

# Measure Savings Estimation: Fundamentals & Proposed Guidance



**CALIFORNIA**

TECHNICAL FORUM

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# Agenda

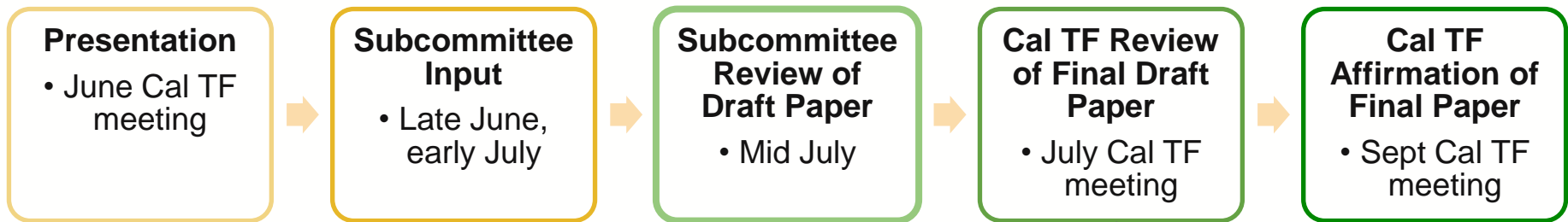
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- Objectives & Timeline
- Recap
- Fundamentals
- Proposed Guidelines
- Next Steps

# Overview

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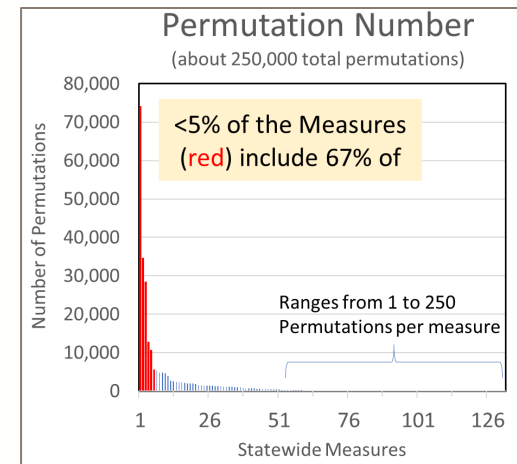
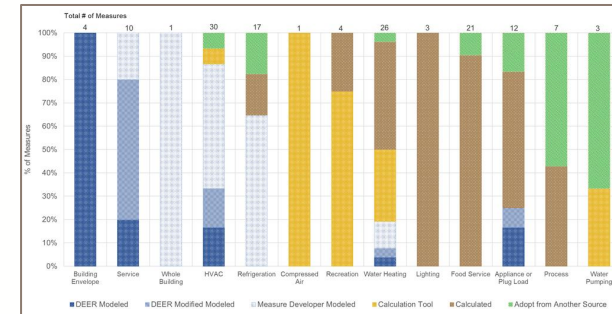
- **Goal**
  - Characterize current practices for developing savings by use category
  - Create best practice guidelines and templates for developing deemed savings
- **Value**
  - Facilitate the consistency of methods by use category
  - Ensure savings calculations are transparent and reproducible
  - Provide measure developers with trade-offs associated with each method to ensure accuracy and cost-efficiency
- **Next Steps**



# Recap: Current Practices

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- Approach
  - Reviewed savings analysis documentation of 130+ statewide measures
- Categorization
  - Categorize in: Modeled, Calculation Tool, Calculated, Adopted from Another Source
- Permutation Analysis
  - Four common parameters that affect permutation number
  - Large variation does exist
- Claims Data Analysis
  - No significant correlation to calculation methodology or permutation count.



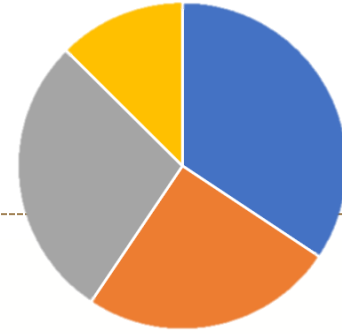
# Savings Methodology Fundamentals

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1. Comply with regulatory requirements.
2. Represent average savings achieved by customers.
3. Represent current market conditions.
4. Represent an “apples-to-apples” comparison between base and measure case usage.
5. Represent manufacturer agnostics savings.
6. Investment in measure savings development should be commensurate with the measure contribution of impacts to the portfolio.
7. Be transparent and well documented to foster consistency and reproducibility. Use of “best available data”.

# Measure Impact to Portfolio

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- Demonstrated **High** impact measure:
  - A measure predicted to immediately be high impact or has demonstrated high portfolio impact through the course of implementation.
  - *Definition: >1% of savings for each fuel type*
- **Normal** impact measure:
  - A measure predicted to be normal impact, or that has demonstrated normal portfolio impact through the course of implementation.
  - *Definition: Savings of <1% (for each fuel type) to average (not including HIMs)*
- **Low** impact measure:
  - A measure that is predicted to have a lower impact on the portfolio than average.
  - *Definition: Savings that are below average*
- **Interim** measure:
  - A measure for which sufficient information is anticipated but not yet available that would satisfy the level of rigor for a measure predicted to be normal or high impact. Interim measures must be re-examined after 1 year or another duration determined by the Cal TF.
  - *Definition: New measure (used proxy of NTG = ET, <2 yrs, and Fuel-sub)*

# Measure Impact to Portfolio

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- 2019 Deemed IOU Claims

- Definitions:

- **HIM:** >1% of gas or electric savings

- **Normal:** Average to 1% savings

- **Low:** Below average savings

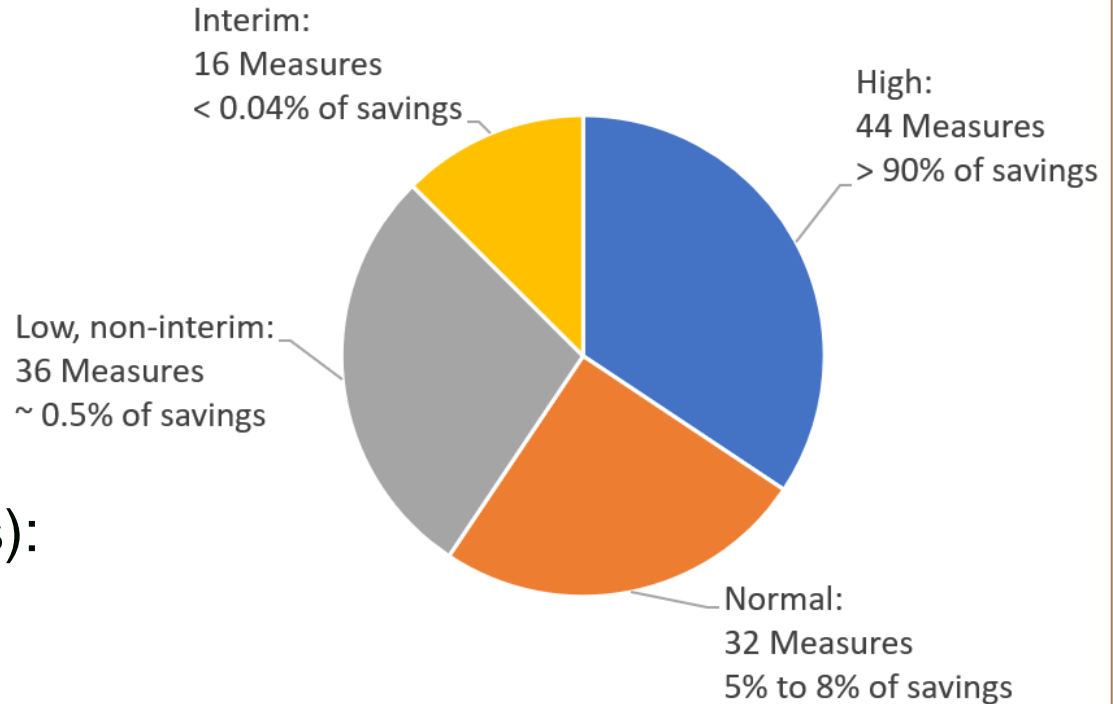
- **Interim** (new measures):

- ✦ ET-NTG

- ✦ All-Default<2yr

- ✦ Fuel Sub

- Observation: 1% is a much smaller threshold today for electric (since lighting dominance is going away)



# Recommended Guidelines

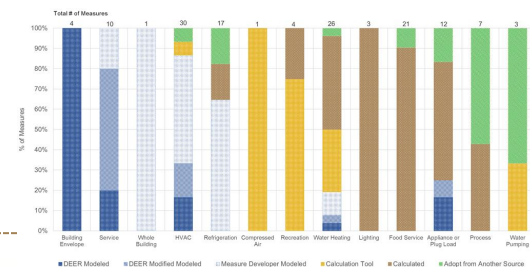
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1. **Methodology:** Choose an Impact Estimation Method that Aligns with the Measure Use Category
2. **Documentation:** Develop Measure Savings that Align with Cost-Effectiveness and Claims Requirements
3. **Documentation:** Document Influential Parameters for Sensitivity Analysis
4. **Documentation:** Document Base Case and Measure Case Energy Usage
5. **Interactive Effects:** Include Interactive Effects Consistently
6. **Permutations:** Reduce Measure Complexity
7. **Program Data Collection:** Identify Inputs That Should Be Collected Through Programs



# Guideline 1: Methodology

## Choose an Impact Estimation Method that Aligns with the Measure Use Category



Use Category – Technology Group	Modeled	Calculation Tool	Calculated	Adoption of Values from Another Source
Building Envelope	Whole-Building Energy Modeling (BEM) tools provide accepted packages to evaluate complex, interacting building systems.			RCT, ET Studies, custom projects, EM&V, or regression models constitute a large portion of this category.
Service (RCx)				
Whole Building				
HVAC				
Refrigeration				
Compressed Air		Simulation tools for specialized end-use categories used when interactions with other systems is not required.		
Recreation (Pools)				
Water Heating – Equipment				
Water Heating – Water Fixture			These measures involved relatively simple physics models or engineering calculations that are widely accepted.	
Lighting				
Water Pumping				
Food Service				
Appliance or Plug Load				
Process				

# Guideline 2: Documentation

## Develop Measure Savings that Align with Cost-Effectiveness and Claims Requirements

Measure Application Type	Description	1 <sup>st</sup> Baseline	2 <sup>nd</sup> Baseline
Accelerated Replacement (AR)	Measure is installed when the existing equipment is still operational. This type includes Repair Eligible and Repair Indefinitely measures.	Existing conditions	Code / Standard Practice
Normal Replacement (NR)	Measure is installed when the existing equipment fails, or maintenance requires replacement.	Code / Standard Practice	N/A
New Construction (NC)	Measure is installed during construction instead of code/standard equipment.	Code / Standard Practice	N/A
Add-on Equipment (AOE)	Measure is installed to pre-existing "host" equipment that is still operational.	Existing conditions	N/A
Building Weatherization (BW)	Measure includes improvements to nonmechanical building structures or existing equipment that is essential to building function without maintenance.	Existing conditions	N/A
Behavioral (BRO-Bhv)	Measure includes informational or educational programs that influence energy-related practices.	Existing conditions	N/A
Retrocommissioning (BRO-RCx)	Measure is installed/applied as part of retro-commissioning.	Existing conditions	N/A
Operational (BRO-Op)	Measures that improve the efficient operation of installed equipment.	Existing conditions	N/A

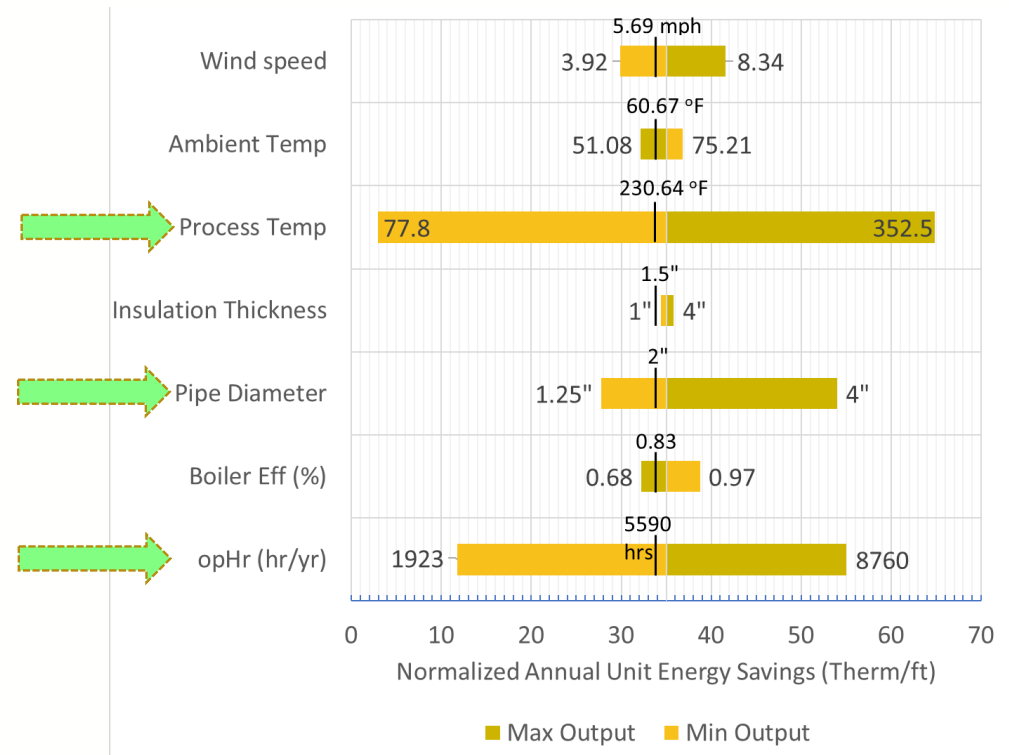
# Guideline 3: Documentation

## Document Influential Parameters for Sensitivity Analysis

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- Understand which Parameters are more influential in the sensitivity Analysis
- Document differently depending upon
  - Impact to the portfolio
  - Age of the measure

### Example: Pipe Insulation



# Guideline 3: Documentation

## Document Influential Parameters for Sensitivity Analysis

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- Document differently depending upon the impact to portfolio

Approval Type	Low Impact	Normal Impact	High Impact	Interim
Short Term (expires after 1 year)				Sensitivity analysis for highest impact parameters <u>80% confidence level</u> <u>TF judgement for precision</u>
Long Term	TF judgement	Sensitivity analysis for highest impact parameters <u>80% confidence level</u> <u>TF judgement for precision</u>	Sensitivity analysis for highest impact parameters 90% confidence level <u>10% precision</u>	

- Input needed to apply precision and confidence levels
  - Consider 80% confidence limit for Normal Impact
- Results from this guideline feed into:
  - Measure Complexity ([Guideline 6](#))
  - Program Data Collection ([Guideline 7](#))



# Guideline 4: Documentation

## Document Base Case and Measure Case Energy Usage

- All measures:

- *Measure Characterization Template* should be followed to guide developers
- *Measure Development and QA / QC Guidelines* document
  - ✦ Being updated this month! -> (Still can find these on the Cal TF website)

- Modeled Measures

- *Modeled Measure Documentation Template* provides additional guidance specifically for modeled measures.

# Guideline 5: Interactive Effects

## Include Interactive Effects Consistently

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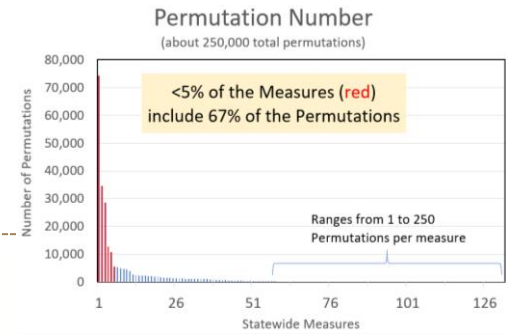
- **General Guidance**
  - Apply interactive effects when significant
  - Table supports general guidance
- **Specific Guidance**
  - Normal and Low Impact Measures
    - ✦ Impacts should vary by more than 10%
  - High Impact Measures
    - ✦ Consider the affect on the portfolio
- **Improve interactive effect definition**

Use Category – Technology Group	Apply Interactive Effects?	Recommended Approach
Building Envelope	Yes	Building Energy Model
Service (RCx)	Yes	Building Energy Model
Whole Building	Yes	Building Energy Model
HVAC	Yes	Building Energy Model
Refrigeration	Yes	Building Energy Model
Compressed Air	No	
Recreation (Pools)	No	
Water Heating – Equipment	No	
Water Heating – Water Fixture	No	
Lighting	Yes	Commercial and Residential Interactive Effect Table
Water Pumping	No	
Food Service	No	
Appliance or Plug Load	Yes	Commercial and Residential Interactive Effect Table
Process	No	

# Guideline 6: Permutations

## Reduce Measure Complexity

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- If permutations vary by less than 10%, collapse them
  - Avoid false precision

Low Impact	Normal Impact	High Impact	Interim
Savings vary by >10% due to variation by influential parameter	Savings vary by >10% due to variation by influential parameter	Consider the effect on the portfolio; include parameters as appropriate	Savings vary by >10% due to variation by influential parameter

- Consider for
  - Shared Parameters that Impact Savings or Cost
    - ✦ Bldg Type, Climate Zone, Vintage
  - Measure-Specific Parameter that Impact Savings or Cost
    - ✦ Efficiency Tiers, Product Subcategories, Measure Application Type
  - Parameters that Do Not Impact Savings or Cost
    - ✦ Delivery Type

# Guideline 7: Program Data Collection

## Identify Inputs That Should Be Collected Through Programs

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- Example measure types

Measure Type	Reason to Collect Data	Sunset Period
Interim Measure	New measure with not enough existing implementation data	1 year
Accelerated Replacement	Existing conditions baseline	Judgement
Add-On Equipment / To-Code	Existing conditions baseline	Judgement
<u>Midstream / Upstream Programs</u>	<u>Document customer data (BT, CZ, HTR, etc)</u>	<u>EM&amp;V Feedback</u>

- Impose a “Sunset” date to reevaluate
  - Create a clear understanding of how the data will be evaluated and the next stage.

### Measure Details

**MEASURE NAME**

LED, High or Low Bay

**USE CATEGORY**

LG - Lighting

**STATEWIDE MEASURE ID**

SWLG011

**EFFECTIVE DATE**

February 19, 2020

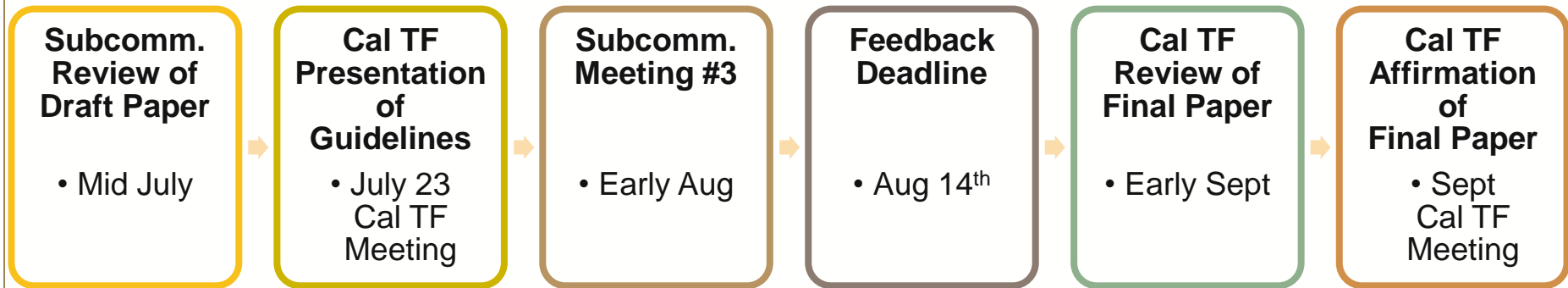
**SUNSET DATE**

December 31, 2020



# Next Steps

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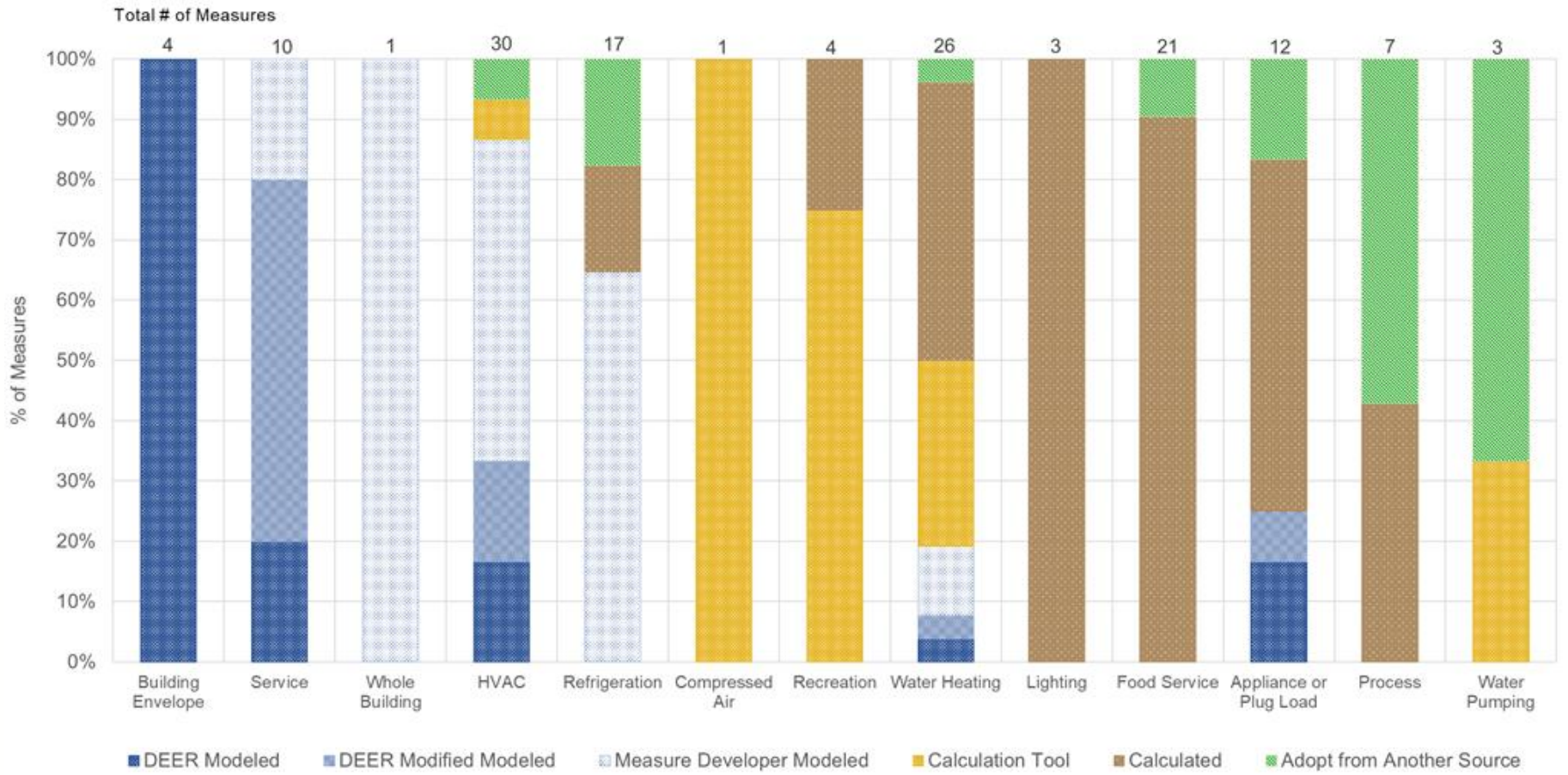


- If you can provide your feedback early (within July), we can work it into the presentation for the 3<sup>rd</sup> Subcommittee Meeting

# Appendix

- Current Methods Slides
  - Categorization
  - Permutation Analysis
  - Claims Analysis

# Current Methods - Categorization

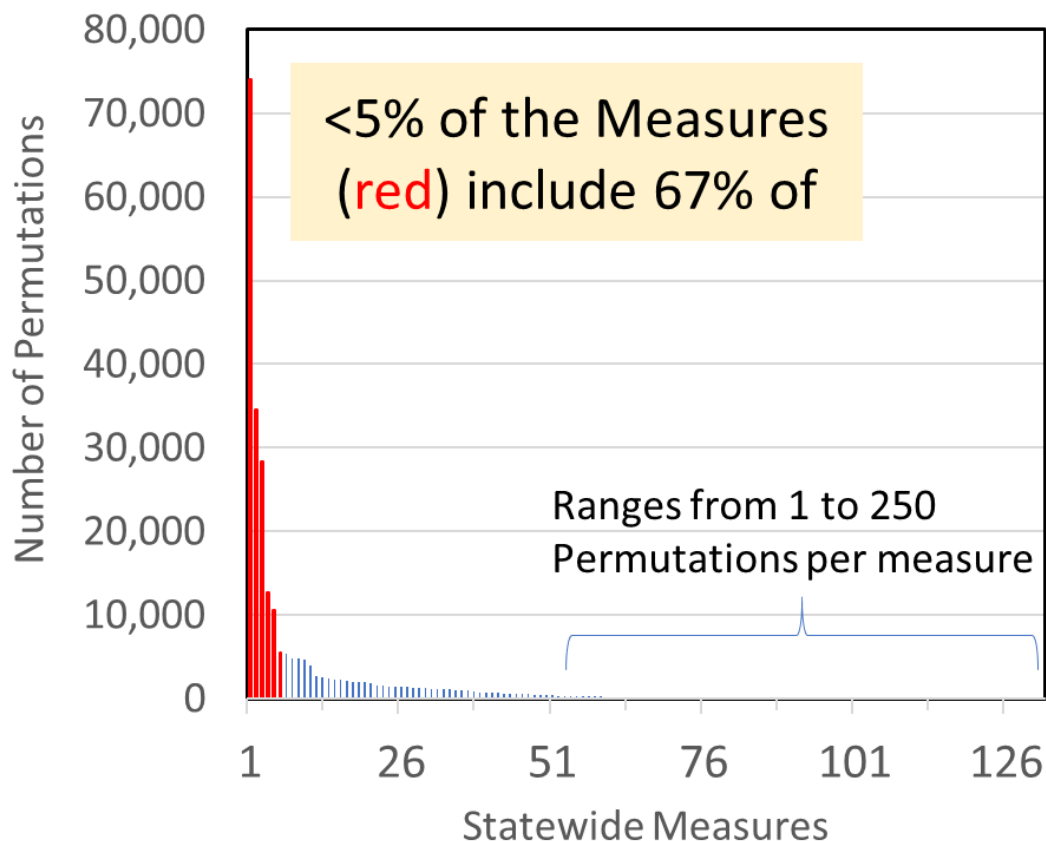


# Current Methods – Permutation Analysis

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## Permutation Number

(about 250,000 total permutations)



- Four factors dramatically effect the number of permutations

- Building Types (24)
- Climate Zones (16)
- Delivery Types (3)
- Offerings (varies)
- *Vintages (in the future)*

# Current Methods – Claims Data Analysis

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- Claims data from 2018 (Q1-Q4) correlated to statewide measures.
- No significant correlation to calculation methodology or permutation count.