameters are defined and documented with the standard measure template, except for...
- Savings methodology:
 - ✦ “Procedure” is document rather than the “savings values”.
 - ✦ Approach includes the methodology for estimating savings and the methodology for claiming/validating savings.
- Anything else?

- Example:

- SWWB002-01, Universal Audit Tool
 - ✦ Savings Determination:
 - Population NMEC (Normalized Metered Energy Consumption)
 - Quasi-Experimental Design (need for opt-in program)
 - Savings claimed as a single line-item (not by widget)
 - ✦ Measure Application Type: BRO-Behavioral
 - ✦ Delivery Type: DnDeemed (Downstream)
 - ✦ Building Type: Single Family, Multi-Family

Whitepapers – Group 2

Targeted Measures

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- *Can we target measures to specific groups that may help achieve specific goals (underserved, more cost-effective, stranded, demand savings, etc?)*
 - *Valuable to look at the “sunset” measure list; measures deemed to be ISP previously may be an opportunity for a targeted group.*
- **Description**
 - All of the data specification parameters are defined and documented with the standard measure template, except for...
 - Baseline variation options:
 - ✦ Documenting the appropriate baseline for a group
 - ✦ Group potentially defined by building type, location, size of business, etc.
 - Savings methodology: (specifies a deemed savings value)
 - ✦ Modeled
 - ✦ Hybrid
 - ✦ NMEC
- **Examples**
 - Existing conditions / flexible baseline / whole building
 - NMEC measures
 - Does not exist today as a statewide measure

Whitepapers – Bundled Measures

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- *Can we group measures in simple bundles to meet statewide policy objectives?*
 - *Zero net energy (ZNE), decarbonization, others?*
- **Description**
 - All of the data specification parameters are defined and documented with the standard measure template
 - Methodologies include overlaps:
 - ✦ Savings overlaps to ensure accuracy (document interactive effects, detrimental interactions)
 - ✦ Cost advantages when performing multiple measures together
 - **Anything else?**
- **Example**
 - Measure Offerings NR plus AOE
 - Similar to:
 - ✦ Whole House Upgrade program
 - ✦ EnergyStar manufactured homes

Whitepapers – Non-Widget Based Measures

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- *Should behavioral or service-related measures be documented differently?*
 - Behavioral, retro-commissioning (RCx), others?
- Description
 - All of the data specification parameters are defined and documented with the standard measure template
 - Documentation challenges:
 - ✦ State of existing conditions
 - ✦ Persistence of savings / life of measure
 - Anything else?
- Examples
 - Service measures exist now that include, but no behavioral:
 - ✦ Quality maintenance
 - ✦ Duct sealing
 - ✦ Economizer repair / economizer controls

- *Can savings be documented consistently to other measure types?*
- Description
 - CEC also uses this data
 - How are savings documented now?
 - ✦ More research needed
 - Anything else?
- Examples
 - May exist through retired workpapers
 - A few examples of “to-code” measures have existed in the past

General Timeline and Scope

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- Type 1 – Already in use (Estimated Q2)

Examples:

- Fuel substitution measures
- Procedural measures (ex post savings)

- Type 2 – Targeted measures (Estimated Q3)

Examples:

- Existing conditions / flexible baseline / whole building
- NMEC measures

- Type 3 – Other (Estimated Q4)

Examples:

- Simple measure bundles related to statewide policy objectives
- Non-widget-based measures
- Codes and Standards measures