

Stage 2 Item Prioritization



JENNIFER BARNES
TIM MELLOCH

Stage 2 Roadmap

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- 2019 Business Plan Objective #2: Prepare a roadmap for pursuing resolution of Stage 2 issues identified through the measure consolidation process
- Pursue 12 Stage II issues by end-of-year
- Input from IOUs, POUUs, CPUC Staff and EAR Consultants and CEC Staff
- Draft by January 31, 2019
- Final by end of Q1, 2019

Stage 2 Item Summary

Category of Go/Open Only

Use Category	Count
Agriculture	10
Appliance & Plug Load	16
Commercial Refrigeration	15
Cross-Cutting	7
Food Service	7
Lighting	3
Miscellaneous	5
Policy	3
Pools & Spas	5
Process	3
Service & Domestic Hot	
Water	11
Water Pumping / Irrigation	2
Grand Total	87

Status	Count
Closed	71
Go/Open	87
Go/Underway	32
TBD	114
Wait	12
Grand Total	316

High Priority Go/Open Items

Use Category	Count
Agriculture	1
Appliance & Plug Load	1
Commercial Refrigeration	2
Cross-Cutting	4
Food Service	1
Lighting	1
Policy	2
Pools & Spas	1
Water Pumping / Irrigation	1
Grand Total	14

Prioritization Process

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- Consolidated various notes fields
 - Only moved; didn't delete
- Updated "Status" category to capture items that are being addressed through:
 - IOU WP updates
 - Cal TF Business Plan activities
- Set aside newly added HVAC items under this plan
- Reviewed status field to apply a consistent definition for each

Stage 2 Recommendations for 2019



FEBRUARY 2019

EUL & RUL for REA Measures (#3 & #95)

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EUL / RUL

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- Effective Useful Life (EUL) for Retrofit-Add On (REA) measures
- RUL ID - 1/3 of 20 yrs

1st Baseline Life for AOE Measures

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- 1st Baseline Life for an Add-On Equipment (AOE) measure is the minimum of:
 - EUL of the measure
 - RUL of the host (defined typically as 1/3 of the EUL of the host)
 - **Impact:**
 - Good measures have severely limited cost-effectiveness that will force retirement.
-
- Basis for guidance comes from Accelerated Replacement discussions:
 - KEMA study (2008) that states this rule “provides a reasonable RUL estimate without the requiring any a priori knowledge about the age of the equipment being replaced.”
 - D.12-05-015 (p.347-348) – Recommended for use with program induced early retirement as a starting assumption, but offers the flexibility to utilize alternative RULs.
 - Policy Manual (2013) – Recommends limiting EUL to 1/3 of the EUL in DEER for program-induced early retirement.
 - Discussion based upon premise that equipment would be replaced soon (since focus was accelerated replacement).
 - Current Guidance applies to Add-On Equipment:
 - Early Retirement Using Preponderance of Evidence (7/16/14)
 - ✦ VFD on Pump example (section 2.2.5)
 - Noted again in Resolution E-4818
 - Anecdotal note that based upon premise that code may change in within the period of the RUL.

1st Baseline Life for AOE Measures

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- 1st Baseline Life for an Add-On Equipment (AOE) measure is the minimum of:
 - EUL of the measure
 - RUL of the host (defined typically as 1/3 of the EUL of the host)

- Re-application of the rule works for many traditional Add-On Equipment measures when
 - Savings tied to the specific/exist host equipment AND buying decision not significantly impacted by RUL of existing equipment
 - Examples:
 - ✦ Economizer on an HVAC Package Unit
 - ✦ Insulation on a pipe or tank
- But guidance begins to break down when
 - Savings tied to the site or the larger system OR buying decision is impacted by RUL of existing equipment
 - Examples:
 - ✦ VFD on Well Pump
 - ✦ Demand Controlled Ventilation for Commercial Kitchen Hoods
 - Consider that these cases are mis-classified as Add-On Equipment and should be treated as a special case of Normal Replacement
 - ✦ Alternatively, the host-EUL's could be defined for the well. As an example, a whole-house fan uses a 15-yrs life presumably because the life of the home is long (45+ yrs).

New EUL ID's: Host ID's / EUL for Multifamily

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EUL Host ID

- 1st Baseline Life for an Add-On Equipment (AOE) measure is the minimum of:
 - EUL of the measure
 - RUL of the host (defined typically as 1/3 of the EUL of the host)
- Impact:
 - In many cases, the Host ID does not exist in the standard list. This is most typically the case for non-EE components
- Examples include:
 - Faucet Aerators (host = faucet)
 - Floating Head Pressure Controls (host = refrig system)
 - Exhaust Hood Demand Control Ventilation (host = hood)
 - VFD on Well Pumps (host = well)
- Should they be specific or general?
 - WtrHtr-Faucet
 - Host-15years

New EUL ID's: Host ID's / EUL for Multifamily

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Table 9. Existing EUL Table Entries that Require Use of Host Equipment RUL Values When the Add-On is to Existing Equipment

Description	Sector	Version Source	Existing Values		Typical Host Value
			EUL	RUL	RUL
Refrigeration Insulation for Bare Suction Lines	Com	DEER	11	3.7	5
Milk Transfer Pump Variable Speed Drive	Ag	DEER	15	5	5
Milking Vacuum Pump Variable Speed Drive	Ag	DEER	15	5	5

³⁰ See Resolution E-4818 at 27 "We also note for the sake of completeness that add-on measures are assigned an existing baseline for the shorter of: a) the EUL of the add-on measure or b) for the RUL of the host equipment. This requirement accounts for the potential shortening of the life of the add-on measure due to replacement or failure of the host equipment."

A-37

Resolution E-4952
DEER2020 and Revised DEER2019

October 11, 2018
Attachment

Description	Sector	Version Source	Existing Values		Typical Host Value
			EUL	RUL	RUL
Well Pump Variable Speed Drive	Ag	DEER	10	3.3	5
Wine Tank Insulation	Ag	DEER	15	5	10
Floor Insulation - Commercial	Com	DEER	20	6.7	10

EUL: Host ID's

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ID	Measure	Host ID	Source
1.04	Auto Closer for Refrigerated Storage Door		
1.06a	Floating Head Pressure Controls, Multiplex		
1.06b	Floating Suction Controls, Multiplex		
1.08	Bare Suction Pipe Insulation		
1.14	Floating Head Pressure Controls, Single Compressor		
2.12	Exhaust Hood Demand Controlled Ventilation, Commercial		
3.05	VFD on Well Pump, ≤ 300 hp		
3.14	Greenhouse Heat Curtain		
3.15	Greenhouse Infrared Film		
6.02	Faucet Aerator, Residential		
6.03	Low-flow Showerhead, Residential		
6.04	Temperature-initiated Shower Flow Restriction Valve, Residential		
6.05	Laminar Flow Restrictor, Commercial		
6.21	Hot Water Pipe Insulation, Nonresidential		
6.23	Faucet Aerator, Commercial		
7.16	Smart Power Strip		
7.18	Vending or Beverage Merchandise Controller		

EUL for Multifamily

- Multifamily (MFm) building type is in the Residential sector
 - MFm permutations must use Residential EUL and NTG
- Common area MFm equipment characterized by:
 - Commercial grade
 - Maintenance follow commercial schedule
 - Buying decisions are commercially driven
- Examples
 - *Central Storage Water Heater, Multifamily
 - Boiler, Multifamily
 - Tankless Water Heater, Residential (has MFm offering)

* Most important since Res/Com values are different

Cost Updates/Methodology (#4)

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Current understanding of ranking of preferable sources for cost information:

- Check DEER for existing DEER2016 cost data
- Check WO17 measure cost study
- Review original WP for the measure cost sources
- Review measure costs with implementation teams
- RS Means (large equipment) web scraping (lighting, appliances)
- Past project data (invoices)
- Vendor quotes
- Cost studies by PAs or CPUC

Load Shapes (#5)

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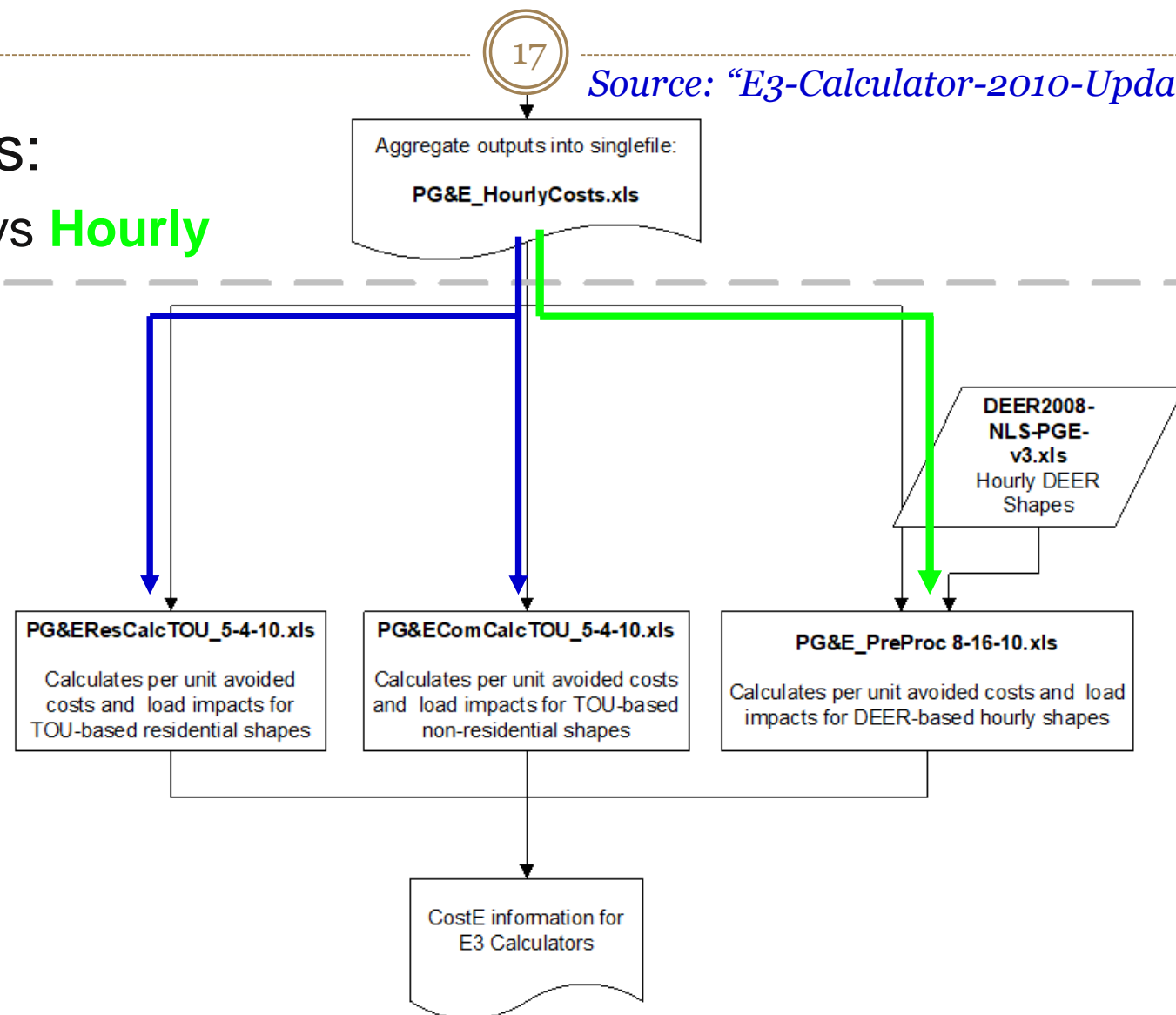
Load Shape Discussion

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Source: "E3-Calculator-2010-Update-v2(1)"

- 2 Paths:

- TOU vs Hourly



Load Shape Status

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- Load Shapes

- ❑ DEER2011 curves – 21 available

- Commercial (7)

- ❑ Indoor_CFL_Ltg
 - ❑ Indoor_Non-CFL_Ltg
 - ❑ HVAC_Chillers
 - ❑ HVAC_Refrig_Charge
 - ❑ HVAC_Split-Package_AC
 - ❑ HVAC_Duct_Sealing
 - ❑ HVAC_Split-Package_HP

- Residential (14)

- ❑ Indoor_CFL_Ltg
 - ❑ RefgFrzr_HighEff
 - ❑ RefgFrzr_Recyc-Conditioned
 - ❑ RefgFrzr_Recyc-UnConditioned
 - ❑ HVAC_Eff_AC
 - ❑ HVAC_Eff_HP
 - ❑ HVAC_Duct_Sealing

- ❑ HVAC_Refrig_Charge
 - ❑ Refg_Chrg_Duct_Seal
 - ❑ RefgFrzr_Recycling
 - ❑ Res_ClothesDishWasher
 - ❑ Res_BldgShell_Ins
 - ❑ Dishwasher
 - ❑ ClothesWasher

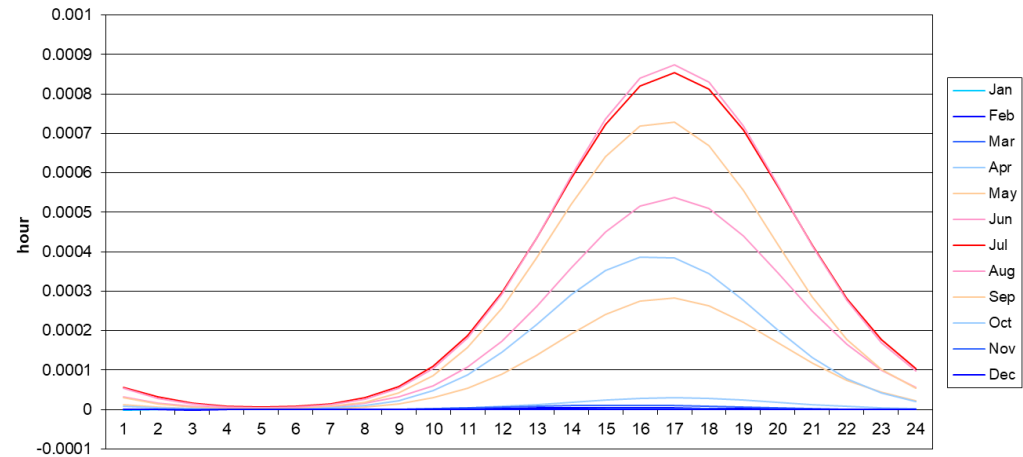
Hourly Profiles

19

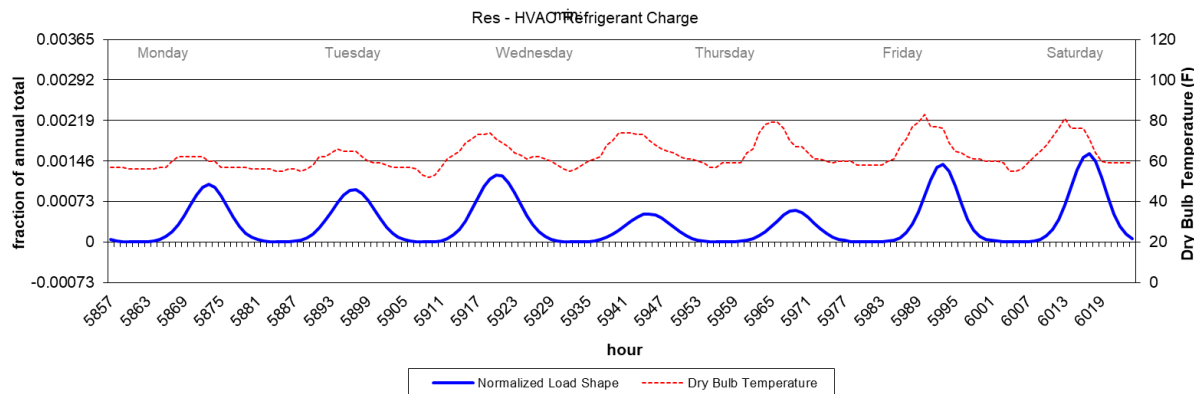
HVAC_Refrig_Charge

- 8,760 hr/yr curve
- Hourly values sum to 1.0

Res - HVAC Refrigerant Charge - Average Weekday



Hourly Data for Week 36 (Monday Sep 02 through Sunday Sep 08)



Status / Discussion

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- Status

- ❑ IOU – Have non-DEER TOU Values but have not seen supporting hourly curves (may not exist)
 - ✦ About 30-50 per IOU (different names)
- ❑ CEC – Pursuing TOU Load Shapes now (*status?*)
 - ✦ ADM creating load shapes to support Demand Forecast Model
- ❑ RTF – Updated Load Shapes recently
- ❑ CPUC – Raised the concern to update during the Peak Period discussions (*status?*)

- Next Steps

- ❑ Collect existing curves
- ❑ Obstacles to choosing a statewide set
- ❑ eTRM plans to store load shape (not yet)

Greenhouse Gases (#8)

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Pump Overhaul Savings (#16)

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VFDs on Ag Pump (#162)

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Irrigation / Water Pumping

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- Pump overhaul measure
- Consider more sensitive variables to distinguish savings

3.01 Pump System Overhaul - Status

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- SCE

- Deemed program is shut down
- Larger pumps (>50 hp) follow the custom process
- Cost effectiveness due to BRO-RCx life is low

- PG&E

- Deemed program for smaller pumps (< 25 hp) is operational but no demand savings claimed
- Larger pumps (> 25 hp) follow the custom process
- Cost effectiveness due to BRO-RCx life is low

Danger of measure being retired due to low TRC (0.1 – 0.4)

Measure Consensus

3.01 Pump System Overhaul

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● Offering

- ❑ Pump size (<25 hp)
- ❑ Varies by Pump Type (5 types)
- ❑ Varies by Climate Zone (16 CZs)

● Stage 1 Issues

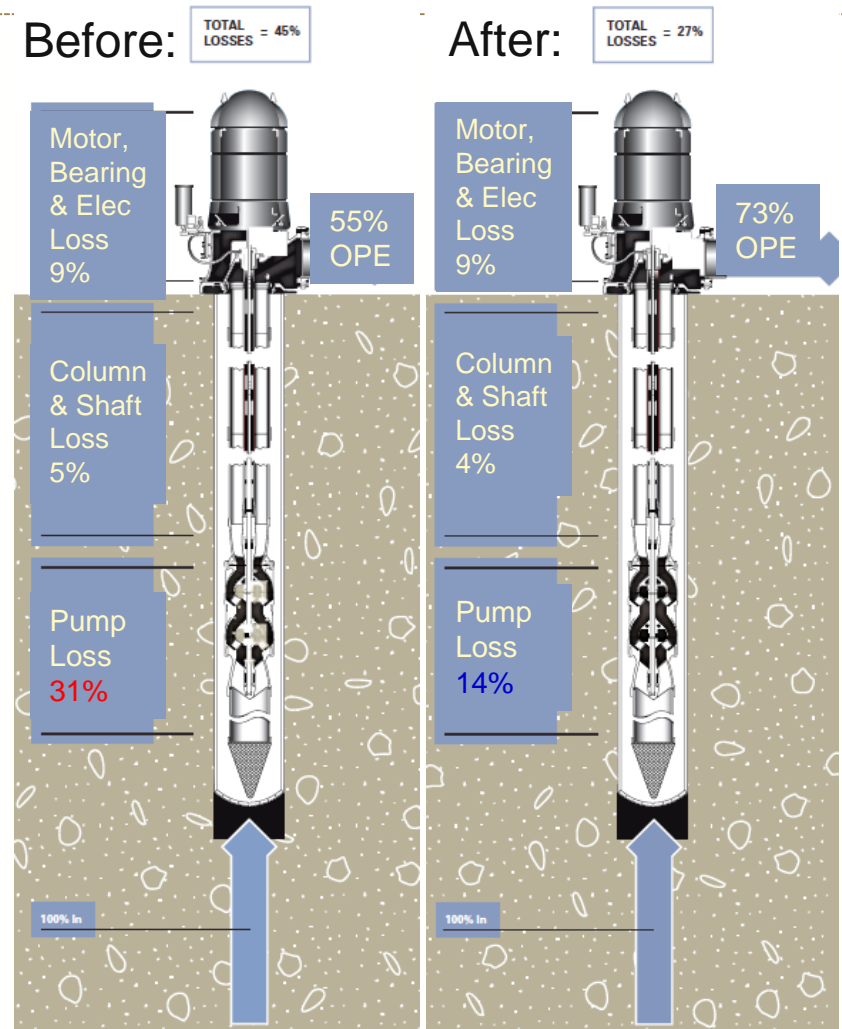
- ❑ *BRO measure – sets life to 3 years*
 - ✦ Data exists to document longer life of savings
- ❑ *Peak Demand savings – set to zero*
 - ✦ Study found peak demand increase and long pump times do no avoid peak hours
 - ✦ Investigate if results change with shifting peak
- ❑ **Energy savings methodology - consensus*

● Measure Extension

- ❑ Added measure for POU's
- ❑ Added measure for SCE and SDG&E

● Stage 2 Issues

- ❑ **Improve accuracy of EUL*
- ❑ *Consider MUNI vs Agricultural offerings*
- ❑ *Consider hours of operation within permutations*
- ❑ *Consider using Hydrological or Geological Zones*



Next Steps to Recommend BRO Life (other than 3 yrs)

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From SCE/Pump Overhaul database	0<HP≤25	25<HP≤50	50<HP≤100	100<HP≤200	200<HP≤10000	All HP
Number of Pumps	1428	1696	2197	1592	938	7851
Degradation Rate (%/yr)	1.83	2.03	2.06	2.14	2.09	2.03

From SCE/IR database	0<HP≤25	25<HP≤50	50<HP≤100	100<HP≤200	200<HP≤10000	All HP
Average baseline OPE from IR database	34.37	42.32	47.89	56.19	58.95	47.52
Average post OPE from IR database	66.72	63.3	68.37	70.02	71.23	67.93
Average degradation rate	1.83	2.03	2.06	2.14	2.09	2.03
Number of pumps used in computing baseline OPE	30	21	23	32	19	125
Number of pumps used in computing post OPE	29	20	21	30	17	117
RUL (delta OPE/deg rate)	17.68	10.33	9.94	6.46	5.87	10.06

	CB	SB	SW	TB	TW	All
RUL	13.1	2.59	11.64	11.13	9.17	10.06

CB	<i>Centrifugal Booster</i>
SW	<i>Submersible Well</i>
SB	<i>Submersible Booster</i>
TB	<i>Turbine Booster</i>
TW	<i>Turbine Well</i>

* Results taken from SCE report by Lincus using large pump database

Pump System Overhaul – ITRC Recommendations

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- Based upon a PG&E / 50-well pump study in the San Joaquin Valley
- Conclusions / Recommendations:
 - ❑ Estimated future consumption improves using kWh/acre-foot(AF) versus OPE (overall pump efficiency)
 - ❑ Average annual consumption increased by 7% (above historical) and 61% (above predicted)
 - ❑ Annual energy consumption cannot be predicted because
 - ✦ Base usage varies significantly
 - ✦ Water volume to be pumped changes due to annual precipitation, number of fields service, water deliveries from district, and crop change/age
 - ✦ Volume of surface water available cannot be predicted
 - ❑ 98% of the wells showed a decrease in kWh/AF
 - ❑ 100% of the wells showed an improvement in OPE
 - ❑ About half of the sites that listed clean to reduce drawdown received no benefit; Improved procedures to diagnose and clean are needed
 - ❑ Much of the variability in the pump performance data appears to be related to flow measures during the test; Improved procedures to measure flow needed
 - ❑ Documented reduction in kWh/AF resulted in energy savings above what would have happened if the pumps had not been improved

Lighting Savings (#18)

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Several issues came up during the lighting measure consolidation process:

- What is the best method to use to calculate lighting measure savings:
 - ❑ Wattage reduction ratio
 - ❑ Wattage range method
 - ❑ Delta watts
- Do hours of use (HOU) for various applications need to be updated?
- Should methodology for applying interactive effects be modified to reduce measure permutations?

Collapsing Permutations (#22)

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Collapsing Permutations

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- Is there an opportunity to collapse permutations with limited effect on accuracy of savings?

Collapsing Permutations

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- Goal:
 - Reduce measure complexity without effecting accuracy of savings
- Questions:
 - Permutations grow for multiple reasons:
 - ✦ Don't typically impact savings/cost: Sector, delivery type, PA
 - ✦ Do typically impact savings/cost: Climate zone, building type, measure application type, delivery type
 - Input on rules for collapsing
 - ✦ Savings within 10% or round values systematically:
 - Should this rule change for High Impact Measures
 - Should the collapse focus use claims data as an input (or market population)
 - Should the rule be tied to accuracy of the sensitive variables
 - Should limits be tied to one parameter (ie, kWh) or all (ie, kWh, kW, therms, cost, ...)

Commercial Refrigeration (#109 & 115)

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Commercial Refrigeration

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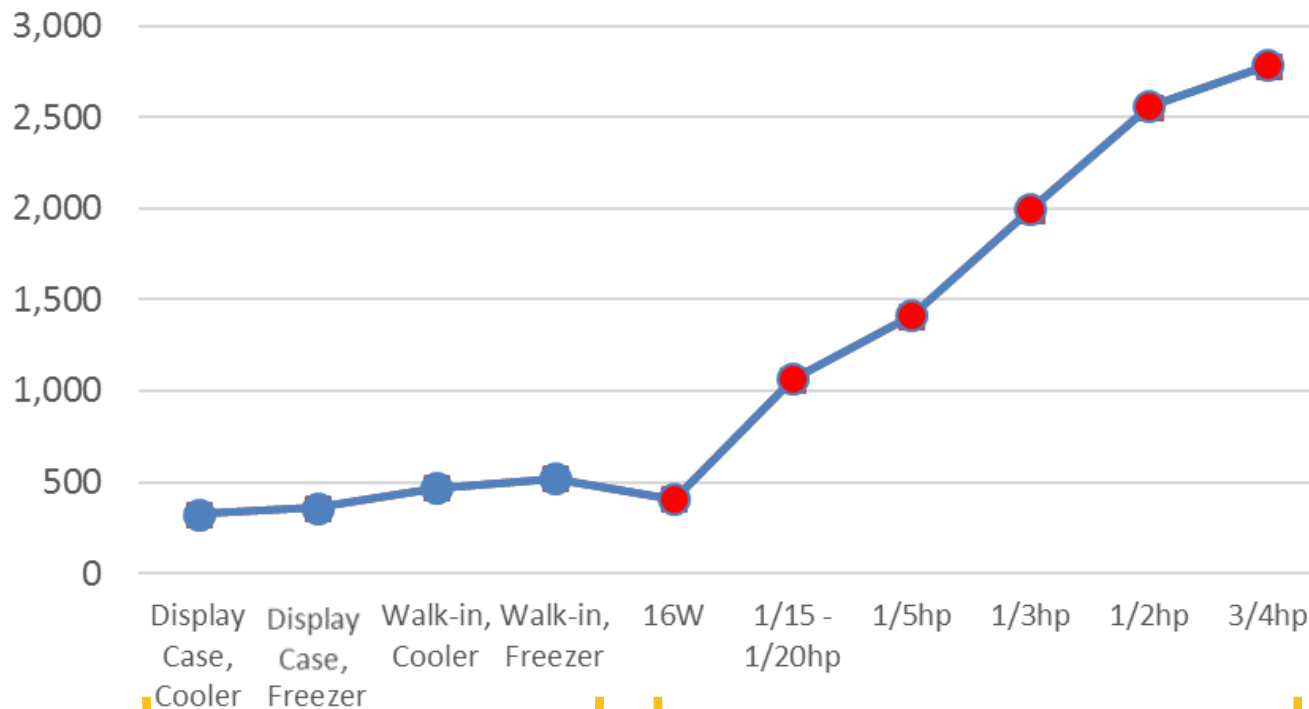
- Change Normal Unit to "Rated HP" from "Each". IOUs move to POU methodology
 - 1.03b Walk-in Cooler/Freezer w/ECM Motor Retrofit
 - 1.05 Walk-in Cooler Evaporative Fan Cycling & VFD Controls
- Resolve 1.17b measures - Open to Closed; Adding interactive effects

How Data Can Influence Offerings

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Ref No	Name	Total No of Units	Energy (kWh/yr)
1.01	Anti-Sweat Heater (ASH) Controls	21,570	5,022,366
1.02	Anti-Sweat Heater Display Doors	2,424	1,539,951
1.03	Evaporator Fan Motors	1,397	524,845
1.04	Refrigerated Storage Auto Closer	1,760	3,731,458
1.05	Walk-in Cooler Evaporative Fan Cycling an	1,854	1,285,285
1.06	Refrigeration Head Pressure Controls	3,330	2,429,104
1.07	Refrigeration Night Covers	4,134	153,634
1.08	Bare Refrigeration Line Insulation	1,028	42,398
1.09	Add Doors to Walk-in Cooler	433	304,913
	etrofit: Multiplex	54	191,502
	1 Motor Retrofit	1,023	722,109
	er: Multiplex	350	197,666
	essure - Single Compresso	214	101,384
	to Reach-In	269	850,046
	pen Case Retrofit	1,771	215,188
	h Doors	4,012	4,896,771
	ase Doors	5,433	2,575,884
			24,784,503

Refrigeration - Evaporator EC Motor



IOU Approach

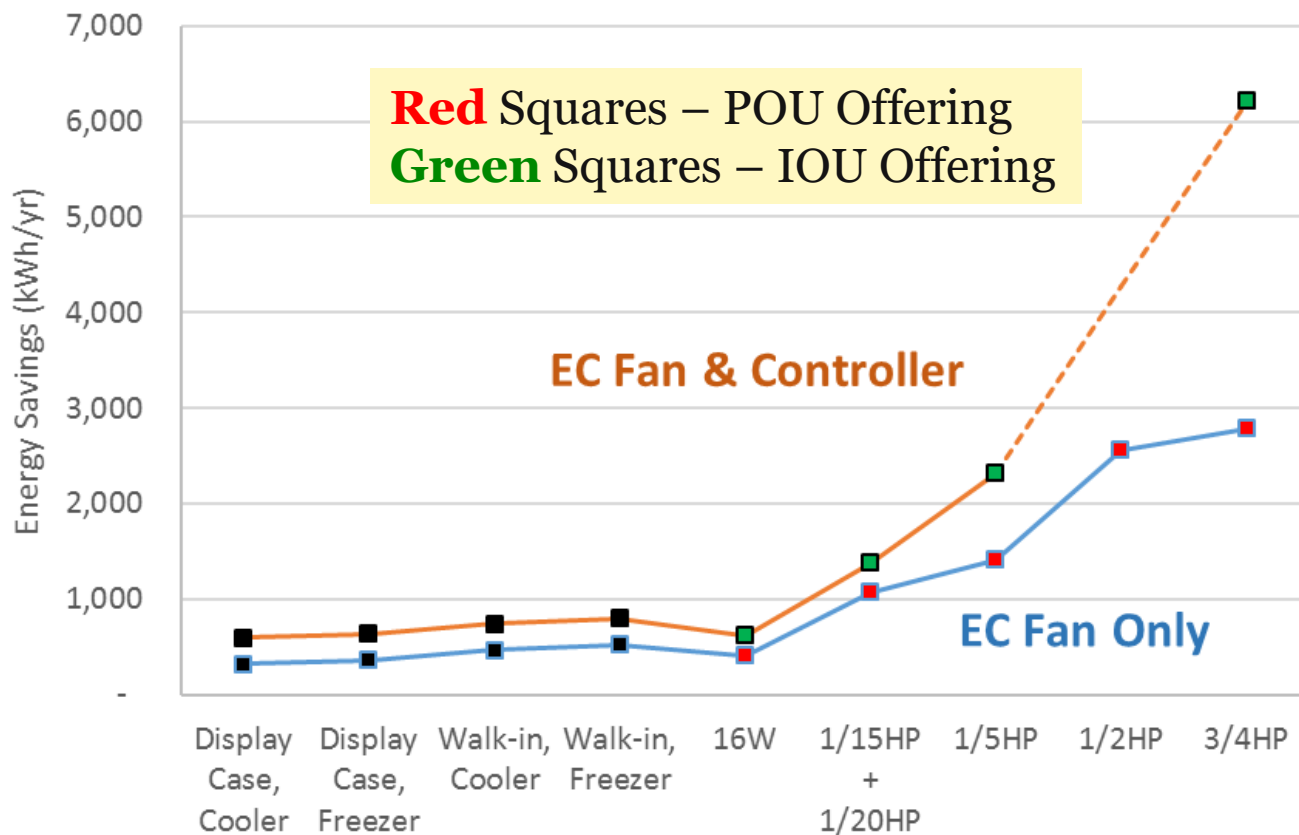
POU Approach

How Data Can Influence Offerings

37

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Evap EC Motor Measures

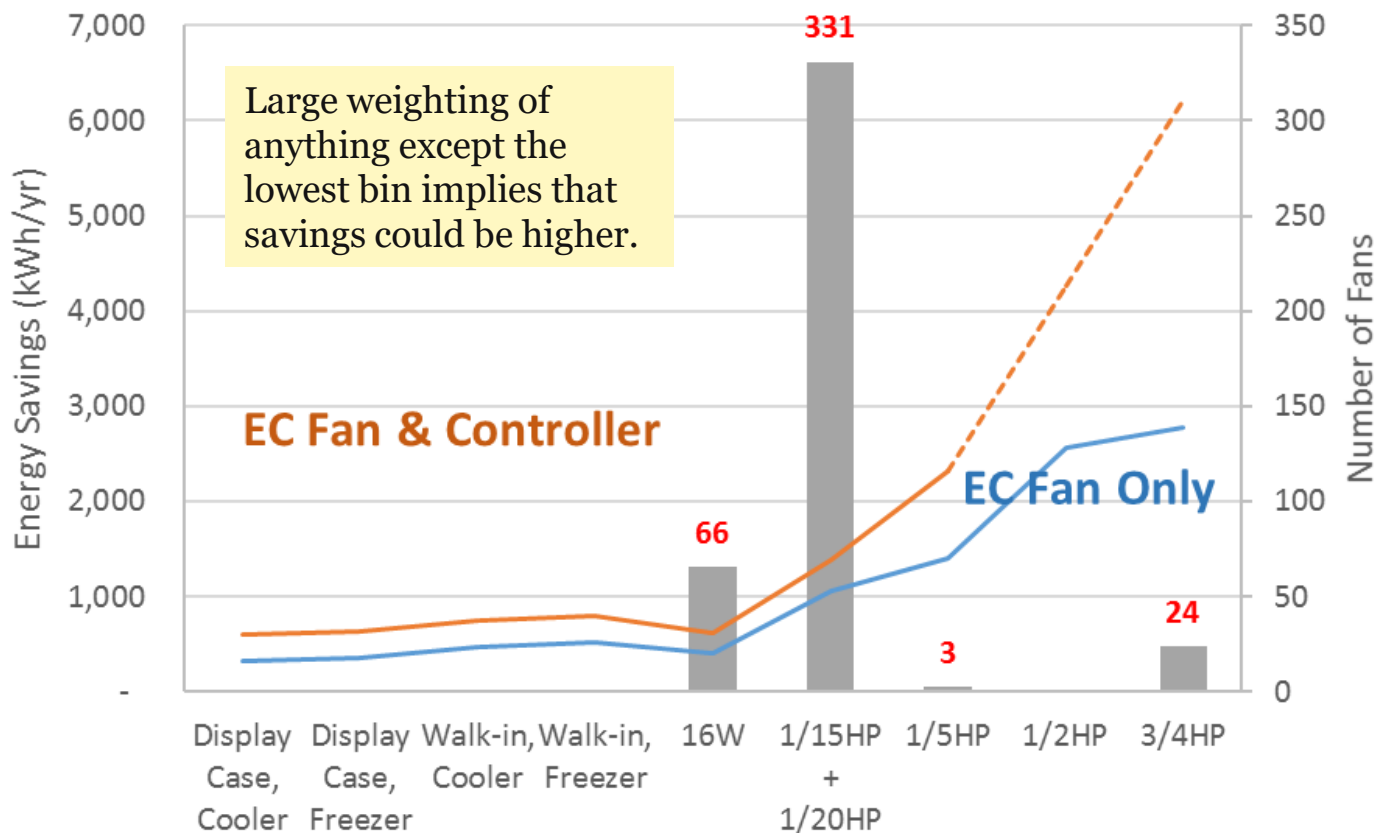


How Data Can Influence Offerings

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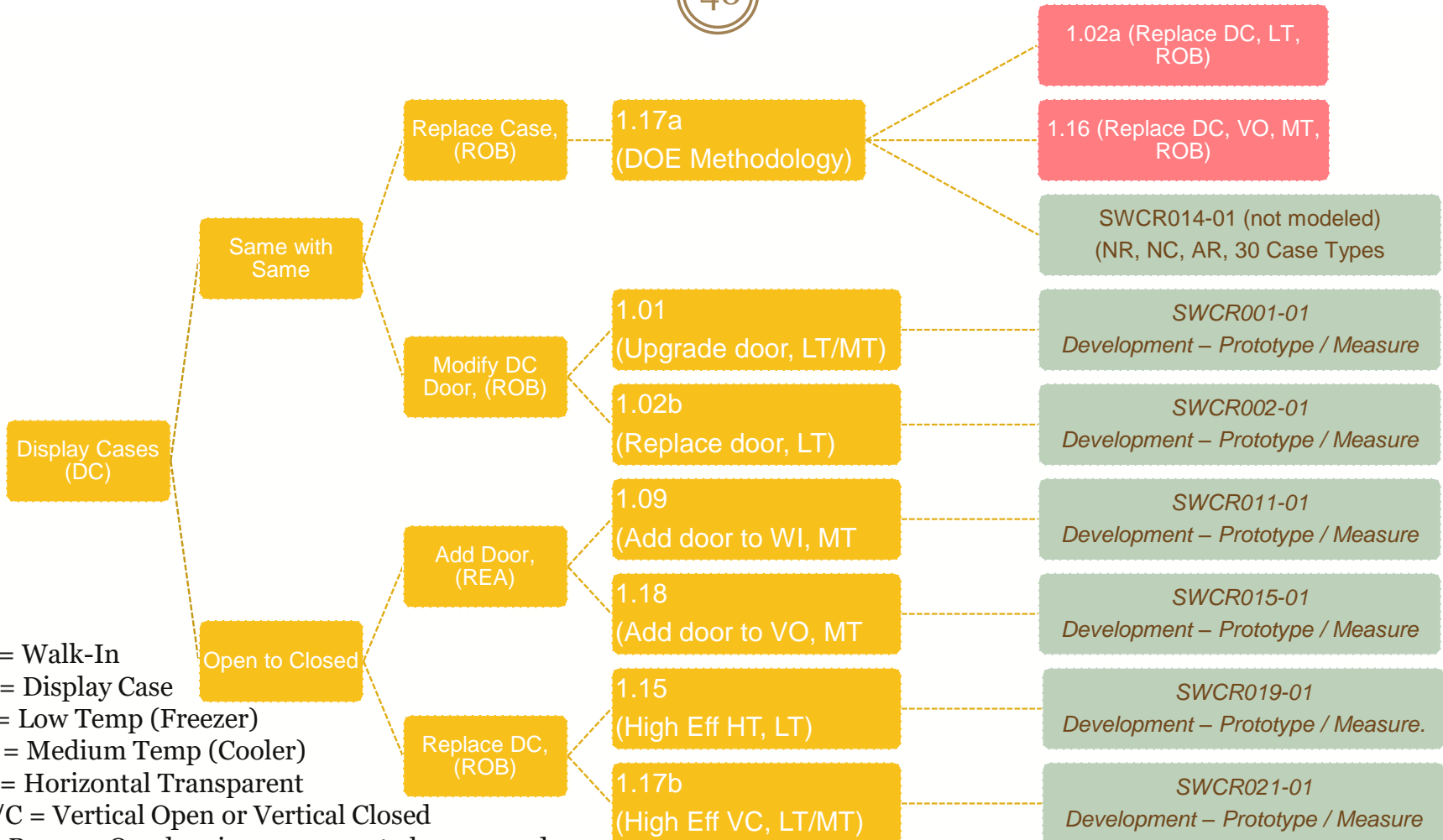
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Evap EC Motor Measures



Display Case Tree

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WI = Walk-In
 DC = Display Case
 LT = Low Temp (Freezer)
 MT = Medium Temp (Cooler)
 HT = Horizontal Transparent
 VO/C = Vertical Open or Vertical Closed
 Red Boxes = Overlapping measures to be removed
 Italics – Planned / In-Development

Appliance & Plug Load (#120)

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Pools & Spas (#181)

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ROGER BAKER

Food Service (#188)

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Food Services - CDF

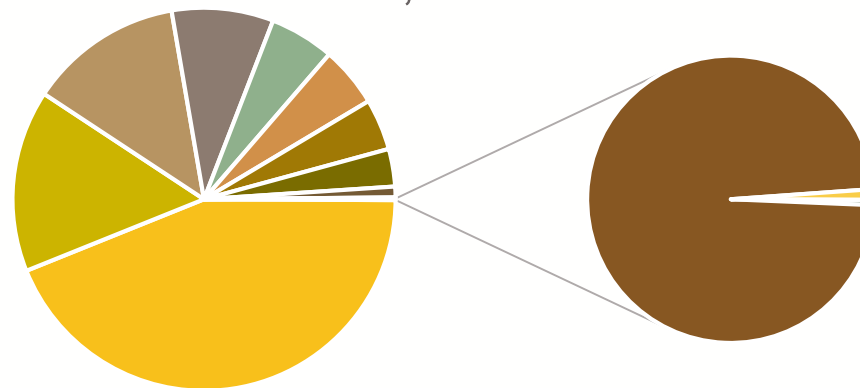
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- Current IOU Workpaper Plan to address Stage 2 Issues
- Coincident Demand Factor(CDF) – not included directly

Parameter	Value	Source
Coincidence Demand Factor	0.90	Itron, Inc. 2005. <i>2004-2005 Database for Energy Efficiency Resources (DEER) Update Study - Final Report</i> . Prepared for Southern California Edison. Pages 3-15 to 3-17, Table 3-14.

- Value based upon professional judgement
- Impact is small

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



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

Next Steps

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Next Steps

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- Complete draft 2019 Stage 2 Roadmap write up
- Circulate draft to contributors for review and input
- (Ongoing) As statewide workpapers are reviewed by the CPUC, incorporate Disposition feedback related to Stage 2 items.