Measure Consolidation Technical Analysis

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APRIL 2017

Agenda

- Measure Consolidation - Flow Chart
- Measures and Measure Data
  - Statewide Measure List
- Data Used to Understand the Measures
  - Workpapers
  - EEStat / CEDARs
  - Ex Ante Tables
  - What else are we missing…
- Power of the Data
- Subcommittee Expectation

Questions / Comments?

Measure Consolidation Flow Chart

Cal TF Staff

1. Identify Measures
3. Identify WP & POU TRM
4. Identify Sources

- Statewide Measure List

Cal TF Staff

8. Identify WP Differences & Issues
7. Complete Overlapping WP Template

- Workpapers
- CEDARS Data
- Ex Ante Tables

- Excel Summaries
- Pivot Tables
- Decks Summarizing Measures & Tables

IOU/POU Tech Staff

11. Identify Other Potential Issues
12. Challenges to Developing Statewide Measure

- IOU/POU Pre-Subcommittee Meeting

Back for additional consultation, if needed

Subcommittee

2. Subcommittee Formation
9. Address Issues Identified
6. Assess If Data is Sufficient
17. Subcommittee Measure Recommendations
16. Assess Measure Future

Full TF

19. CalTF Peer Review / Affirmation

Cal TF Staff

14,20. Populate Draft & Final eTRM Template and Upload into Repository

CPUC Staff

21. CPUC Approval of Measures and Repository

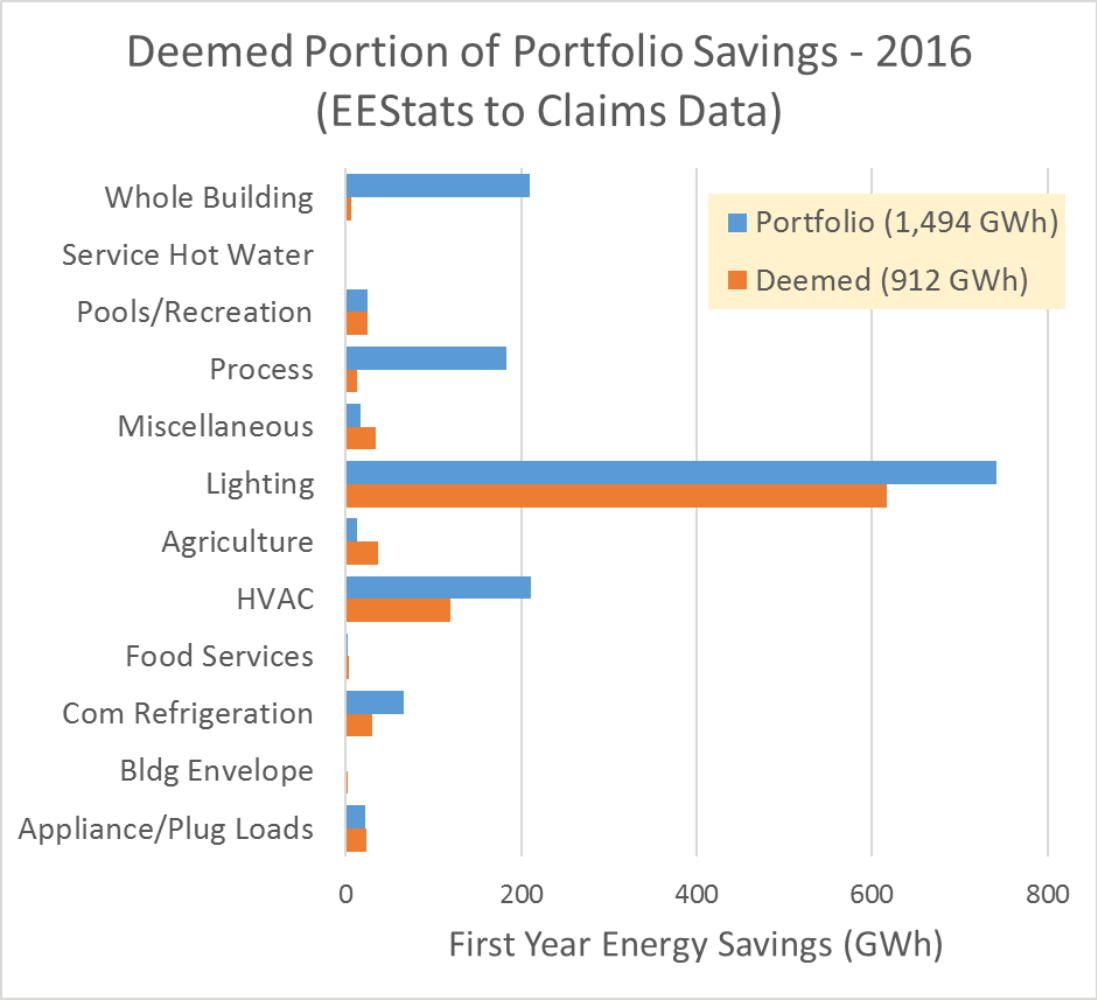
Cal TF Staff

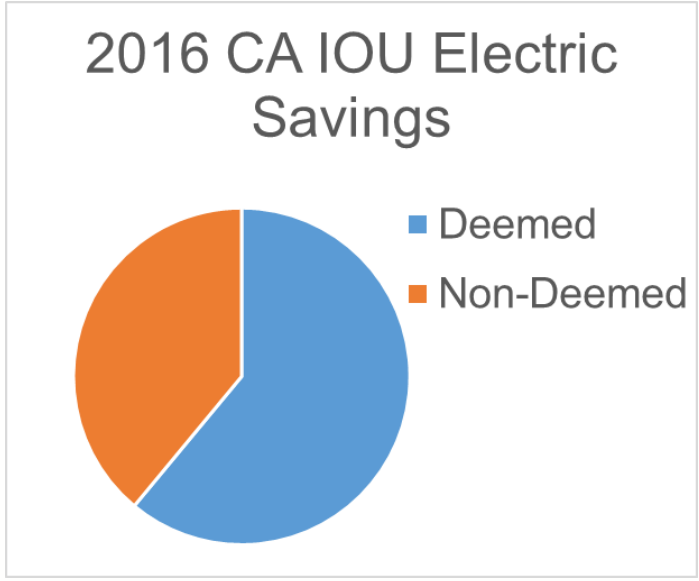
5. Gather / Analyze Sources
10. Compare to Values in Other TRMs (if needed)

13. CPUC Consultation
18. Obtain CPUC Staff Feedback

*Note: Numbers refer to steps in TPP#6.

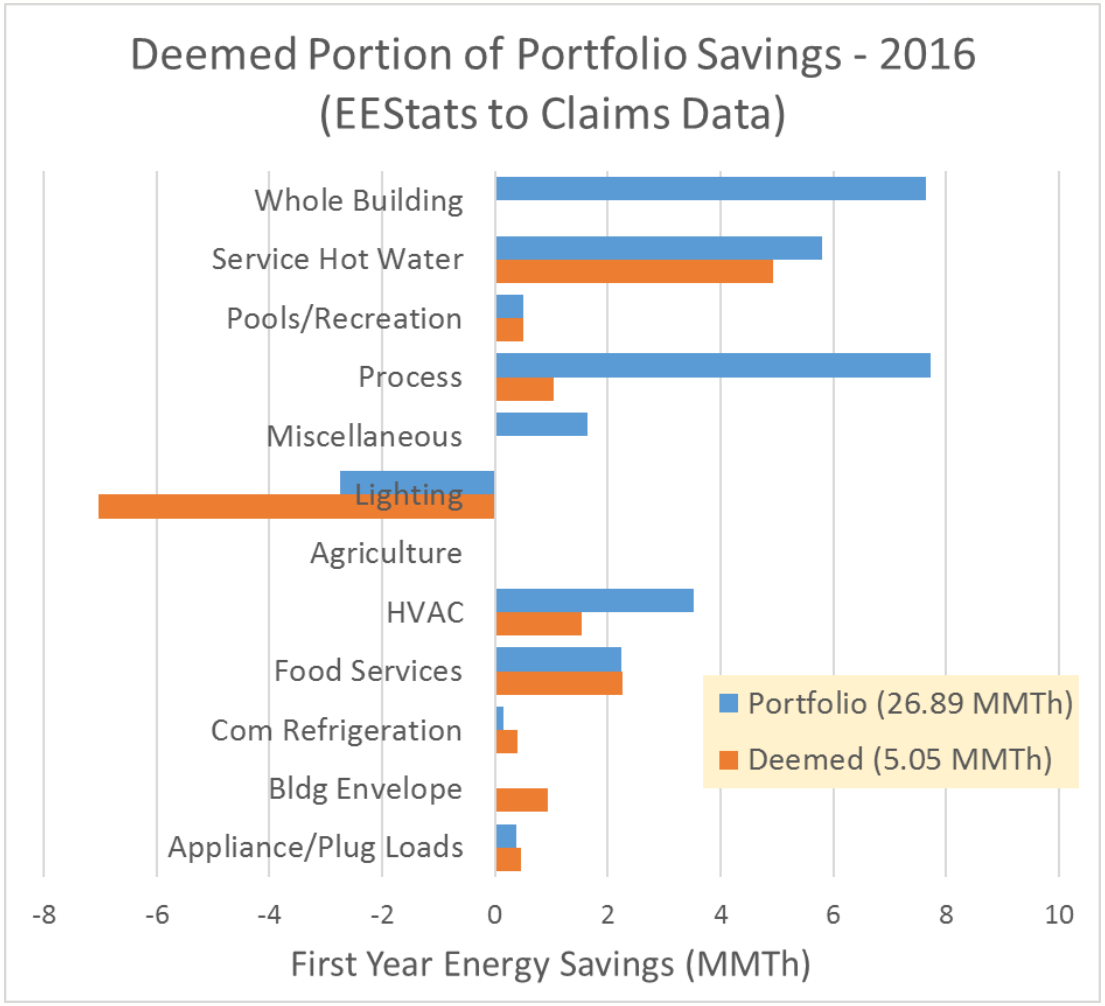
General Observations
Portfolio vs Deemed Savings - Electric

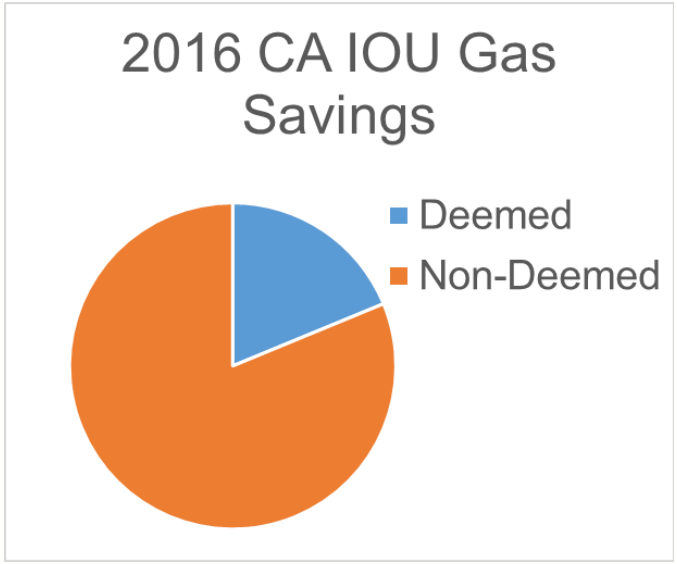




Note: Categories do not align between EEStats and Claims data. (Portfolio should always be greater than Deemed.)

General Observations
Portfolio vs Deemed Savings - Gas





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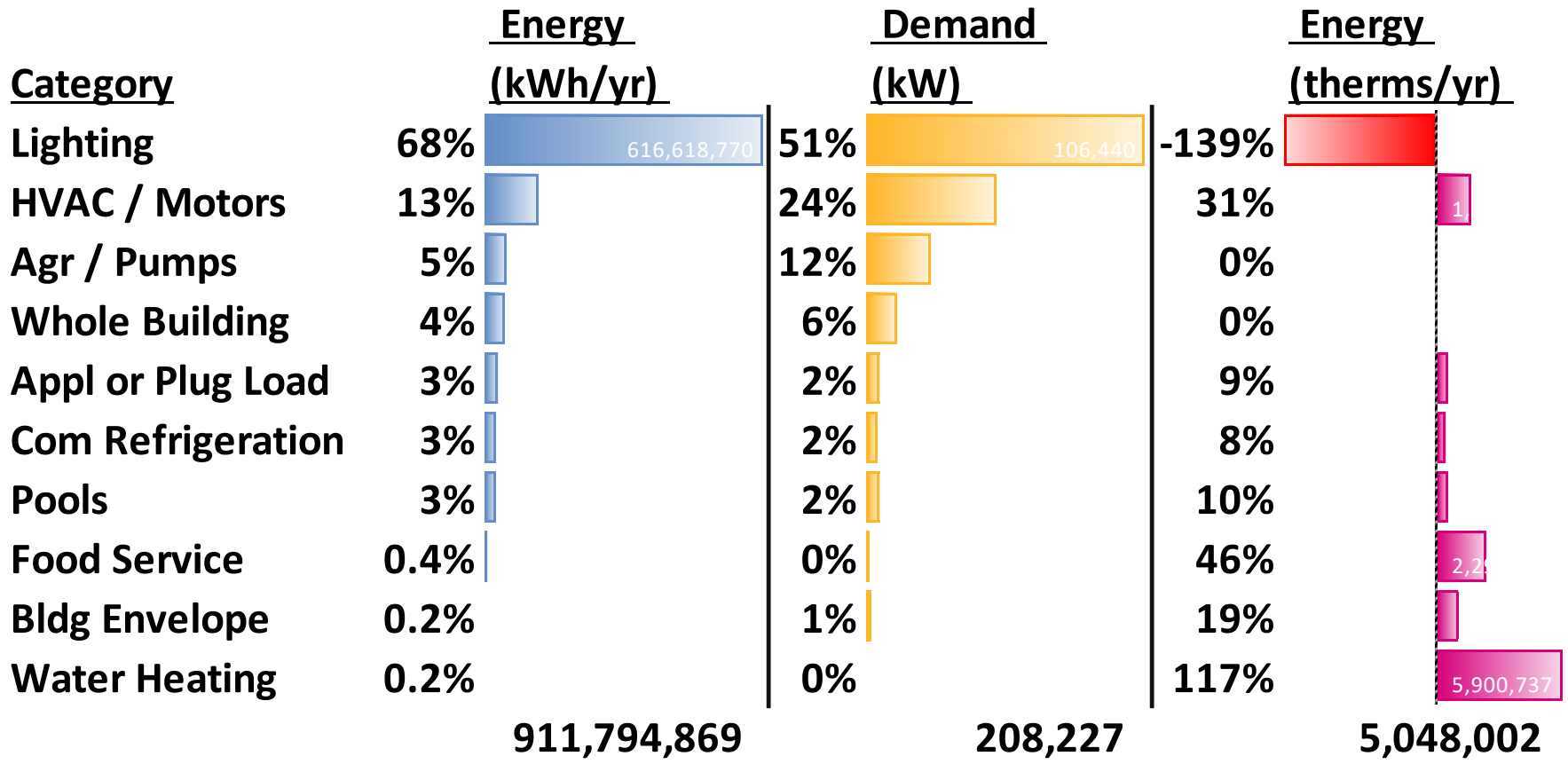
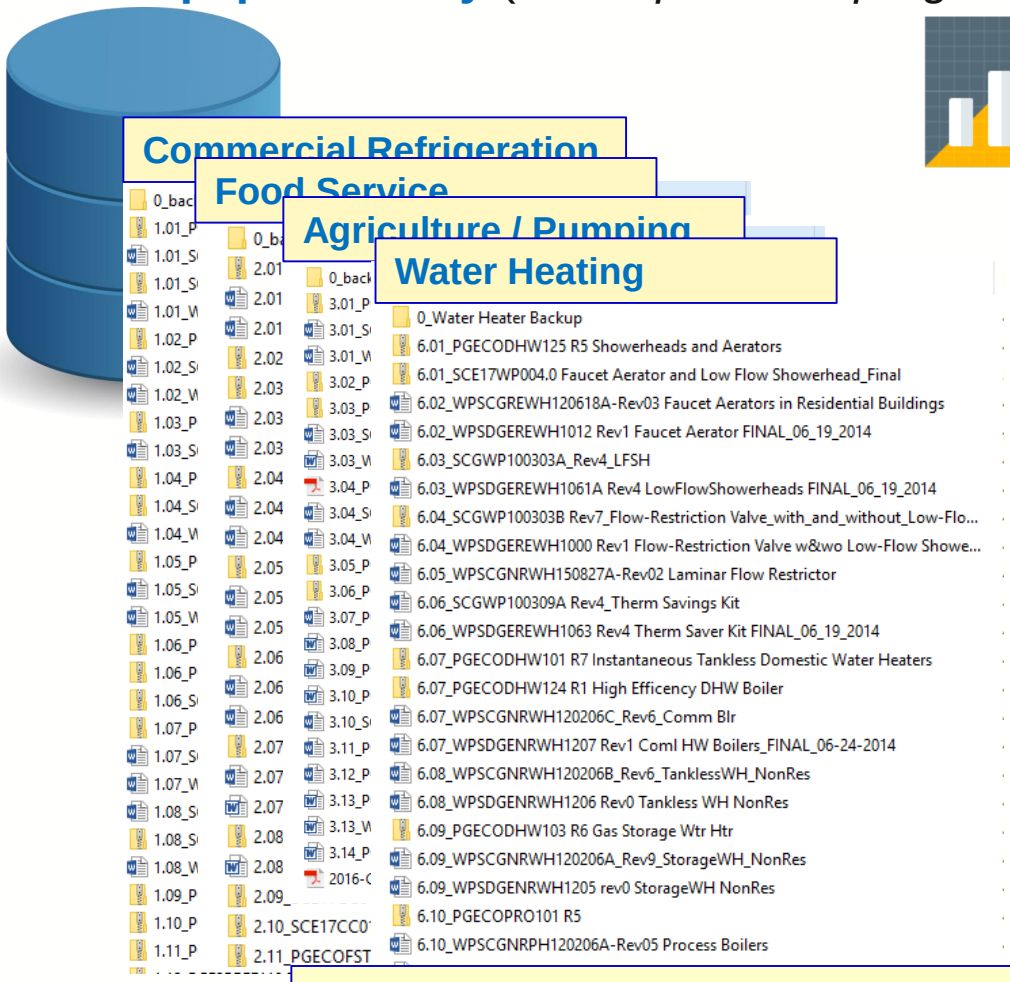
Deemed Portfolio Savings - 2016



Data Used to Understand the Measures

1. Workpaper Library (*development in progress*)



CALIFORNIA ENERGY EFFICIENCY STATISTICS

2. EE Stats: 2016 Portfolio Savings
- PA, Program
- End-Use, Sub-End-Use
- Climate Zone, Zip Code

3. CEDARS: 2016 Deemed Savings
- Workpaper
- Offering

4. Ex Ante Measure Tables:
- Impact -> Permutations
- Measure
- Implementation
- Measure Cost

5. Are we missing anything that should be included?

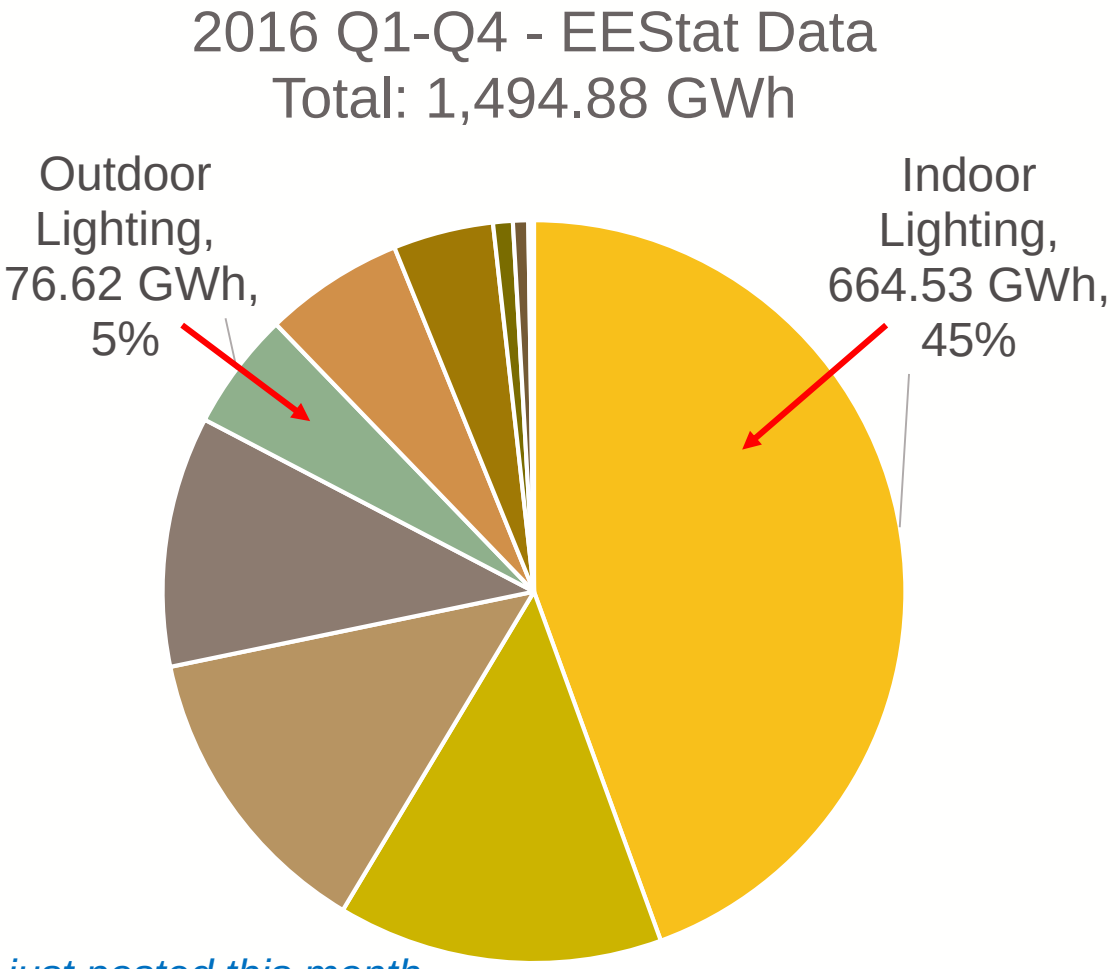
Power of Data

- Reviewed data sources to identify values and differences for measure consolidation process.

  BUT…

- In reviewing data, found that it had value in measure consolidation process beyond identifying similarities and differences across measures AND beyond measure consolidation process
  - Identifying HIMs (high impact measures) for greater focus
  - Use data to maintain savings accuracy
  - Shows opportunities for a statewide approach

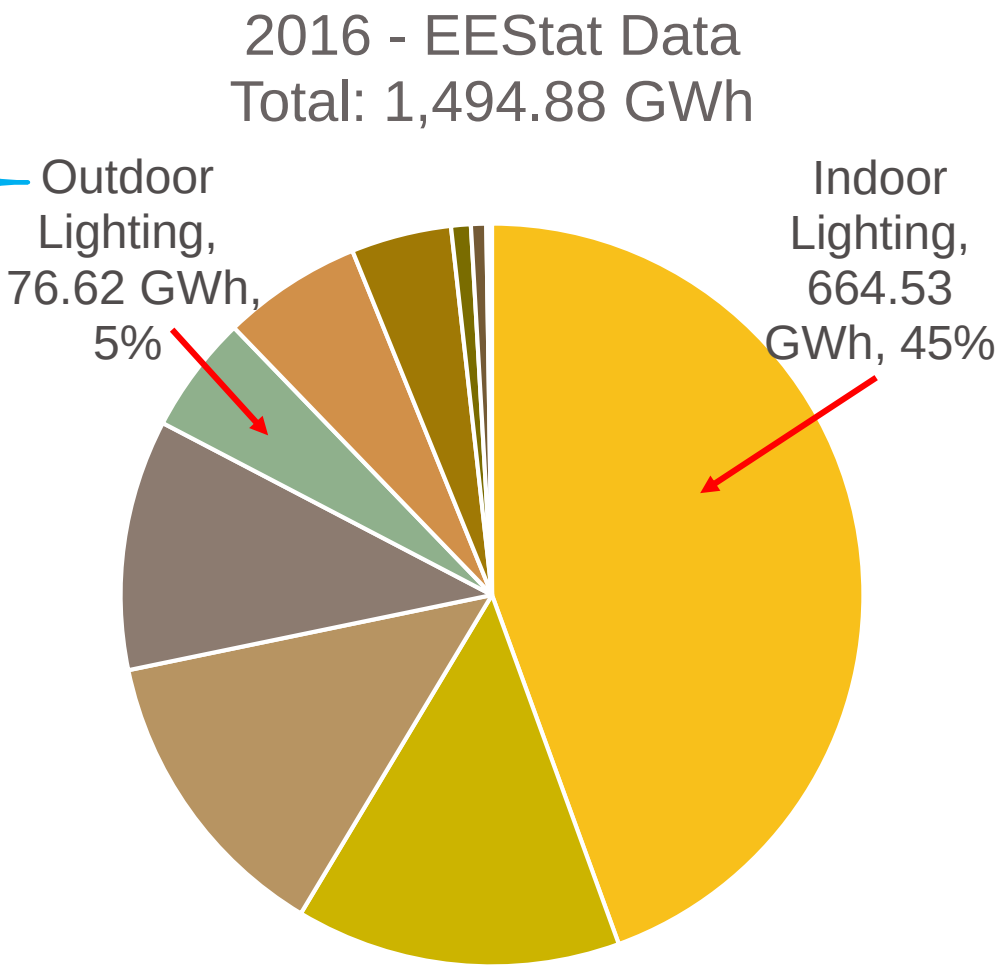
Example: "Power of Data" for Lighting



2016 Q1-Q4 IOU data just posted this month.

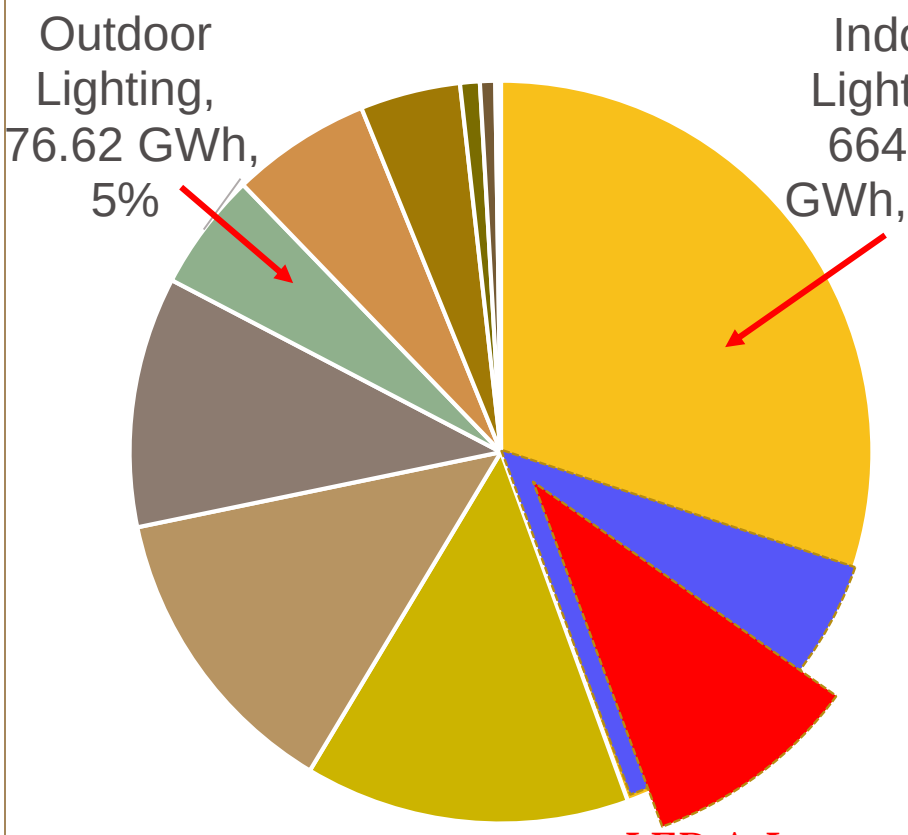
Outdoor Lighting - HIMs

Outdoor Lighting	
Codes And Standards Title 24	1.14
Lighting Outdoor CFL Basic	0.03
Lighting Outdoor CFL Fixture	2.98
Lighting Outdoor CFL Other	0.00
Lighting Outdoor CFL Reflector	0.04
Lighting Outdoor Controls Other	0.36
Lighting Outdoor HID	0.08
Lighting Outdoor Induction	0.33
Lighting Outdoor LED Fixture	51.04
Lighting Outdoor LED Lamp	0.24
Lighting Outdoor LED Other	11.37
Lighting Outdoor LED Streetlight	7.47
Lighting Outdoor Linear Fluorescent	0.03
Lighting Outdoor Other	1.50
Whole Building Retrofit	0.00
Outdoor Lighting Total	**76.62**



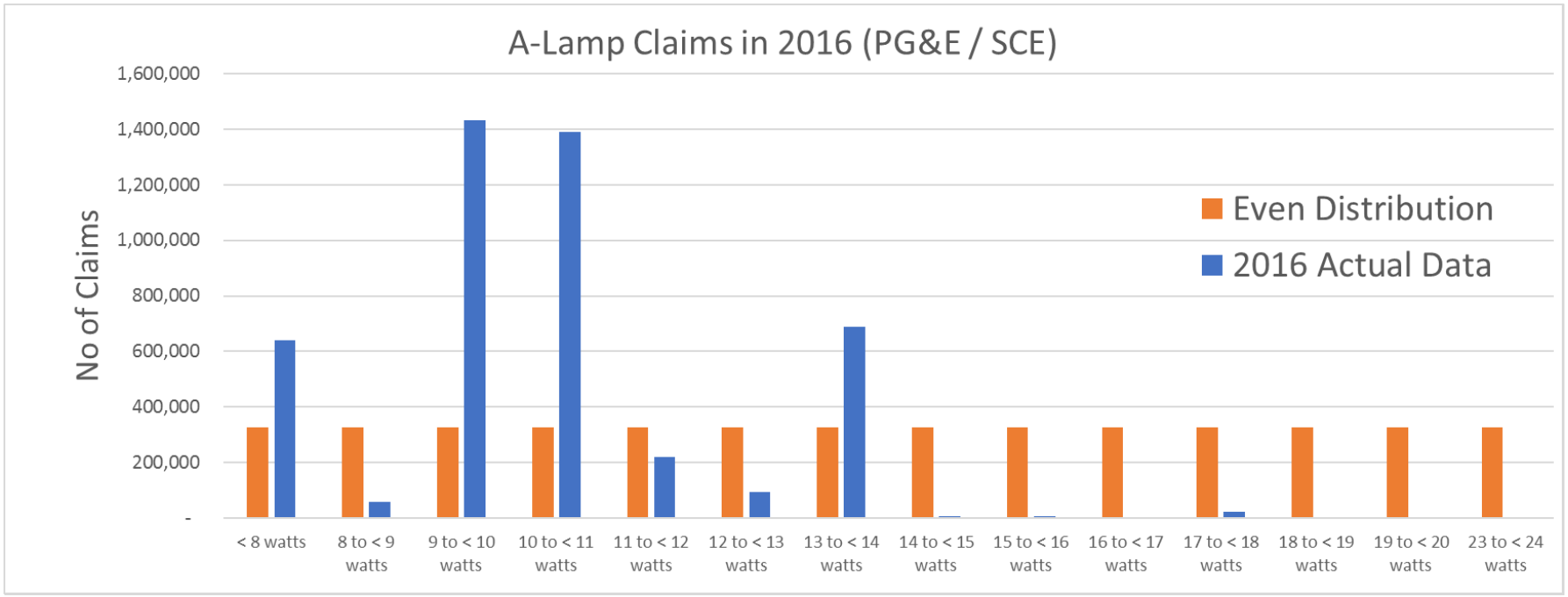
Indoor Lighting - HIMs

2016 - EEStat Data
Total: 1,494.88 GWh



Indoor Lighting	
Lighting Indoor CFL > 30 Watts	2.58
Lighting Indoor CFL 3 Way	13.54
Lighting Indoor CFL A Lamp	31.46
Lighting Indoor CFL Basic	138.87
Lighting Indoor CFL Fixture	1.76
Lighting Indoor CFL Globe	0.00
Lighting Indoor CFL Other	0.00
Lighting Indoor CFL Reflector	4.65
Lighting Indoor Controls Daylighting	0.17
Lighting Indoor Controls Other	1.40
Lighting Indoor Controls Wall Or Ceiling	1.30
Lighting Indoor Fixture Integrated Occu	0.17
Lighting Indoor HID	0.18
Lighting Indoor High Bay Fluorescent	2.21
Lighting Indoor Induction	0.02
Lighting Indoor LED Fixture	125.80
Lighting Indoor LED Lamp	123.43
Lighting Indoor LED Night Light	0.20
Lighting Indoor LED Other	19.97
Lighting Indoor LED Reflector Lamp	124.17
Lighting Indoor LED Signage	0.13
Lighting Indoor Linear Fluorescent	42.10
Lighting Indoor Linear Fluorescent Dela	3.96
Lighting Indoor Other	26.09
Lighting Outdoor LED Fixture	0.03
Lighting Outdoor LED Streetlight	0.28
Other	-
Retrocommissioning Lighting	0.06
Indoor Lighting Total	**664.53**

CEDARs / Claims Data Helps Maintain Savings Accuracy



2016 Savings – 82.4 GWh/yr (all A-Lamps)

Distribution is not even;
1-Watt bins provides great value to keep savings accurate.

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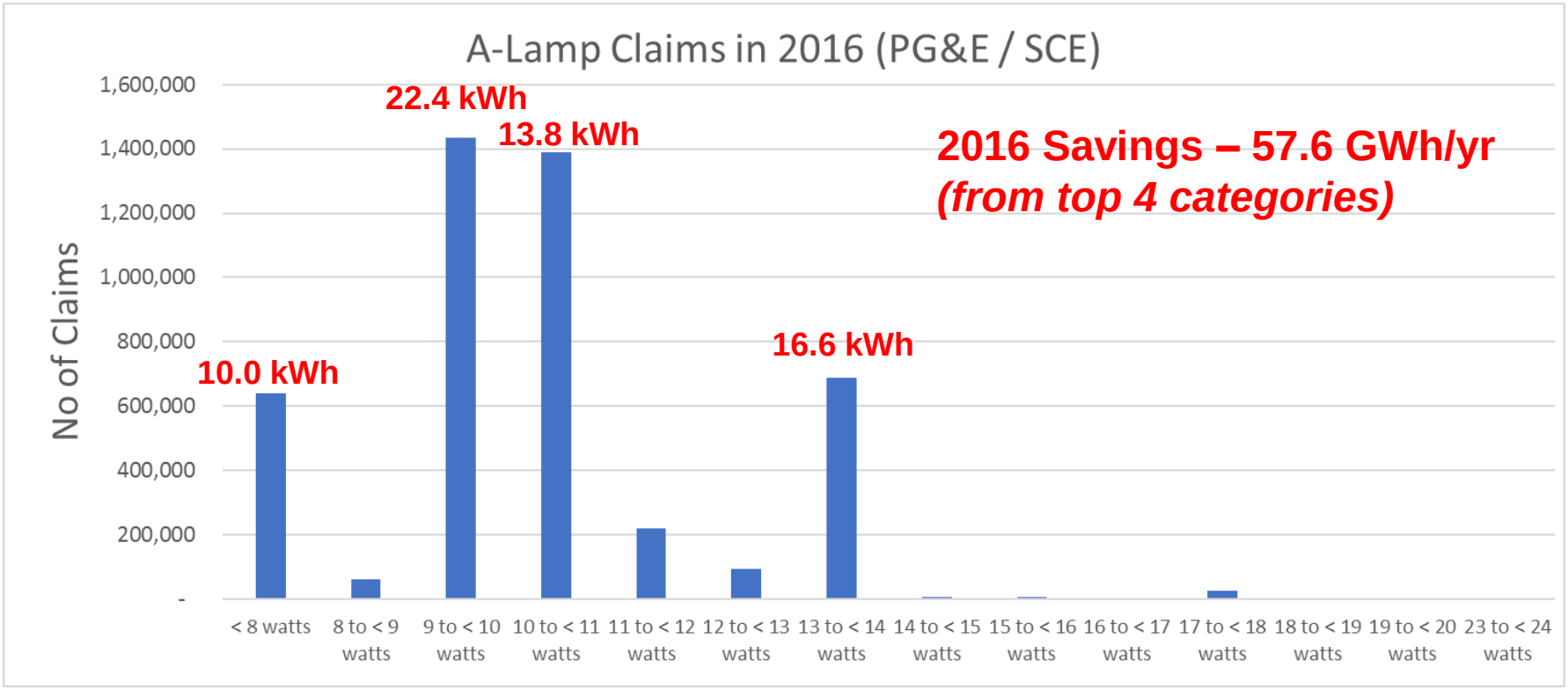

2016 Savings – 82.4 GWh/yr (all A-Lamps)

2016 Savings – 57.6 GWh/yr (top 4 categories)

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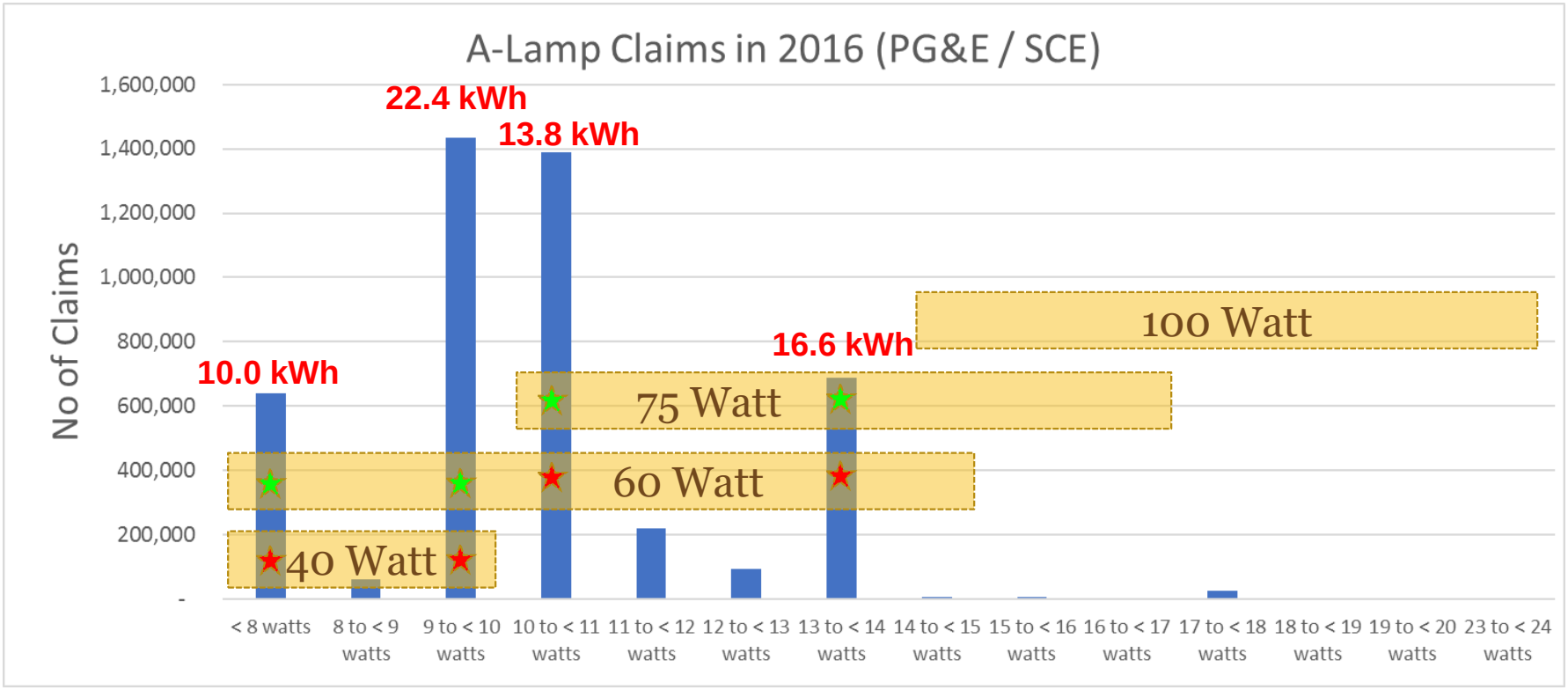


2016 Savings – 82.4 GWh/yr (all A-Lamps) / 57.6 GWh/yr (top 4 categories)

Unapproved 2017 Range in Top 4 Categories (same quantities)

★ - From ~70 GWh/yr

★ - To ~125 GWh/yr

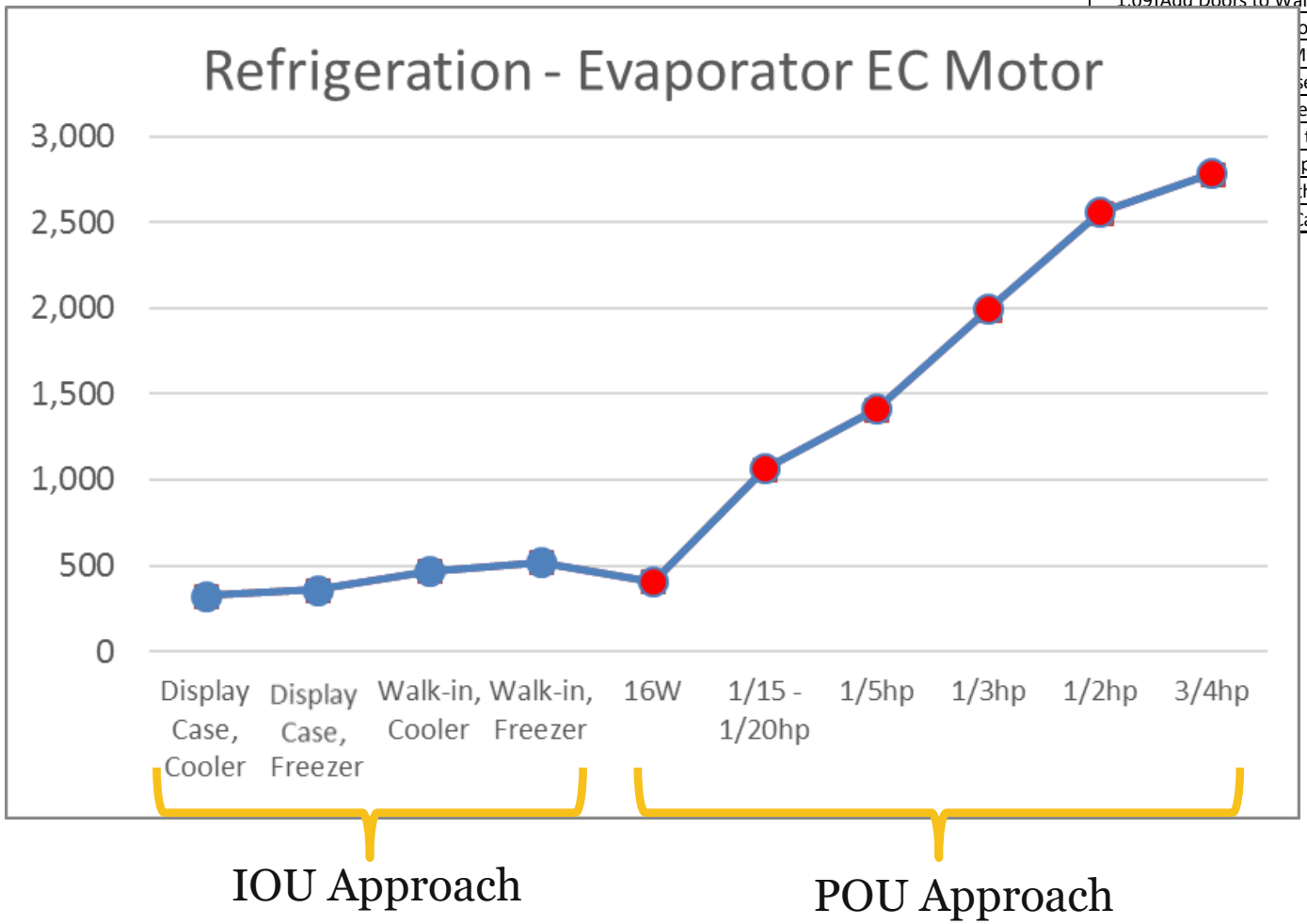
Values are not so important; Range is critical.
Potentially, twice the savings from correct baseline.

Power of Data

- What about:
  - How to characterize a measure?
    - Based upon variables that show sensitivity.
    - Example of EC Motor offerings: Application (Freezer/Cooler) vs Rated Motor HP
  - How many permutation are needed?
    - All permutations within 10% of each other.
    - Example of insignificant variation by climate zone from the EC Motor

How Data Can Influence Offerings

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
	ofit: Multiplex	54	191,502
	I Motor Retrofit	1,023	722,109
	ser: 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
	Case Doors	5,433	2,575,884
			24,784,503



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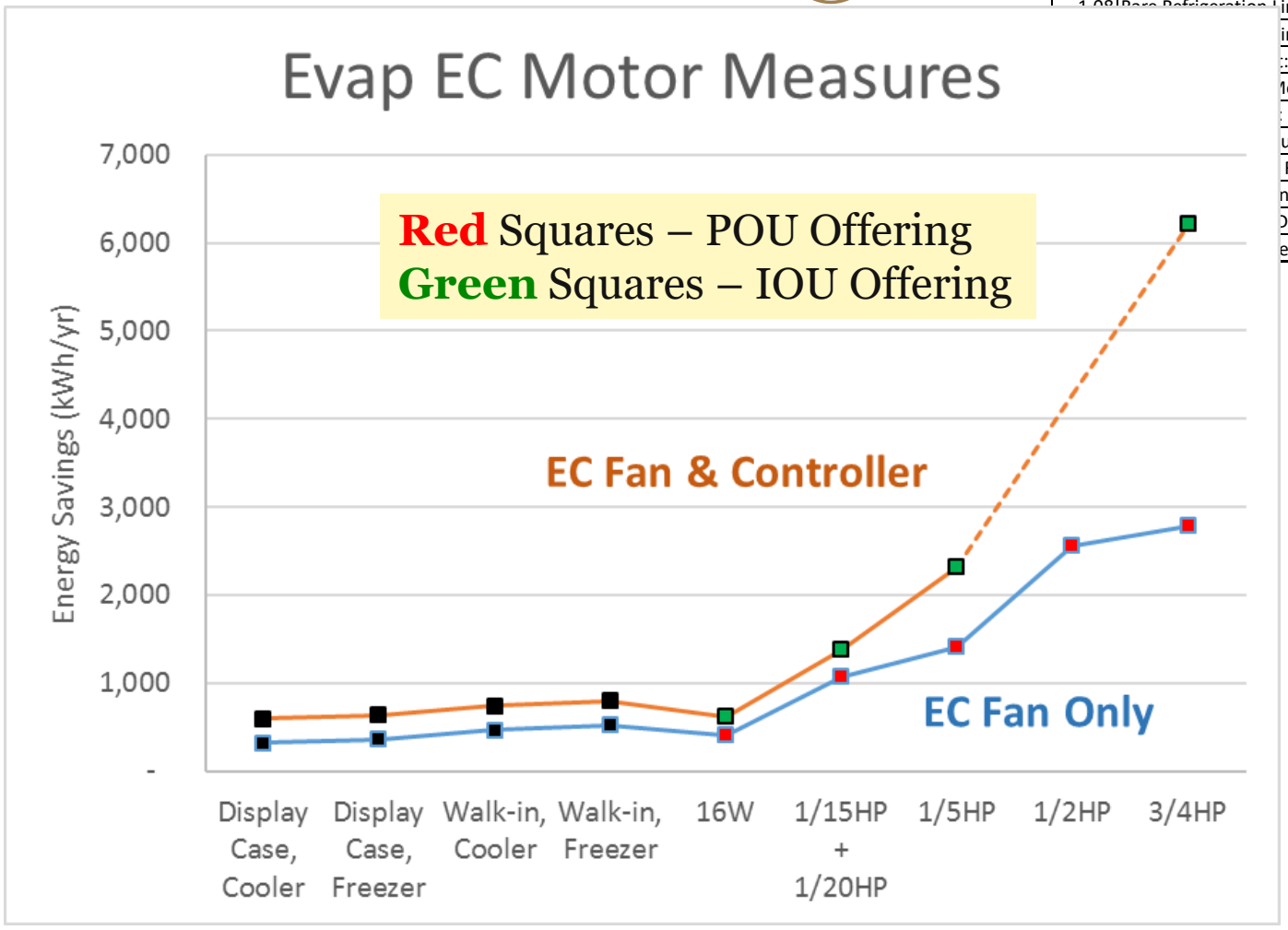

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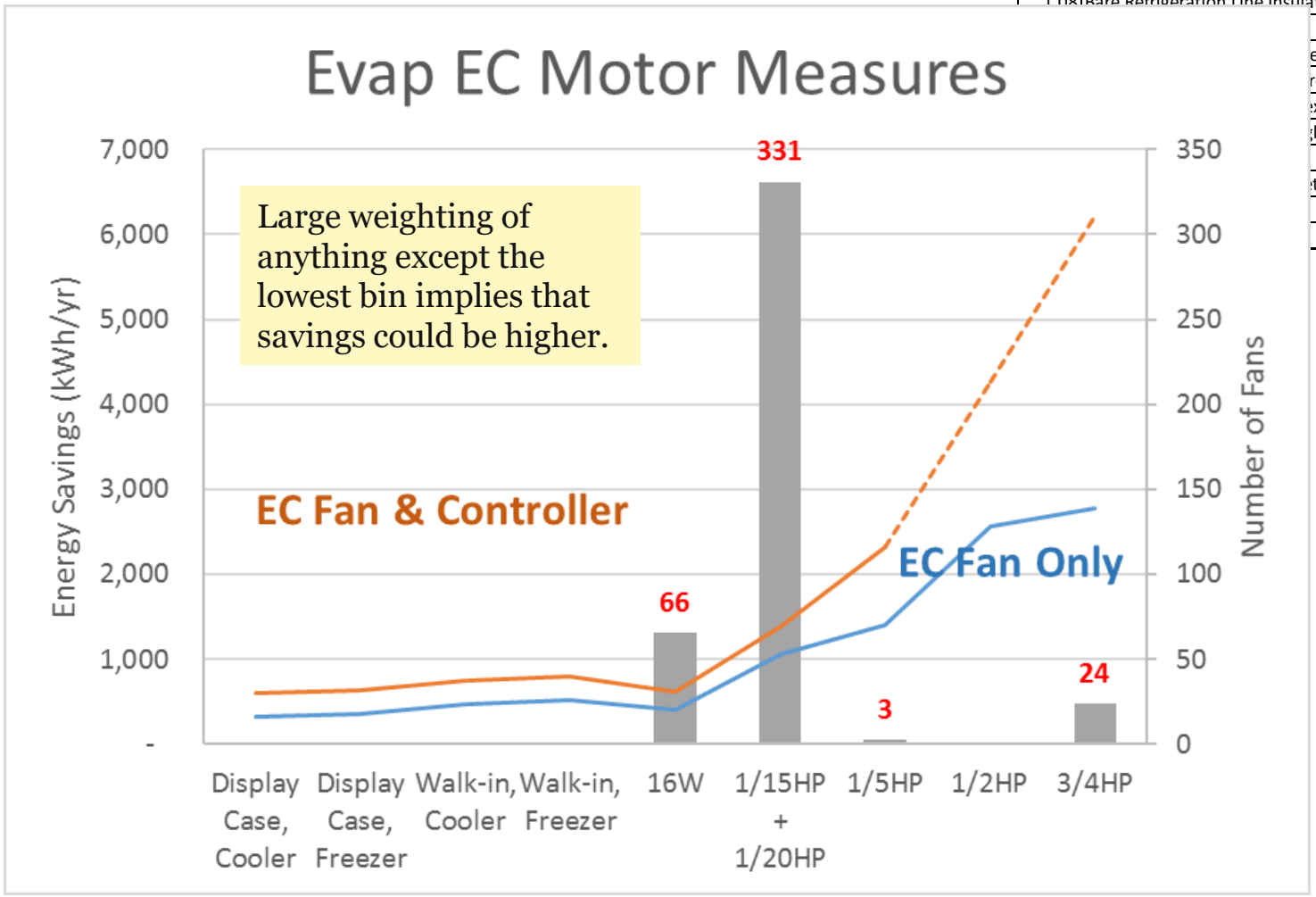


Limit Permutations

Type REF

UseSubCatego	TechGroup	TechType	WP_No	WP name	WP_R	Measure Code	Offer Description	Norm Unit	MeasAp	NTG	EUL	RUL	GSIA	Delivery	No of Permutations	1st Baseline Energy (kWh) Average of APreWB kWh	1st Baseline Std Dev (kWh) StdDev of APreWB kWh	2nd Baseline Energy (kWh) Average of AStdWB kWh	2nd Baseline Std Dev (kWh) StdDev of AStdWB kWh
Equipment	Ref_Storage	HorDisp	PGECOREF109	Evap Fan Motor	R6	R145	Display Case Cooler Evaporator	Each	ROB	0.6	15	5	1	Any	9	-	-	324.6	3.4
						R134a	Display Case Freezer Evaporator	Each	ROB	0.6	15	5	1	Any	9	-	-	357.5	3.5
						R404A	Walk-in Cooler Evaporator	Each	ROB	0.6	15	5	1	Any	9	-	-	465.9	4.9
						R407A	Walk-in Freezer Evaporator	Each	ROB	0.6	15	5	1	Any	9	-	-	519.1	14.3
																-	-	416.8	80.4

Offer Description	No of Permutations	2nd Baseline Energy (kWh) Average of AStdWB kWh	2nd Baseline Std Dev (kWh) StdDev of AStdWB kWh
Display Case Cooler Evaporator	9	324.6	3.4
Display Case Freezer Evaporator	9	357.5	3.5
Walk-in Cooler Evaporator	9	465.9	4.9
Walk-in Freezer Evaporator	9	519.1	14.3

In this case, Permutation are due to Climate Zone. However, variation between CZ's is only 1-3%.

If other parameters (like motor HP or hours of use) vary savings more significantly, consolidation is valuable.

Subcommittee Expectation

- Goals for this First Phase
  - Address Measures at a higher level (by category) to:
    - Identify and make recommendations on all **cross-cutting category issues** that are technical or policy related.
    - React to **Measure specific issues** that arise during the consolidation process.
    - Separate issues into 2017 / 2018 **issue solution path** to set expectations correctly
  - Create a **communication channel** for category stakeholders to stay informed or participate in a more focused manner.

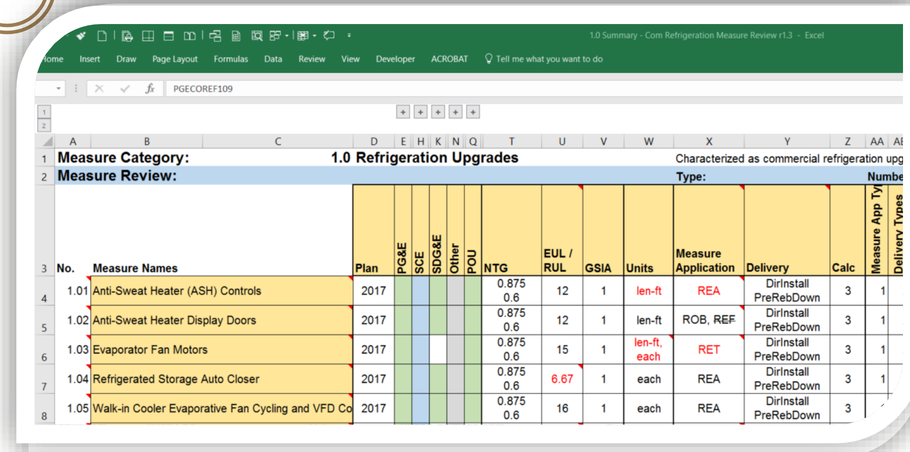
Subcommittee Expectation

- Initial Expectations
  - Cal TF Staff:
    - Creates **summary documentation** prior to meeting.
    - Creates **measure comparison pivot tables** prior to meeting.
    - Provide **access to detailed documentation** if desired
    - Share **common results** between Subcommittees.
  - Subcommittee Members:
    - Read through **summary documentation** prior to meeting.
    - Formulate **opinions on issues** identified.
    - Raise **other concerns** that should be looked at in further detail.

Subcommittee Materials

CALIFORNIA TECHNICAL FORUM

- 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*)

Questions