

# Statewide Measure Development and QA/QC Guidelines

VERSION 2.0

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## Revision Log

Version	Publish Date	Description of Revisions	Owner
1.0	11/15/2018	Initial version.	Jennifer Holmes, Cal TF Staff
2.0	07/30/2020	Revisions for Guidelines for Data Fields: Added detail and clarifications for numerous fields.	Ayad Al-Shaikh, Cal TF Staff
		Added Revision Log	Jennifer Holmes, Cal TF Staff
		Revisions to Guidelines for Characterization Fields: Added detail and clarifications for numerous fields.	



## Preface

Historically, the California investor-owned utilities (IOUs) have developed and submitted new energy efficiency measures (the technical analysis, inputs, and impact estimates documented in “workpapers”) to the California Public Utilities Commission (CPUC) for approval. Prior to the consolidation of utility-specific deemed measures to statewide measures, energy efficiency measures met the specific needs of the “sponsor” or “lead” IOU, and measure developers and other IOU staff followed the internally-developed guidelines, review requirements, and governance procedures established by the IOU prior to submitting workpapers to the CPUC.

In late 2016, the CPUC staff directed the IOUs to develop *statewide workpapers* for new measures.<sup>1</sup> That is, the measure definition, technical analyses, inputs, applicable markets, building types, etc. need to represent the interests of “more than one” program administrator (PA).

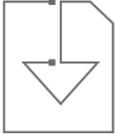
The California Technical Forum (Cal TF) Staff developed the *Statewide Measure Development and QA/QC Guidelines* (“Guidelines”) to ensure each statewide measure meets all data specification requirements and that measure development and QA/QC guidelines are established for measure developers and reviewers. The ultimate objective is to ensure high-quality measures that embody an appropriate level of technical rigor, represent industry best-practices, are well documented, and are transparent with respect to methods and inputs. In addition to clarifying expectations for the measure fields, the Cal TF website provides various tools and resources that are intended to increase measure quality, accuracy, transparency, and standardization (<http://www.caltf.org/tools>).

These Guidelines were developed based on extensive Cal TF Staff review of internal guidelines for measure workpaper development, reviews, and approvals provided by Southern California Edison (SCE), Pacific Gas and Electric (PG&E), and San Diego Gas and Electric (SDG&E). Cal TF Staff also reviewed the CPUC ex ante review team feedback on utility-developed workpapers, issues and trends that the CPUC ex ante review team identified with the IOU non-DEER workpapers, workpaper dispositions, preliminary and final workpaper reviews, abstract reviews, and the Energy Savings and Performance Incentive (ESPI) scoring reports for each IOU for year-end 2015 and mid-year 2016. Finally, these Guidelines were informed by Cal TF Staff experience with utility-developed workpapers and insights gained through the statewide measure consolidation efforts.

The Guidelines will be updated as necessary to reflect current regulatory direction and utility expectations for statewide deemed measures. The current version of the Guidelines can be accessed from the Cal TF website (<http://www.caltf.org/tools>).

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<sup>1</sup> Specifically, the guidance states that “[o]nly one workpaper may be submitted for each set of programs/measures which are adopted by more than [one] program administrator; such workpapers have been termed “statewide workpapers” and program administrators have been directed to collaborate on such efforts.”

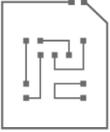


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# Overview

The *Statewide Measure Development and QA/QC Guidelines* (“Guidelines”) provides specific guidance for measure development, quality assurance and quality control (QA/QC), and management approval of a statewide deemed measure before the measure is advanced to review by the California Technical Forum (Cal TF) and California Public Utilities Commission (CPUC). These Guidelines are not intended to replace existing governance procedures within organizations that develop deemed measures; rather, they are intended to supplement any such existing procedures to ensure standardization and transparency of statewide measures in the eTRM.

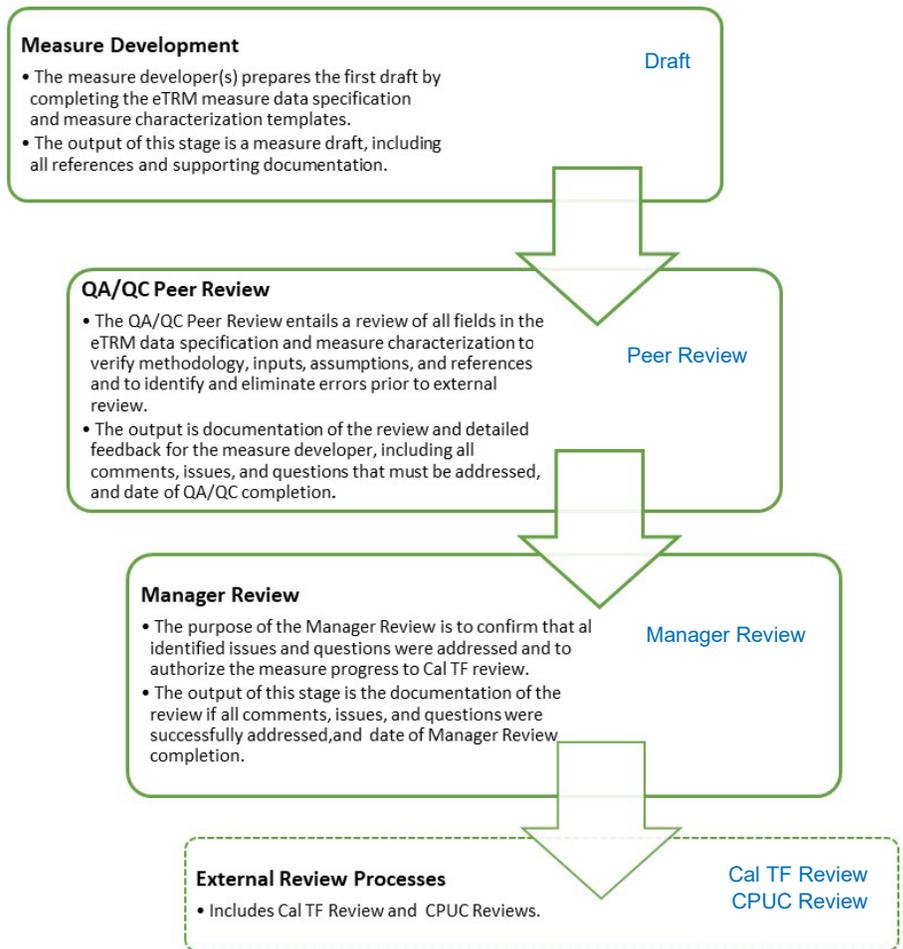
The Guidelines provided herein are applicable to the development of a new measure, as well as to the revision of an existing measure to reflect new measure offerings, state or federal code changes, dispositions and guidance issued by the CPUC Energy Division (or its ex ante review consultants), updated evaluation, measurement and verification (EM&V) or other research, and/or other changes.

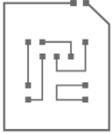
The measure development stages and the measure status in the approval workflow are depicted in the figure. The stages that are the subject of these Guidelines are the QA/QC Peer Review and Manager Review stages. After measure approval at the Manager Review stage, the measure will advance to the external review stages during which the measure will be reviewed by the Cal TF and then the CPUC. The final “external review” stages are not addressed in these Guidelines.

*A **Measure Developer** is a qualified engineer who has been assigned to develop the measure. Typically, a Measure Developer is an entry- to mid-level engineer with three to seven years of relevant experience with energy efficiency technologies and CA deemed measure requirements outlined in the Policy Manual and Statewide Rulebook.*

*A **Peer Reviewer** is an engineer in the same firm with similar experience-as required for the Measure Developer.*

*The **Manager** is a senior-level engineer or supervisor within the same organization as the Measure Developer and the Peer Reviewer.*





## Guidelines for Characterization Fields

This section provides a description of each field for the Characterization tab in the eTRM, as well as guidance for the Peer Review QA/QC. Collectively, the Characterization fields describe the measure and explain the data sources and analysis methods to derive energy use, energy and demand impacts, and other cost effectiveness metrics.

Resources and support for statewide measure development are available on the “Tools” page of the Cal TF website (<http://www.caltf.org/tools>). Measure developers can utilize the *Statewide Measure Characterization Template* and the *Style Guide* for specific guidelines for conventions and expectations for documentation for all assumptions, values, inputs, and references utilized for the measure.

### Effective Date

Measure Developer

The Effective Date is set to follow the CPUC approval of the measure. This date will be linked to the “Implementation Dates” that will be used for allowing claims, thus this date is critical. Consult with the lead IOU to determine the appropriate effective date.

Peer Review QA/QC

None.

### Sunset Date

Measure Developer

The Sunset Date is the date after which the measure is no longer eligible to be implemented in *any* California program.

A Sunset Date is required if specified in a disposition issued by the CPUC Energy Division or its consultants. A Sunset Date is not required but should be considered to trigger review of measure parameters and/or supporting data or assumptions.

Peer Review QA/QC

Sunset Date specified if required by disposition or if NTG ID is “All-Default<=2yrs” then Sunset Date equals 2 years after Effective Date.

### Technology Summary

Measure Developer

The Technology Summary presents a detailed technical description of the measure and its market potential, includes summaries of relevant studies (i.e., EM&V, market, baseline studies) that collectively document the development and demonstration of the technology and its applications. The Technical Summary should include justification if the measure is proposed as an Emerging Technology (ET) and/or if the ET net-to-gross ratio<sup>2</sup> is specified.

Peer Review QA/QC

Review for completeness.

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<sup>2</sup> California Public Utilities Commission (CPUC). 2012. *Decision 12-05-015 in the Order Instituting Rulemaking to Examine the Commission’s Post-2008 Energy Efficiency Policies, Programs, Evaluation, Measurement, and Verification, and Related Issues (R.09-11-014)*. Issued May 18, 2012. Ordering Paragraph 14.

This field should also include concise summaries of any relevant studies that were utilized to develop the base case and measure case specifications, and that informed the measure development (even if the study did not directly inform calculations).

## Measure Case Description

### Measure Developer

The Measure Case Description provides a narrative description of the measure case technology, key drivers of energy savings and demand reduction, and key attributes that distinguish the measure from other similar technologies. This field also specifies minimum efficiency requirements for the measure case and specifies all measure offerings.<sup>3</sup>

If a *fuel substitution* measure, the measure case description of a must comply with the *Fuel Substitution Technical Guidance for Energy Efficiency*.

Add the Offering ID value table to this section. For example, see the Measure Case Description for SWFS005-02.

#### Offering ID

STEAMER TYPE	STATEWIDE MEASURE OFFERING ID	MEASURE OFFERING DESCRIPTION
Electric	A	Efficient, Commercial Steamer, Electric
Gas	B	Efficient, Commercial Steamer, Gas

### Peer Review QA/QC

- Review for completeness.
- If a fuel substitution measure, confirm baseline meets requirements of *Fuel Substitution Technical Guidance*.
- Check that data sources and references to establish the measure case are appropriately cited.

## Base Case Description

### Measure Developer

The Base Case Description provides a narrative description of base case technology and specifies the base case for each measure offering. This description includes documentation and any insights related to industry standard practice (ISP) and codes and standards that could affect the base case for the measure.

If a *fuel substitution* measure, the baseline and base case description of a must comply with the *Fuel Substitution Technical Guidance for Energy Efficiency*.

Add the measure Base Case Descriptions value table to this section. For example, see the Base Case Description for SWFS005-02.

### Peer Review QA/QC

- Review for completeness.
- If a fuel substitution measure, confirm baseline meets requirements of *Fuel Substitution Technical Guidance*.
- Check that data sources and references to establish the baseline are appropriately cited.

<sup>3</sup> A **measure offering** is represented by a unique combination of measure determinants that are specifically defined for each measure. A high-efficiency clothes washer measure, for example, might include numerous measure offerings defined by combinations of configuration (front or top loading) and tub capacity.

## Base Case Descriptions

STEAMER TYPE	STATEWIDE MEASURE OFFERING ID	EXISTING DESCRIPTION	STANDARD DESCRIPTION
Electric	A	Standard, Commercial Steamer, Electric	Standard, Commercial Steamer, Electric
Gas	B	Standard, Commercial Steamer, Gas	Standard, Commercial Steamer, Gas

## Code Requirements

### Measure Developer

Standards and regulations can impact the assumptions and inputs of the energy savings and demand reduction calculations.

The Code Requirements field specifies all federal and/or state regulations that govern the minimum energy use requirements of the measure. This field includes a narrative description of the minimum requirements of applicable state and federal codes and a clear definition of the code efficiency level for the calculation of measure impacts. If state and/or federal codes do not apply, indicate which code is most relevant and why it does not apply.

Commonly referenced sources include (but are not limited to): California Building Energy Efficiency Standards (Title 24), California Appliance Efficiency Program Codes (Title 20), and Title 10 of the Code of Federal Regulations.

### Peer Review QA/QC

- Review for completeness.
- Confirm that the most recent versions of the State and Federal standards are referenced.
- Check that each referenced code specifies the relevant section/subsection(s) and effective date(s) are provided.
- Check that a complete citation of the applicable code reference(s) is(are) provided.
- If state and/or federal codes do not apply, "n/a" is indicated in the summary table.

## Program Requirements

### Measure Developer

The Program Requirements field provides all eligibility requirements for implementation of the measure. Elements of this field include:

*Measure Implementation Eligibility:* Designates the measure application type, delivery type, and sector combinations for which impacts have been developed.

Add the Implementation Eligibility value table to this section. For example, see the Program Requirements for SWFS005-02.

### Implementation Eligibility

MEASURE APPLICATION TYPE	DELIVERY TYPE	SECTOR	AVAILABLE?
NC	DnDeemDI	Ag	Yes
NC	DnDeemDI	Com	Yes
NC	DnDeemDI	Ind	Yes
NC	DnDeemed	Ag	Yes
NC	DnDeemed	Com	Yes
NC	DnDeemed	Ind	Yes

*Accelerated Replacement Requirements (if applicable):* Designates implementation requirements such as installation verification, inspection protocols, and preponderance of evidence (POE) requirements for accelerated replacement measures. For example, see Program Requirements for SWWH045-01.

*Fuel Substitution Measure Requirements (if applicable):* Summarizes the measure passes all parts of the Fuel Substitution Test and requirements defined in *Fuel Substitution Technical Guidance for Energy Efficiency*. For example, see the *Program Requirements for SWAP014-01*.

*Eligible Products:* Specifies attributes of eligible products, particularly that related to Measure Case Description

*Eligible Building Types and Vintages:* Specify all eligible building types and vintages and include explanation of building types that are particularly relevant for the measure and/or represent biggest opportunities for energy savings/demand reduction.

*Eligible Climate Zones:* Specify all eligible climate zones. Note that statewide measures should be eligible in all California climate zones. If not, explain.

### Peer Review QA/QC

- Review for completeness.
- Confirm accuracy of each installation type/delivery type/sector combinations in the Implementation Eligibility table.
- If AR measure application type is specified, confirm inclusion of all implementation requirements such as preponderance of evidence (POE) requirements.
- If a fuel substitution measure, confirm measure passes all parts of Fuel Substitution Test and that Fuel Substitution Calculator file is cited and provided as a reference.
- Confirm pre/post verification requirements and other requirements needed for application review, rebate processing, and evaluation.
- Review for correct designation of eligible products, building types and vintages, and climate zones.
- Confirm measure is applicable for statewide implementation (i.e., all California climate zones). If not, ensure rationale is provided and is defensible.

## Program Exclusions

Measure Developer

The Program Exclusions field shall state any rules or restrictions that limit the eligibility of the measure, such as markets, building types that are excluded for this measure. If no exclusions, state "None."

Peer Review QA/QC

- Review for completeness.

## Data Collection Requirements

Measure Developer

This field documents data requirements and timeline if additional data is needed to improve robustness and precision of measure energy and demand impact estimates and/or if required for future EM&V. This field shall also include a summary of sensitivity analyses that identify variables that are key drivers of measure impacts and/or cost effectiveness. Key considerations to identify future data collection needs are:

- The level of rigor and statistical significance of current data/estimates
- When current data will become out-of-date (e.g. costs due to changing market)
- Appropriateness of current data to the measure (i.e. geography, business type, technology, intended target market)
- If current data meets minimum industry best practices of "best available data"
- Additional data/information that is needed to substantiate, augment, or replace current data
- Availability of more recent studies/data (completed or in progress)
- How additional data might impact the inputs and the resultant energy and demand impact estimates. (For example, new measures may require data collection as part of program implementation or for longer-term studies, and products may start out as low impact but move to high impact later.)
- The timeline required for additional data collection (particularly in relation to measure updates)

Peer Review QA/QC

- Review for completeness.

## Use Category

Measure Developer

Specify the statewide end-use category that is applicable for the measure. Available end-use categories are available in the [UseCategory](#) shared measure parameter table of the eTRM.

Peer Review QA/QC

- Confirm the correct Use Category is assigned to the measure.

## Electric Savings

The Electric Savings and Gas Savings fields provide a detailed, comprehensive, and defensible explanation of methodology, inputs and assumptions to derive estimates of electric unit energy consumption (UEC) and unit energy savings (UES). The methodologies must be presented in a logical and consistent order and need to be understood by a variety of energy efficiency professionals.

The contents of this field will explain and cite all references for inputs, assumptions, and methods to derive UES values, including (but not limited to): EM&V reports, workpaper dispositions, and M&V studies.

Unit energy savings (UES) are typically estimated using one of the following four methods:

*Modeled Energy Use:* uses whole-building energy modeling to simulate energy use and energy/demand impacts. This approach includes variants: DEER, DEER-Modified, and Measure Developer Modeled

*Engineering Calculations:* use of widely accepted and relatively simple calculations based upon sound engineering principles to calculate energy and demand impacts.

*Calculation Tool:* the use of an industry-accepted software to calculate measure impacts, that typically require user-selected inputs to calculate impacts through embedded (protected) macros or formulae.

*Adopted from Another Source:* pertains to the adoption of estimated impacts *without modification* from an M&V study (such as an emerging technology study or a lab test report), custom project collections, or a study conducted for another purpose.

If applicable, the DEER Measure and DEER Run IDs should be the first source considered to substantiate energy savings estimates, unless the measure developer believes the relevant DEER values do not represent the “best available data.”

Even if the measure is not in DEER, DEER assumptions and methodologies must be used (i.e., hours of operation, interactive effects, baseline of similar measures).

Measure Developer

The general organization and guidelines for the Electric Savings field content for each method is outlined below.

*Modeled Approach*

Refer to the Statewide Measure Characterization Template for specific guidelines and documentation requirements.

*Engineering Calculations, Calculation Tool, and Adopted from Another Source Approaches:*

Narrative explanation of the methodology and key drivers (influential variables) of energy use.

Presentation of equations that represent the calculation of base and measure case UEC and UES. All variables are defined with units following each equation.

One or more tables with input values and assumptions (corresponding to all variables in the presented equations) for the calculation of savings, accompanied by a discussion of the source/derivation of each.

Sample calculation

Refer to the Statewide Measure Characterization Template for additional guidelines and documentation requirements.

Peer Review QA/QC

- The narrative thoroughly documents methods to derive the estimates of energy savings and demand impacts. All methods must be reproducible.
- The methodology is presented in a logical manner and will be easily followed and understood.
- The methodology represents industry best practices and accepted engineering and statistical principles.
- All UES estimates are normalized to the appropriate unit of measurement.
- A sample calculation is provided and accurate (if applicable).
- DEER values or methods are used, if possible.
- All data sources and references are appropriately cited
- All data sources and cited references and data files are provided.
- If Modeled Approach, the documentation follows the Modeled Savings Methodology Template in the Statewide Measure Characterization Template.
- If Modeled Approach, all simulations are documented and reproducible (if applicable).
- All calculations are accurate (if applicable).
- All calculations are reproducible (if applicable).
- If a normal replacement (NR) or accelerated replacement (AR) measure application type, the UES calculations are provided for both baseline periods.

**Peak Electric Demand Reduction**

Measure Developer

See [Electric Savings](#).

Peer Review QA/QC

- See [Electric Savings](#).
- Confirm application of correct peak demand period.
- If applicable, confirm correct CDF and reference is cited.

The demand reduction calculations/estimates must consider the peak demand period delineated by climate zone.<sup>4</sup>

If a coincident demand factor (CDF) is applied, include the calculation and the CDF value table; the reference for the CDF value must be cited and provided.

## Gas Savings

Measure Developer

See [Electric Savings](#).

Peer Review QA/QC

See [Electric Savings](#).

## Life Cycle

Measure Developer

The estimated useful life (EUL) describes an estimate of the median number of years that the measures installed under the program are still in place and operable. The remaining useful life (RUL) is an estimate of the median number of years that a measure being replaced under the program would remain in place and operable if the program intervention had not caused the replacement.

This field provides an explanation of the source and derivation of the EUL and the RUL, if applicable. If no other documentation or supporting information is available, RUL can be assumed to be 1/3 of the EUL.<sup>5</sup>

If an EUL or RUL does not exist for the measure, research and recommend an appropriate value. Documentation and rationale for recommended value(s) should be included in this Characterization field.

Include the Effective Useful File and Remaining Useful Life shared value table to this section.

If the measure application type is add-on equipment (AOE), include the Effective Useful Life and Remaining Useful Life – Host shared value table

For example, see Life Cycle for SWFS012-01.

Peer Review QA/QC

- Review for completeness.
- Confirm correct designation of measure and host equipment.
- Review for consistency of assigned EUL and RUL with “like” measures.
- Confirm original source of the EUL and basis for RUL (if applicable) are cited.
- Confirm all documentation of cited references are provided and verified.

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<sup>4</sup> California Public Utilities Commission (CPUC). 2018. *Resolution E-4952*. October 12. OP 1.

<sup>5</sup> California Public Utilities Commission (CPUC), Energy Division. 2013. *Energy Efficiency Policy Manual Version 5*. Page 32.

## Base Case Material Cost

Measure Developer

This field shall fully explain and cite all data sources and analytical methods used to estimate the base case material cost. The explanation should include the rationale for the analytical method chosen.

Sources for cost data include (but are not limited to):

- Cost studies by PAs or the CPUC consultants
- Program and invoice data from PAs and vendors
- Online retailers (web-scraped data) and point-of-sale data
- Wholesale costs supplemented by bulk purchase discounts, contractor mark-ups
- Warranties, and other factors that determine the retail price
- Construction estimation resources, such as RSMeans
- DOE or Title 24 rulemaking technical support documents

Analytical methods depend upon the characteristics of the cost data and include simple average, weighted average, median, lower-quartile, regression analysis, hedonic cost model.

Peer Review QA/QC

- Confirm material costs do not include installation labor or maintenance costs.
- Review for completeness and that the derivation of costs is fully explained.
- Determine that cost data sources and analysis methodology meet industry best practices.
- Confirm that costs are normalized to the correct unit of measurement.

## Measure Case Material Cost

Measure Developer

See [Base Case Material Cost](#)

If a fuel substitution measure, explain and document estimated infrastructure costs.

Peer Review QA/QC

- See [Base Case Material Cost](#).

## Base Case Labor Cost

Measure Developer

The Base Case Labor Cost field shall include an explanation and cite all data sources and research utilized to estimate the base case labor cost.

Note that for most new construction (NC) and normal replacement (NR) measure application types, the installation labor cost for the base and measure cases will be the same and thus not estimated. If so, the measure developer should include a statement to note as such.

Peer Review QA/QC

- Review for completeness and that the derivation of costs is fully explained.
- Determine that labor cost sources and analysis methodology meet industry best practices.
- Costs are normalized to the correct unit of measurement.

## Measure Case Labor Cost

Measure Developer

See [Base Case Labor Cost](#)

Peer Review QA/QC

- See [Base Case Labor Cost](#)

## Net-to-Gross (NTG)

### Measure Developer

This field provides a generic definition of the NTG ratio and includes an explanation of derivation and source of the NTG ratio(s) specified for the measure.

This section needs to include all the applicable Net to Gross Ratio shared value tables:

- Net to Gross Ratio
- Net to Gross Ratio – Nonresidential
- Net to Gross Ratio – Residential

For example, see Net-to-Gross for SWFS005-02.

### Net to Gross Ratio – Nonresidential

NET TO GROSS RATIO ID	NTGRKWH (RATIO) <span style="border: 1px solid green; padding: 2px;">R103</span>	NTGR THERM (RATIO) <span style="border: 1px solid green; padding: 2px;">R103</span>
Agric-Default>2yrs	<b>0.6000</b>	<b>0.6000</b>
Com-Default>2yrs	<b>0.6000</b>	<b>0.6000</b>
Ind-Default>2yrs	<b>0.6000</b>	<b>0.6000</b>

### Peer Review QA/QC

- Confirm specification of the correct and approved NTG ratio(s).
- Confirm original source of the NTG ratio(s) is(are) cited.
- Confirm all documentation of cited references are provided and verified.

## Gross Savings Installation Adjustment (GSIA)

### Measure Developer

This field includes an explanation of the derivation/source of the gross savings installation adjustment (GSIA) rate and the justification for the measure.

The GSIA factor combines the *realization rate* and the *installation rate*. It is dependent on the measure technology and how the measure is delivered.

The installation rate is the ratio of verified installations of a measure to the number of claimed installations. Typically, the installation rates applied on an ex ante basis are based upon previous ex post evaluations.

The realization rate represents the ratio of achieved impacts to predicted impacts.

Include all the applicable Gross Savings Installation Adjustments shared value tables:

- Gross Savings Installation Adjustments
- Gross Savings Installation Adjustments – Default

For example, see Gross Savings Installation Adjustment (GSIA) for SWFS005-02.

### Gross Savings Installation Adjustments – Default

GSIA ID	GSIA (RATIO) <span style="border: 1px solid green; padding: 2px;">R105</span>
Def-GSIA	<b>1.0000</b>

### Peer Review QA/QC

- Ensure specification of the correct and approved GSIA factor(s).
- Confirm original source of the GSIA factor(s) is(are) cited.
- Confirm all documentation of cited references are provided and verified.

## Non-Energy Impacts

Measure Developer

This field explains the methodology and associated inputs and assumptions to derive non-energy impacts, such as water savings. For projects that also save water, the [Water-Energy Calculator](#) must be used to determine the embedded energy savings that can be claimed and develop a separate water energy nexus workpaper.

Completion of this field should follow guidance provided for the [Electric Savings](#) field.

If non-energy impacts have not been derived or are not applicable, this field should state “Non-energy impacts have not been derived for this measure.” or “Non-energy impacts are not applicable for this measure.”

Peer Review QA/QC

See [Electric Savings](#).

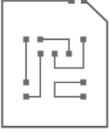
## DEER Differences Analysis

Measure Developer

This field provides a summary table of DEER-based inputs and methods, and the rationale for inputs and methods that are not DEER-based.

Peer Review QA/QC

Review the DEER Difference Summary table for completeness and consistency with inputs and methods adopted to develop the measure.



# Guidelines for Data Fields

This section provides a description of and peer review QA/QC guidance for each data field needed to generate the permutations for a measure. Many data fields have a companion field in the Characterization that explains the source, inputs, and methodology to derive the data value. For ease of navigation, the data fields are presented in the following groupings:

- [Measure Summary](#)
- [Permutation Characterization](#)
- [Common Measure Parameters](#)
- [First Baseline Energy Savings](#)
- [Second Baseline Energy Savings](#)
- [Costs](#)

- [Life Cycle](#)
- [Energy Use](#)
- [Implementation Parameters](#)
- [Cost Effectiveness Parameters](#)
- [Other](#)

## Measure Summary

### Measure Detail ID

#### Measure Developer

This field is a unique identifier for each permutation. This field is populated with an auto-generated identifier created as a concatenation of the Statewide Measure ID, Version, and all other parameters that have been used in this measure (e.g. SWFS001-NC-Each-Any-Any-Any-IOU-Any-NonUpStrm-Standard-IOU-Deemed-Cook equip-OvenConv-FoodServ-Cooking-Annual-Any-Gas-Half-None-Def-GSIA-None-Ag).

The Measure Detail ID could include a varying number of terms depending on the measure. Some measures may not require a “Host EUL”, for example, or may have more measure-specific parameter lists to define offerings.

#### Peer Review QA/QC

None.

### Statewide Measure ID

#### Measure Developer

The Statewide ID identifies a unique measure and is based on the [Use Category](#).

The nomenclature of this identifier is shown below. This convention is tied to CEDARS categories.

The Statewide Measure ID is auto-generated by the eTRM to ensure that numbers do not overlap.

#### Peer Review QA/QC

Review the Statewide ID and verify that the correct “Use Category” was chosen for the measure

Example	SWAP001-00			
Statewide Designator	Use Category	Measure Number	Version Designator	Version Number
SW	AP - Appliance & Plug Loads BE - Building Envelope CR - Commercial Refrigeration CA - Compressed Air FS - Food Service HC - HVAC LG - Lighting MI - Miscellaneous PR - Process RE - Recreation SV - Service WB - Whole Building WH - Service & Domestic Hot Water WP - Water Pumping / Irrigation	Starts at 001 for the first measure of the end use category. Assigned sequentially to each unique measure of the end use category.	-	Starts at 01 for the first "Published" version of a measure. Assigned sequentially to each subsequent version.

## Measure Name

### Measure Developer

The convention for designating a measure name is provided below. The measure name includes a short concise descriptor of the technology, with sector, fuel type, or other attributes appended *only* if necessary to distinguish the measure from other available products.

Use commas to separate technology and any appended attributes.

The Measure Name should be singular unless it is only installed in multiple quantities. For example, "Boiler, Commercial" "Floating Suction Controls, Multiplex" "Low-flow Pre-rinse Spray Valve".

### Peer Review QA/QC

- Confirm the measure name is consistent with guidance.

Root technology, Sector, Fuel Type, Fuel Substitution Type			
Root technology	Fuel Type	Sector	Fuel Substitution Type
Technology (noun, singular). Use plural only if more than one is always installed. Only use descriptive or modifying words if necessary to clarify its intended use as add-on equipment, or to distinguish the measure from other measures or from other available technologies. Do not use "Efficient" or "Energy Efficient". ENERGY STAR is necessary in name only if all offerings are ENERGY STAR. No abbreviations. No acronyms.	Fuel type should only be specified in the measure name if necessary to distinguish from another similar measure and/or if the measure excludes a fuel type that is available in the market.  It is not necessary to specify a fuel type if the technology is <i>only</i> available for that fuel type.  Do not specify both electric and gas or "all".	Sector should only be specified in the measure name if necessary to distinguish from another similar measure and/or if excluding specific sectors.  Do not specify all sectors or "all".	Fuel Substitution should only be specified if the measure is a fuel substitution measure.

## Offering ID

Measure Developer

Offering ID is a unique identifier for each unique measure offering, based on unique combinations of measure determinants defined for each measure.

Peer Review QA/QC

- Verify that Offering IDs are created for each unique measure offering

## Offering ID Description

Measure Developer

Offering ID Description provides an understanding of what this group of permutations includes. This field could be used by program implementers and/or IOUs to use in product literature/program catalogue(s) for their customers.

Peer Review QA/QC

- Verify that Offering ID Description clearly describe the scope of each offering to a non-technical user.

# Permutation Characterization

## First Base Case Description

### Measure Developer

Concatenated description based upon permutation parameters; Description should uniquely describe each permutation with parameters that vary impacts (i.e., savings, cost, life, net results, cost effectiveness).

For example, a First Base Case Description for the Residential Low-flow Showerhead (SWWH002-02) would be “Showerhead, 2.25 gpm, Electric, DMO, AOE, CZ01”. The description for Commercial Steamer (SWFS005-02) is simply “Standard Commercial Steamer, Electric” since savings or cost do not vary by building type, measure application type, or climate zone.

The correct first base case description must be evaluated for each measure application type specified in the measure permutation. The first baseline is established by the measure application type as either the existing condition or the code/industry standard practice.

Measure Application Type	First Baseline
New Construction (NC)	Code/ Standard Practice
New Replacement (NR)	Code/ Standard Practice
Accelerated Replacement (AR)	Existing Condition
Add-on Equipment (AOE)	Existing Condition
Behavior Retrocommissioning, Operational (BRO-xxx)	Existing Condition
Building Weatherization (BW)	Existing Condition

*Existing Description:* Description of the existing condition/equipment that is used to characterize the 1st baseline of AR, AOE, and BRO measure application types. For Residential Low-Flow Showerhead, the existing condition would be “Inefficient Showerhead, 2.25 gpm”. See SWWH002-02 Base Case Descriptions value table.

*Standard Description:* Description of the code / industry standard practice that is used to characterize the 1st baseline of NR and NC measure application types. For the Residential Low-Flow Showerhead, the standard description would be “Title 20 Code Showerhead, 1.8 gpm”. See SWWH002-02 Base Case Descriptions value table.

### Peer Review QA/QC

- Review for completeness and consistency with guidance.

## Second Base Case Description

### Measure Developer

Concatenated description based upon permutation parameters. Leave the field blank if no second baseline exists for the measure (i.e., only used for accelerated replacement, AR). While all fields must be mapped, a blank field requires the “Null Values” value table to be imported, and one can choose the “Null Values: Blank” option.

For AR, second base case is the code/industry standard practice. For example, a second base case description for the AR Residential Low-Flow Showerhead would be “Showerhead, 1.8 gpm, Electric, DMO, AR, CZ01”. All other MATs have a blank field. See SWWH002-02 Measure Offerings value table.

### Peer Review QA/QC

- Review for completeness and consistency with guidance.

## Measure Case Description

### Measure Developer

Concatenated description based upon permutation parameters. The description should uniquely describe each permutation with parameters that vary impacts (i.e., savings, cost, life, net results, cost effectiveness).

For example, a measure case description for Residential Low-Flow Showerhead would be “Efficient Flow Control Valves, 1.0 gpm, Electric, DMO, AOE, CZ01”. See SWWH002-02 Measure Offerings value table.

### Peer Review QA/QC

- Review for completeness and consistency with guidance.

## Common Measure Parameters

### Measure Application Type

### Measure Developer

Measure application type, also called installation type, classifies an energy efficiency activity and dictates the appropriate baseline treatment, measure effective useful life, eligibility, documentation requirements, and cost calculation methodology.

### Peer Review QA/QC

- Verify that all proposed measure application types are specified.

## Building Type

### Measure Developer

A building type refers to the prototypical building that is meant to represent an average building in California.

The 'Com' and 'Res' building types represent the weighted average of *all* commercial or *all* residential building types, respectively.

'Any' should be used to specify measures for which savings do not depend upon Building Type.

Only Building Type options on the CEDARS building type list are eligible; do not assign "non-standard" building types.

### Peer Review QA/QC

- Verify consistency with guidance for the specific building type identified. Specifically, check that sector is consistently defined.
- If the weighted average Building Type is assigned, (Com or Res) confirm if appropriate.
- If 'Any' is assigned, confirm if appropriate and that savings of the measure do not depend on building type.

## Building Vintage

### Measure Developer

Describes the construction of the building, which is typically limited to existing (Ex) or new (New). However, existing buildings are representative of a weighted average of code-based vintage constructions that could also be represented as "old" or "rec".

"Any" should be used to describe cases for which savings do not depend upon Vintage. (A limited number of measures may warrant a sub-vintage category.)

"Any" is not a valid vintage option for the shared interactive effects (IE) tables. If calculations require the shared IE tables even the measure building vintage must be "Ex", "New", "old", or "rec" even if savings do not vary by vintage.

If a measure has multiple measure application types and multiple vintages, create the MAT – Vintage exclusion table. See SWWH002-02 MAT – Vintage exclusion tables.

### Peer Review QA/QC

- Verify consistency with guidance: building construction existing (Ex) or new (NC) specified, for existing buildings specific building vintage or sub-vintage identified or "Any" used in cases where savings do not depend on building type.

MAT – Building Vintage Exclusion Table

MAT	Vintage
NC	New, Any
NR	Ex, Any
AR	Ex
AOE	Ex
BRO-xxx	Ex
BW	Ex

## Building Location

### Measure Developer

Describes the location of the building according to a California climate zone within a utility service territory. The zone that represents a weighted average of the climate zones is referred to as IOU. The term 'Any' should be used to describe cases for which savings are not weather dependent.

### Peer Review QA/QC

- Verify correct designation of applicable climate zones.
- Verify that values are available for all climate zones. If values are not available for all climate zones, ensure rationale is documented in Program Requirements field.

## Normalized Unit

### Measure Developer

Savings and costs are expressed by a unit of measure referred to as the Normalized Unit. The Normalized Unit should be consistent across similar measures in a use category. See Technology Type Section.

### Peer Review QA/QC

- Confirm the normalizing unit is appropriate for the measure.
- Confirm the normalizing unit is consistent with similar measures in the use category

## Sector

### Measure Developer

Sector refers to a group of customers that share common characteristics and barriers upon which energy efficiency strategies are based. The primary sectors are consistent with CEDARS: Residential, Commercial, Industrial, and Agricultural.

Sector must agree with the measure building type(s), as shown in the table below. For measures with building types spanning multiple sectors, a "Sector – Building Type" exclusion table is required. See SWHC023-02 BT-Sector exclusion table.

Building Type - Sector Exclusion Table

Sector	Building Type
(any sector)	Any
Agricultural	AgOth, ALF, APF, GHs, VPr
Commercial	Asm, Cnc, Com, CRe, Dat, ECC, EPr, ERC, Ese, EUD, EUn, Fhc, Gro, Gst, HGR, Hsp, Htl, Mtl, Nrs, OfL, OfS, RFF, RSD, Rt3, RtL, RtS, SCn, Sun, Sup, WRf
Industrial	IAT, IBM, ICP, ICS, IFP, IGM, IGP, IndOth, IPe, IPH, IPM, MBT, MCE, MLI, MPF, WWT
Residential	DMo, MFm, MFmCmn, Res, SFm, SMO

### Peer Review QA/QC

- Verify applicable sector(s) are properly identified.

## Program Administrator Type

### Measure Developer

This field designates if permutations are applicable specifically to an 'IOU' or 'POU'. If impacts do not vary by IOU/POU area, designate 'Any'.

### Peer Review QA/QC

- Verify properly identified.
- If 'IOU' or 'POU' is designated, confirm impacts differ across IOU/POU territories.

## Program Administrator (optional)

### Measure Developer

Note that this field is optional and is distinct from Program Administrator Type.

This field designates if permutations are applicable to certain California IOUs or RENs (i.e., PA dependent).

In general, statewide measures are intended to be PA-independent, so all efforts should be made to use PA = "Any" values. Building Location and GSIA are two of the more common parameters that could require a PA-dependent permutation.

For example, if the measure impact varies by climate zone (i.e. Building Location = one of the 16 climate zones), then the program administrator is "Any". If the measure impact is a weighted average of climate zones (i.e. Building Location = "IOU"), then specify the utility territory of the weighted value. See SWAP003-01 PA – CZ exclusion table.

### PA – Building Location Exclusion Table

PA	Building Location
Any	CZ01 – CZ16
PGE	IOU
SCE	IOU
SCG	IOU
SDG	IOU

### Peer Review QA/QC

- Verify properly identified.
- Ensure that PA dependent permutations are required.

## First Baseline Energy Savings

*Note: values for kWh are expressed with two significant digits; kW and therm values are expressed with four significant digits.*

### First Baseline – Peak Electric Demand Reduction (kW)

#### Measure Developer

Peak demand reduction per normalized unit during first baseline period. Should conform to the California peak demand definition.

This field is populated with a calculated value. If possible, demand reduction should be calculated as the difference between baseline and measure case unit demand values.

Methodology is included in the [Peak Electric Demand Reduction](#) Characterization field.

#### Peer Review QA/QC

- Verify peak demand reduction calculation is correct and correct values are aligned in the correct permutation.
- If a fuel substitution measure, confirm "0" demand reduction, as per *Fuel Substitution Technical Guidance*.

### First Baseline – Electric Savings (kWh/yr)

#### Measure Developer

Annual electric UES per normalized unit during first baseline period.

This data field is populated with a calculated value. If possible, savings should be calculated as the difference between baseline and measure case electric UEC values.

Methodology is included in the [Electric Savings](#) Characterization field.

#### Peer Review QA/QC

- Verify UES calculation is correct and correct values are aligned in the correct permutation.

### First Baseline – Gas Savings (therms/yr)

#### Measure Developer

Annual gas UES per normalized unit during first baseline period.

This data field is populated with a calculated value. If possible, savings should be calculated as the difference between baseline and measure case gas UEC values.

Methodology is included in the [Gas Savings](#) Characterization field.

#### Peer Review QA/QC

- Verify UES calculation is correct and correct values are aligned in the correct permutation.

## Second Baseline Energy Savings

*Note: values for kWh are expressed with two significant digits; kW and therm values are expressed with four significant digits.*

### Second Baseline – Peak Electric Demand Reduction (kW)

#### Measure Developer

Peak demand reduction per normalized unit during second baseline period. Should conform to the California peak demand definition.

This data field is populated with a calculated value. If possible, demand reduction should be calculated as the difference between baseline and measure case unit demand values.

The value should equal "0" for a measure without a second baseline (NR, AOE, and NC). The value mapped should be from the "Null Values" shared data table, called "Null Values: Energy Rate".

Methodology is included in the [Peak Electric Demand Reduction](#) Characterization field.

#### Peer Review QA/QC

- Verify peak demand reduction calculation is correct and correct values are aligned in the correct permutation.
- If a fuel substitution measure, confirm "0" demand reduction, as per *Fuel Substitution Technical Guidance*.

## Second Baseline – Electric Savings (kWh/yr)

### Measure Developer

Annual electric UES per normalized unit during second baseline period.

This data field is populated with a calculated value. If possible, savings should be calculated as the difference between baseline and measure case electric UEC values.

The value should equal "0" for measure without a second baseline (NR, AOE, and NC). The value mapped should be from the "Null Values" shared data table, called "Null Values: Energy-Electric".

Methodology is included in the [Electric Savings](#) Characterization field.

### Peer Review QA/QC

- Verify UES calculation is correct and correct values are aligned in the correct permutation.

## Second Baseline – Gas Savings (therms/yr)

### Measure Developer

Annual gas UES per normalized unit during second baseline period.

This data field is populated with a calculated value. If possible, savings should be calculated as the difference between baseline and measure case gas UEC values.

The value should equal "0" for measure without a second baseline (NR, AOE, and NC). The value mapped should be from the "Null Values" shared data table, called "Null Values: Energy-Gas".

Methodology is included in the [Gas Savings](#) Characterization field.

### Peer Review QA/QC

- Verify UES calculation is correct and correct values are aligned in the correct permutation.

## Costs

### First Baseline Base Case Labor Cost (USD)

#### Measure Developer

Base Case labor cost per normalized unit applicable to first baseline period. A standard table format is used to include this data.

Cost is equal to "0" if an existing conditions base case is used to represent full measure cost (for example, delivery type of Direct Install or measure application types of AR, AOE, BRO-RCx, or BW).

A description of the cost data is included in the [Base Case Labor Cost](#) Characterization field.

#### Peer Review QA/QC

- Confirm labor cost data meets "best available data" guidelines (i.e., valid source, age of data, size of sample, etc.)
- Verify that data is rounded to the appropriate precision.
- When the normalizing unit is very small, the limit of 2 decimal places may need to be overridden by changing the units from "USD" to "none" in the cost table.

Type text here

### First Baseline Base Case Material Cost (USD)

Measure Developer

Base Case material cost per normalized unit applicable to first baseline period. A standard table format is used to include this data.

Cost is equal to "0" if an existing conditions base case is used to represent full measure cost (for example, delivery type of Direct Install or measure application types of AR, AOE, BRO-RCx, or BW).

A description of the cost data is included in the [Base Case Material Cost](#) Characterization field as a reference.

Peer Review QA/QC

- Verify that data is rounded to the appropriate precision.
- When the normalizing unit is very small, the limit of 2 decimal places may need to be overridden by changing the units from "USD" to "none" in the cost table.

### First Baseline Incremental Cost (USD)

Measure Developer

Calculated value of incremental cost per normalized unit (Measure cost - 1st base case cost).

This data field is populated with a calculated value.

Peer Review QA/QC

- Verify incremental cost calculation is correct. Note that the incremental cost matches the full measure cost when the base case cost is zero.

### Measure – Labor Cost (USD)

Measure Developer

Measure labor cost per normalized unit. (Generally, Measure and Base Labor cost are identical, in which case they would cancel out of the incremental cost calculation. However, values should be documented.) Standard table format is used to include this data.

A description of the cost data is included in the [Measure Case Labor Cost](#) Characterization field.

Peer Review QA/QC

- Verify correct labor cost(s).
- Verify that data is rounded to the appropriate precision.
- When the normalizing unit is very small, the limit of 2 decimal places may need to be overridden by changing the units from "USD" to "none" in the cost table.

### Measure – Material Cost (USD)

Measure Developer

Measure material cost per normalized unit. A standard table format is used to include this data.

A description of the cost data is included in the [Measure Case Material Cost](#) Characterization field.

Peer Review QA/QC

- Verify correct material cost(s).
- Verify that data is rounded to the appropriate precision.
- When the normalizing unit is very small, the limit of 2 decimal places may need to be overridden by changing the units from "USD" to "none" in the cost table.

## Second Baseline – Labor Cost (USD)

### Measure Developer

Base Case labor cost per normalized unit applicable to second baseline period.

Second baseline cost is only required for the AR measure application type. A Standard table format is used to include this data. When no second baseline cost is required, the value mapped should be from the “Null Values” shared data table, called “Null Values: Cost”.

Cost data is described in the [Base Case Labor Cost](#) Characterization field.

### Peer Review QA/QC

- Verify correct labor cost(s).
- Verify that data is rounded to the appropriate precision.
- When the normalizing unit is very small, the limit of 2 decimal places many need to be overridden by changing the units from “USD” to “none” in the cost table.

## Second Baseline – Material Cost (USD)

### Measure Developer

Base Case material cost per normalized unit applicable to second baseline period.

Second baseline cost is only required for the AR measure application type. A standard table format is used to include this data. When no second baseline cost is required, the value mapped should be from the “Null Values” shared data table, called “Null Values: Cost”.

Cost data and methodology confirmed in QA/QC of [Base Case Material Cost](#) Characterization field.

### Peer Review QA/QC

- Verify correct material cost.
- Verify that data is rounded to the appropriate precision.
- When the normalizing unit is very small, the limit of 2 decimal places many need to be overridden by changing the units from “USD” to “none” in the cost table.

## Second Baseline – Incremental Cost (USD)

### Measure Developer

Calculated value of incremental cost per normalized unit (Measure cost - 2nd base case cost).

This data field is populated with a calculated value. The value should equal "0" for measure without a second baseline (NR, AOE, NC BRO-RCx, and BW). When no second baseline cost is required, the value mapped should be from the “Null Values” shared data table, called “Null Values: Cost”.

### Peer Review QA/QC

- Verify correct calculation of incremental cost.

## Locational Cost Adjustment ID

### Measure Developer

Identifies the locational cost adjustment by category. If combined with a Climate Zone value, this ID will separately specify adjustments to material and labor. eTRM costs currently do not use this field. If this field is not applicable, "None" should be entered.

*eTRM does not currently utilize this field.*

### Peer Review QA/QC

- None.

*eTRM does not currently utilize this field.*

# Life Cycle

## Effective Useful Life ID

Measure Developer

The EUL describes an estimate of the median number of years that the measures installed under the program are still in place and operable.

This field specifies the identifier that maps to the appropriate effective useful life (EUL) value of the measure.

EUL ID can vary by measure specific parameters (i.e., fuel type, use category, and technology type). See the description column of the Effective Useful Life ID parameter.

Peer Review QA/QC

- Verify the proper EUL ID has been specified

## Remaining Useful Life ID

Measure Developer

The RUL is an estimate of the median number of years that a measure being replaced under the program would remain in place and operable if the program intervention had not caused the replacement.

This field specifies the identifier that maps to the appropriate remaining useful life (RUL) of the energy efficiency measure. This field will be used to calculate the life in years that can be claimed so that the calculation is transparent to a user.

For an AR measure application type, the RUL ID refers to the measure equipment.

For AOE and some retro-commissioning (BRO-RCx) measure application types, the RUL ID refers to the host equipment.

For other measure application types (NR, NC), the field should be left blank (i.e., use the “Null Values” shared data table with the “Null Values: Blank” option) because the RUL is not applicable.

If the measure includes NR, NC, AR, and AOE measure application types, create a Host EUL ID value table and enter the correct ID for each MAT (Host EUL ID for AOE, RUL ID for AR, and blank for NC and NR). For example, see SWPR007-01 Host EUL ID value table. The “ID” column can then be mapped to the appropriate field.

Peer Review QA/QC

- Verify the proper RUL ID has been specified.
- If a new RUL is proposed, review data and recommended value. New values will not be available from the Shared Data tables until the new ID is approved by the CPUC.

### Host EUL ID

[VIEW TABLE FULLSCREEN](#)

MEASURE APPLICATION TYPE	ID
AOE	PrcHt-StmBlr
NC	

If appropriate RUL ID does not exist for the measure, research and recommend an appropriate value. Include documentation and rationale for selection in the [Life Cycle](#) Characterization field.

## First Baseline – Life Cycle (yr)

### Measure Developer

Measure life, in years, applicable to first baseline period.

For NR, NC, BRO, and BW measure application types the value is equal to the EUL value.

For AR measure application type the value is equal to the RUL value.

For AOE measure application type the value should be calculated as the minimum of the RUL of the Host equipment and the EUL of the Measure equipment.

In special cases, such as lighting and some HVAC measures, the baseline life is dependent upon the annual hours of use that is linked to the building type. For these cases, calculated approaches are required.

Measure life source and estimation approach is included in the [Life Cycle](#) Characterization field.

### Peer Review QA/QC

- Verify correct measure life is assigned to the measure

## Second Baseline – Life Cycle (yr)

### Measure Developer

Measure life, in years, applicable to the measure. For application types that include a RUL in the first baseline period, the second baseline period is defined by the difference in these terms (EUL-RUL).

Measure life source and estimation approach is included in the [Life Cycle](#) Characterization field.

This field is only valid for the AR measure application type and is mapped to a calculation (i.e. Second baseline life). The value should equal "0" for measures without a second baseline (NR, AOE, and NC). For example, see SWHC047-01 Calculation tab. Use the "Null Values" shared data table with the "Null Values: Useful Life" option.

### Peer Review QA/QC

- Verify correct measure life is assigned to the measure.

## Energy Use

### First Baseline – UEC kW (kW)

#### Measure Developer

This field includes the calculated peak demand value per normalized unit during first baseline period. The calculation of this value should conform to the California peak demand period definition.

If only whole-building data is available, effort should be made to isolate the usage associated with the specific measure. If this is not possible, UECKWbase1 should equal UnitkW1stBaseline (in other words, the base case usage should be set equal to the demand reduction).

This data field is populated with a calculated value or mapped from a value table. Naming conventions exist for various measure end-uses.

#### Peer Review QA/QC

- Validate the UEC calculation is correct and the calculation or table is mapped correctly.
- Ensure units are consistent with normalized unit.

### First Baseline – UEC kWh (kWh/yr)

#### Measure Developer

This field includes the calculated UEC of annual electric energy usage per normalized unit during first baseline period.

If only whole-building data is only available, effort should be made to isolate the usage associated with the specific measure. If this is not possible, UECkWhbase1 should equal UnitkWh1stBaseline (in other words, the base case usage should be set equal to the savings).

This data field is populated with a calculated value or mapped from a value table. Naming conventions exist for various measure end-uses.

#### Peer Review QA/QC

- Validate the UEC calculation is correct and the calculation or table is mapped correctly.
- Ensure units are consistent with normalized unit.

### First Baseline – UEC therm (therms/yr)

#### Measure Developer

This field includes the calculated UEC of annual gas usage per normalized unit during first baseline period.

If only whole-building data is only available, effort should be made to isolate the usage associated with the specific measure. If this is not possible, UECthermbase1 should equal Unittherm1stBaseline (in other words, the base case usage should be set equal to the savings).

This data field is populated with a calculated value or mapped from a value table. Naming conventions exist for various measure end-uses.

#### Peer Review QA/QC

- Validate the UEC calculation is correct and the calculation or table is mapped correctly.
- Ensure units are consistent with normalized unit.

### Second Baseline – UEC kW (kW)

#### Measure Developer

The second baseline is only applicable to AR measure application types. In all other case, the “Null Values” shared data table should be used with the “Null Values: Energy Rate” option.

This field includes the calculated peak demand value per normalized unit during second baseline period. The calculation of this value should conform to the California peak demand definition.

If only whole-building data is only available, effort should be made to isolate the usage associated with the specific measure. If this is not possible, UECkWbase2 should equal UnitkW2ndBaseline (in other words, the base case usage should be set equal to the demand reduction).

This data field is populated with a calculated value.

#### Peer Review QA/QC

- Validate the UEC calculation is correct and the calculation or table is mapped correctly.
- Ensure units are consistent with normalized unit.
- If no second baseline confirm value is '0'.

## Second Baseline – UEC kWh (kWh/yr)

### Measure Developer

The second baseline is only applicable to the AR measure application type. In all other case, the “Null Values” shared data table should be used with the “Null Values: Energy-Electric” option.

This field includes the calculated annual electric UEC per normalized unit during second baseline period.

If only whole-building data is only available, efforts should be made to isolate the usage associated with the specific measure. If this is not possible, UECkWhbase2 should equal UnitkWh2ndBaseline (in other words, the base case usage should be set equal to the savings).

This data field is populated with a calculated value or mapped from a value table. Naming conventions exist for various measure end-uses.

### Peer Review QA/QC

- Validate the UEC calculation is correct and the calculation or table is mapped correctly.
- Ensure units are consistent with normalized unit.
- If no second baseline confirm value is '0'.

## Second Baseline – UEC therm (therms/yr)

### Measure Developer

The second baseline is only applicable to the AR measure application type. In all other case, the “Null Values” shared data table should be used with the “Null Values: Energy-Gas” option.

This field includes the calculated annual gas UEC per normalized unit during second baseline period.

If only whole-building data is only available, efforts should be made to isolate the usage associated with the specific measure. If this is not possible, UECthermbase2 should equal Unittherm1ndBaseline (in other words, the base case usage should be set equal to the savings).

This data field is populated with a calculated value or mapped from a value table. Naming conventions exist for various measure end-uses.

### Peer Review QA/QC

- Validate the UEC calculation is correct and the calculation or table is mapped correctly.
- Ensure units are consistent with normalized unit.
- If no second baseline confirm value is '0'.

## Measure UEC kW (kW)

### Measure Developer

This field includes the calculated peak demand value per normalized unit during measure case period. The calculation of this value should conform to the California peak demand definition.

If only whole-building data is available, effort should be made to isolate the UEC associated with the specific measure. If this is not possible, the value of UECkWmeas should equal '0'.

This data field is populated with a calculated value or mapped from a value table. Naming conventions exist for various measure end-uses.

### Peer Review QA/QC

- Validate the UEC demand calculation is correct and correct values are aligned in the correction permutation.

### Measure UEC kWh (kWh/yr)

#### Measure Developer

This field includes the calculated UEC of annual electric energy usage per normalized unit.

If only whole-building data is available, efforts should be made to isolate the UEC associated with the specific measure. If this is not possible, the value of UECkWhmeas should equal '0'.

This data field is populated with a calculated value or mapped from a value table. Naming conventions exist for various measure end-uses.

#### Peer Review QA/QC

- Validate the UEC calculation is correct and correct values are aligned in the correction permutation.

### Measure UEC therm (therm/yr)

#### Measure Developer

This field includes the UEC of annual gas energy usage per normalized unit.

If only whole-building data is available, efforts should be made to isolate the UEC associated with the specific measure. If this is not possible, the value of UECthermmeas should equal '0'.

This data field is populated with a calculated value or mapped from a value table. Naming conventions exist for various measure end-uses.

#### Peer Review QA/QC

- Validate the UEC calculation is correct and correct values are aligned in the correction permutation.

## Implementation Parameters

### Delivery Type

#### Measure Developer

Delivery Type refers to the market channel to which program services are targeted (also referred to as the "delivery channel").

#### Peer Review QA/QC

- Verify correct delivery type(s) is(are) specified.

## Net to Gross Ratio ID

### Measure Developer

The net-to-gross (NTG) ratio is the ratio of net program impacts to gross or total impacts. The NTG ratio represents the extent of free-ridership, or the portion of energy or demand impacts that would have occurred in the absence of the program. The NTG ratio typically varies by sector but can also vary by other parameters like delivery type.

There are three NTG shared value tables in eTRM to streamline the importing of the table (with references attached) and to refine the information displayed to the users. The table below shows which table should be imported for each NTG IDs.

NTG ID	NTG Table
Res-Default>2	Net to Gross Ratio - Residential
Agric-Default>2yrs	Net to Gross Ratio - Nonresidential
Com-Default>2yrs	Net to Gross Ratio - Nonresidential
Ind-Default>2yrs	Net to Gross Ratio - Nonresidential
All Other IDs	Net to Gross Ratio

If the measure requires multiple NTG tables (i.e., Res and NonRes), import those tables and use calculation to pull in the correct ratio for each NTG ID. Map this field to the calculation. Remove invalid labels from each NTGR table (ie. "Res-Default>2" label from "Net to Gross Ratio – Nonresidential" table). See SWLG009-01 Supporting Data and Calculation tab.

### Net to Gross Ratio – kWh<sub>in</sub> ratio

NET TO GROSS RATIO ID	VALIDITY	EQUATION (RATIO)
Agric-Default>2yrs	✓	<i>netToGrossRatioNonresidential__nTGRkWh</i>
Com-Default>2yrs	✓	<i>netToGrossRatioNonresidential__nTGRkWh</i>
Ind-Default>2yrs	✓	<i>netToGrossRatioNonresidential__nTGRkWh</i>
Res-Default>2	✓	<i>netToGrossRatioResidential__nTGRkWh</i>

The first phrase of each NTG ID indicates the sector for which the ID is valid (ex. Com-Default>2yrs is valid for Com sector)

The sector indicted by the NTG ID must be consistent with the measure Sector. See SWLG009-01 "Sector – NTG" exclusion table.

### Peer Review QA/QC

- ✓ Verify correct NTG ID(s) is(are) specified.
- ✓ The description field can be helpful in understand when a NTG ID should or should not be used.
- ✓ Verify that both the NTG Parameter List and Value Table have been imported to the measure.
- ✓ Verify that the chosen NTG ID has associated values and that the ID is still active (ie, that the "Expiry Date" is blank).

Sector – NTG ID Exclusion Table

NTG ID	Sector
Agric- (Agric-Default>2yrs)	Ag
Com- (Com-Default>2yrs) K-12School-ComCollege	Com
Ind- (Ind-Default>2yrs)	Ind
Res- (Res-sAll-mCFL) EUC-Default	Res
NonRes-sAll- (NonRes-sAll-mHVAC-Chiller) NonRes- (NonRes-HVAC-maint)	Com, Ind, Ag
NonRes-sGHS- (NonRes-sGHS-mIRF-ci)	Ag Sector – Greenhouse building type.
Not specify (ET-Default or All-Ltg-ScrwnLED)	Any

The description column in the shared NTG ID parameter list has further restrictions for the IDs (i.e., delivery type, building type, fuel type, etc.).

This field specifies the identifier that maps to the value of the NTG ratio in the Net to Gross Ratio shared value table that is associated with the measure.

**NTGR kWh (ratio)**

Measure Developer

This field contains the lookup value from Net to Gross Ratio shared value table associated with the [Net to Gross Ratio ID](#) that will be applied directly to the Gross kWh savings value.

This value is provided with the Net to Gross Ratio ID. The value to map is NTGR kWh (ratio).

Peer Review QA/QC

None.

**NTGR kW (ratio)**

Measure Developer

This field contains the lookup value from Net to Gross Ratio shared table associated with the [Net to Gross Ratio ID](#) that will be applied directly to the Gross kW reduction value.

This value is typically defined as the [NTGR kWh \(ratio\)](#).

Peer Review QA/QC

None.

**NTGR Therms (ratio)**

Measure Developer

This field contains the lookup value from Net to Gross Ratio shared table associated with the [Net to Gross Ratio ID](#) that will be applied directly to the Gross therms savings value.

This value is provided with the Net to Gross Ratio ID. The value to map is NTGR Therm (ratio).

Peer Review QA/QC

None.

## NTGR Cost (ratio)

Measure Developer

This field contains the lookup value from Net to Gross Ratio shared value table associated with the [Net to Gross Ratio ID](#) that will be applied directly to the Gross cost value.

This value is typically taken directly from the NTG kWh or NTG therm value depending upon whether the measure is primarily focused on electric or gas savings.

Peer Review QA/QC

None.

## GSIA ID

Measure Developer

This field specifies the identifier that maps to the GSIA value for the measure.

If the default GSIA is used, map this field to the “Gross Savings Installation Adjustments – Default” value table.

For all other GSIA IDs, map the field to “Gross Savings Installation Adjustments” value table. Importing the “Gross Saving Installation Adjustment” shared value table will automatically propagate 3 additional GSIA parameters: GSIA-BLDG TYPE, GSIA-PA, and GSIA-VINTAGE.

The GSIA value is dependent on building type, vintage, and PA. The “Gross Savings Installation Adjustments” table include rows for every permutation of these 3 parameters, but each GSIA ID is only valid for certain permutations; hence there are many blank rows in this table. The three GSIA parameters mimic the function of the three measure parameters (Building Type, Program Administrator, and Vintage) in order for the shared GSIA value table to extract the correct, non-blank GSIA value.

For example, Commercial Condenser Coil Cleaning has 19 commercial building types, “Ex” vintage, and “Any” program administrator. However, the GSIA parameters for “Com-RCA-All” are “Any” GSIA building type, “Any” GSIA vintage, and “Any” GSIA PA (any other combinations will produce a blank cell). See SWSV004-01 Supporting Data tab.

Peer Review QA/QC

Verify correct GSIA ID(s) is(are) specified.

The description field can be helpful in understand when a GSIA ID should or should not be used.

GSIA ID	GSIA-BLDG TYPE	GSIA-PA	GSIA-VINTAGE	GSIA (RATIO)
Com-RCA-All	Any	Any	Any	0.6380
Com-RCA-All	Any	PGE	1975	

See “Exclusion Tables.xlsm” to see which GSIA parameters combination is required for each non-default GSIA ID, as well as the Sector – GSIA ID exclusion table.

See the description column of the GSIA ID parameter or the Exclusion Tables.xlsm.

## GSIA Value (ratio)

Measure Developer

This field includes the lookup value associated with the [GSIA ID](#) from the GSIA shared table.

Peer Review QA/QC

None.

## Cost Effectiveness Parameters

### Electric Impact Profile ID

Measure Developer

This field specifies the identifier of load shapes used for portfolio lifecycle cost analysis.

A load shape indicates the distribution of a measure energy savings over one year. A load shape is a set of fractions summing to unity, with one fraction per hour (or other time period). Multiplying a savings value by the load shape value for a particular hour yields the energy savings for that particular hour of the year.

DEER Load shapes vary by measure sector, as shown in the table below.

Sector	Electric Load Shape
Com	HVAC_Chillers HVAC_Split-Package_AC HVAC_Split-Package_HP Indoor_Non-CFL_Ltg
Res	HVAC_Eff_AC HVAC_Eff_HP Refg_Chrg_Duct_Seal RefgFrzr_HighEff RefgFrzr_Recyc-Conditioned RefgFrzr_Recycling RefgFrzr_Recyc-UnConditioned Res_BldgShell_Ins Res_ClothesDishWasher
Any	HVAC_Duct_Sealing HVAC_Refrig_Charge Indoor_CFL_Ltg

Peer Review QA/QC

- Verify proper electric impact profile ID is specified.
- Additional load shapes are being developed, but consideration should include: Weather sensitive loads, Night loads, etc.

### Gas Impact Profile ID

Measure Developer

This field specifies the identifier of load shapes used for portfolio lifecycle cost analysis.

A load shape indicates the distribution of a measure energy savings over one year. A load shape is a set of fractions summing to unity, with one fraction per hour (or other time period). Multiplying a savings value by the load shape value for a particular hour yields the energy savings for that particular hour.

Peer Review QA/QC

- Verify proper gas impact profile ID is specified.

## Market Effects Benefits

### Measure Developer

The default market effects value is 5% in the CET tool.

The value in this field is expressed as a decimal that represents a whole percentage. For example, 5% should be entered as 0.05; 0.055 is not valid. If no specific value is applicable, this field should be left blank because any value entered will over-ride the portfolio level value.

If the values is left blank, map the “Null Values” shared data table with the “Null Values: Blank” option.

### Peer Review QA/QC

- If this field is blank, verify the default value (5%) is desired.
- If a specific value different from the default is applicable, verify the value meets the guideline.

## Market Effects Costs

### Measure Developer

The default market effects value is 5% in the CET tool.

The value in this field is expressed as a decimal that represents a whole percentage. For example, 5% should be entered as 0.05; 0.055 is not valid. If no specific value is applicable, this field should be left blank because any value entered will over-ride the portfolio level value.

If the values is left blank, map the “Null Values” shared data table with the “Null Values: Blank” option.

### Peer Review QA/QC

- If this field is blank, verify the default value (5%) is desired.
- If a specific value different from the default is applicable, verify the value meets the guideline.

## Measure Inflation

### Measure Developer

This optional CET field defines the measure inflation percentage. The value should be expressed as a decimal that represents a whole percentage. For example, 2% should be entered as 0.02; 0.025 is not valid.

If the value is left blank, map the “Null Values” shared data table with the “Null Values: Blank” option.

### Peer Review QA/QC

- This is an optional field. If it is used, verify the value is in the appropriate format.

## Combustion Type

### Measure Developer

This optional CET field defines the combustion type used:

- Large Boilers (>100 MMBtu/hr Heat Input):Uncontrolled
- Large Boilers (>100 MMBtu/hr Heat Input):Controlled Low NOx Burner
- Large Boilers (>100 MMBtu/hr Heat Input):Controlled – Flue Gas Recirculation
- Small Boilers (<100 MMBtu/hr Heat Input):Uncontrolled
- Small Boilers (<100 MMBtu/hr Heat Input):Controlled Low NOx Burner
- Small Boilers (<100 MMBtu/hr Heat Input):Controlled – Flue Gas Recirculation
- Residential Furnaces (<0.3):Uncontrolled

If this field is not applicable, "NA" should be entered. Map the "Null Values" shared data table with the "Null Values: Not Applicable" option.

### Peer Review QA/QC

- This is an optional CET field. If used, verify the value is in the appropriate format.
- if it is not applicable, verify 'NA'.

## Measure Impact Calculation Type

### Measure Developer

Defines the calculation methodology used to quantify measure savings. Five valid options are available, but almost all values are "Standard":

- Cross-Measure Weighted (CrossMeasWtd): Energy impacts for multiple measures are weighted to create a new set of measure impacts.
- Direct Impacts (DirectIE): Energy impacts are specified with "Direct Impacts" and modified by Interactive-Effects tables.
- Scaled (Scaled): Whole-building energy impacts are specified by a reference to a "Scalable" Energy Impact ID along with a Scale Value.
- Scaled Direct Impacts (ScaledDirectIE): End-Use energy impacts are specified by a reference to a "Scalable" Energy Impact ID along with a Scale Value, Whole-building impacts are determined by applying a specified interactive effects tables to the end-use impacts.
- Standard (Standard): Energy impacts are looked up in the Energy Impact table based on a specified EnergyImpactID.

### Peer Review QA/QC

- Verify that proper "Measure Impact Calculation Type" has been specified based on the descriptions for the five options available.

## Upstream Flag (true/false)

Measure Developer

Calculated field based upon the delivery type. If delivery type is "UpDeemed", map the field to the "Null Values" shared data table with the "Null Values: True" option; otherwise, map to "Null Values: False". If a measure has UpDeemed with DnDeemed and/or DnDeemDI, create an Upstream Flag value table, write in the corresponding Upstream Flag for each delivery type, and map this table. See SWHC020-01 Supporting Data tab.

Upstream Flag

 DELIVERY TYPE	VALUE
DnDeemDI	<b>False</b>
DnDeemed	<b>False</b>
UpDeemed	<b>True</b>

Peer Review QA/QC

None

## Version

Measure Developer

This field designates the version based on Commission policy.

The version will be assigned by the lead utility.

The version is a concatenation of the measure source (DEER or ExAnte = non-DEER) and the effective year. The source must match the measure impact type according to the following exclusion table. See SWAP006-01 Supporting Data tab.

Version – Measure Impact Type Exclusion Table

Version	Measure Impact Type
DEER	Deem-DEER
ExAnte	Deem-WP

The DEER - Deem-DEER combination is only used if it is a DEER measure and the savings are taken directly from the DEER database without any modification. All other deemed measures assume the ExAnte – Deem-WP combination.

Peer Review QA/QC

Verify correct version is specified.

## Other

### Water Savings (gal/yr)

Measure Developer

Annual water savings associated with the measure (if applicable). For projects that also save water, the [Water-Energy Calculator](#) must be used to determine the embedded energy savings that can be reported through a separate Water Energy Nexus mechanism.

The value should be expressed as a whole number per normalized unit. If water savings are not known, map the field to the “Null Values” shared data table with the “Null Values: NULL” option.

This data field is populated with a calculated value.

Peer Review QA/QC

- Methodology confirmed in QA/QC of the [Non-Energy Impacts](#) Characterization field.
- Validate the water savings calculation is correct and confirm correct values are aligned in the correction permutation.

### Technology Group

Measure Developer

Technology Group defines the highest level of measure categorization of the measure.

This field facilitates categorization of claims data.

Peer Review QA/QC

- Confirm correct specification and consistency with like measures.

### Technology Type

Measure Developer

Technology Type is a subcategory to [Technology Group](#) to further characterize the measure.

The Technology Type must be a valid subcategory choice for the chosen technology group. If multiple technology types, belonging to different technology groups, are specified, create a Technology Group – Technology Type exclusion table. See “Exclusion Tables.xlsx”

This field facilitates categorization of claims data.

This field also defines the default normalization unit that should be used for the measure. See “Exclusion Tables.xlsx”.

Peer Review QA/QC

- Confirm correct specification of and consistency with like measures.

### Use Category

Measure Developer

Select the most appropriate end-use category for the measure. When in doubt, review other measures within the category to ensure the correct fit.

[Use Subcategory](#) should be identified to ensure that the fit is correct. This field facilitates categorization of claims data.

As an example, Food Service generally includes commercial cooking equipment, while Appliance and Plug Load includes residential cooking appliances.

Peer Review QA/QC

- Confirm correct specification and consistency with like measures.

## Use Subcategory

Measure Developer

The Sub-Use Category acts as a subcategory to [Use Category](#) to further specify the measure in terms of how the measure is used.

Similar to technology type, the use subcategory must be a valid subcategory choice for the chosen use category label. If multiple use subcategories, belonging to different subcategory labels, are required, then create a Use Category – Use Subcategory exclusion table.

This field facilitates categorization of claims data.

Peer Review QA/QC

- Confirm correct specification and consistency with like measures.

Use Category – Use Subcategory Exclusion Table

Use Category	Use Subcategory	Use Category	Use Subcategory
AppPlug	Electronics KitchenApp Laundry Office_eq Refrig Vending	NonSav	NonSav
BldgEnv	Fenestration Opaque	ProcDist	AirDist DairyVac Power Pumping
C&S	UnCatC&S	ProcDry	Condensing Curing EvapSepDehyd Finish
CompAir	ChemTreat Controls ManufAQA ManufDryAir MatConvPkg ToolsOp	ProcHeat	Cooking Drying EnvContols EvapSepDehyd HeatTreat LiquidDist Melting Pasteurize PreheatLiqSol Reheat SteamDist
ComRefrig	Display Equipment Storage	ProcRefrig	ProdChill ProdManuf ProdStore Separate
FoodServ	Cleaning Cooking Packaging	Recreate	Pool Spa
HVAC	EnvCtrl HeatCool HtRej SpaceCool SpaceHeat VentAirDist	Service	Audit Diagnostic Maintenance RetroComm Testing

Use Category	Use Subcategory	Use Category	Use Subcategory
Irrigate	FarmIrrig LandScape	SHW	Distribute Heating PointOfUse
Lighting	InCommon ; InExit InGen InGen-CFL InGen-HB InGen-LF InRetDisp InTask Out24hr OutCommon OutDuskDawn OutGen OutSign ParkGar RefDisplay Seasonal	WhIBldg	WBUUpgrade

## Building HVAC

### Measure Developer

Building HVAC system describes if the measure savings are applicable to a specific type of HVAC system. If a weighted average approach is followed, special IDs designate the weighted average residential building type (rWtd) or commercial building type (cWtd).

The first letter of each HVAC type indicates the sector of the HVAC system.

### Sector – Building HVAC Exclusion Table

Building HVAC	Sector
a- (ex. aGF)	Agricultural
c- (ex. cDXGF)	Commercial and Industrial
r- (ex. rDXHP)	Residential
Any	Any

### Peer Review QA/QC

- Confirm if savings identified as applicable to specific HVAC system types is appropriate. If so, verify correct ID(s) is(are) specified.

## Is IE Factor Applied? (yes/no)

### Measure Developer

This flag designates whether interactive effects are applied to the measure.

Interactive effects are defined as the secondary energy and demand impacts that result from a measure to a secondary system or equipment not directly involved in the retrofit activity (e.g., cooling or heating energy impacts resulting from the installation of efficient lighting fixtures).

If IE Factor is applied, import the Lighting Type shared parameter, and select from one of the 3 commercial light types and 1 residential light type. If the measure has multiple sectors, create the appropriate Sector – Lighting Type exclusion table.

### Sector – Lighting Type Exclusion Table

Lighting Type	Sector
Com-ILtg-HardWired	Commercial, Industrial, Agricultural
Com-ILtg-HighBay	Commercial, Industrial, Agricultural
Com-ILtg-ScrewIn	Commercial, Industrial, Agricultural
Res-Indoor-CFL	Residential

Similar to the GSIA parameters, the lighting type parameter will create an additional IE-Bldg Type parameter, which is used to make selections from the shared IE tables. The IE-Bldg Type should match 1-to-1 with the measure building type; create an IE Bldg Type – Bldg Type exclusion table if necessary.

The two shared interactive effects tables are Commercial Interactive Effects (2020-Com-InLtg) and Residential Interactive Effects (2020-Res-InLtg). If the measure has multiple sectors, it may be required to remove the unnecessary parameter labels (which show up as blank fields) from each of the IE table.

“Any” is not a valid building vintage option for the shared interactive effect tables; building type should be “Ex”, “New”, “old”, or “rec”.

For example, see SWLG009.

### Peer Review QA/QC

- Verify correct designation of interactive effects.

## IE Table Name

### Measure Developer

This field identifies appropriate interactive effects shared table to apply to permutation.

If interactive effects are not applied to this measure, map this field to the "Null Values" shared data table using the "Null Values: Not Applicable" option. If interactive effects are applied, create a new measure specific parameter "IE Table Name" and map this parameter. The IE Table name labels are the names of the IE value tables used for the measure (ex. 2020-Com-InLtg or 2020-Res-InLtg).

If multiple IE tables are required for the calculation, create the appropriate exclusion table to map the correct IE Table Name for each permutation. For example, see SWLG009 's Area – Interactive Effects Table and IE BT – Interactive Effect Table exclusion tables.

### Peer Review QA/QC

- If interactive effects are applied, ensure that the proper Interactive Effects shared table has been chosen.
- If interactive effects are not applied to the measure, confirm that "None" is entered.

## Measure Qualifier

### Measure Developer

The Measure Qualifier is a descriptive field to define the source of savings. If this field not applicable, map this field to the "Null Values" shared data table using the "Null Values: None" option

### Peer Review QA/QC

- Review the descriptive to field to verify that is identifies the source and timing of the savings.
- If field not applicable, confirm that "None" is entered.

## Energy Impact ID

### Measure Developer

The Energy Impact ID is an identifier specified to link the measure with impacts in the ex ante database.

For DEER measures, the Energy Impact ID field is mapped to the DEER Energy Impact IDs column of the Measure Offering IDs and DEER Energy Impact IDs value table. See SWSV002.

For non-DEER measures, the field is mapped to map this field to the "Null Values" shared data table using the "Null Values: Blank" option.

### Peer Review QA/QC

- Verify correct ID is specified.

## Measure Cost ID

### Measure Developer

For all measures, the field is mapped to the "Null Values" shared data table using the "Null Values: Blank" option.

### Peer Review QA/QC

- Verify correct ID is specified.



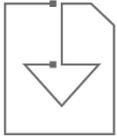
## Guidelines for the Manager Review

The primary objective of the Manager Review is to assess if the measure analysis and presentation is complete and accurate and to authorize the measure progress to next measure status – external review by Cal TF. This review entails a higher-level of QA/QC than the Peer Review and the Manager Review is not intended to duplicate the peer review summarized previously.

The manager review shall include (but should not be limited to) the following:

### Manager Review

- Verify that all Peer Review comments were adequately addressed.
- Document the extent of statewide coordination for measure development.
- Document that the measure impacts and cost effectiveness metrics have been derived for implementation in all California climate zones, if applicable.
- If the measure was previously reviewed by Cal TF, confirm issues and comments were properly addressed and documented.
- If the measure was previously reviewed the CPUC, confirm issues and comments properly addressed and documented.



## Guidelines for Measure Documentation and References

Measure documentation and references refers to the sources of inputs, assumptions, data, and other information used to derive energy consumption, energy usage, energy and demand impacts, costs, and other cost effectiveness inputs. Such documentation includes (but is not limited to): previous workpaper/measure versions, technical analyses, calculation spreadsheets, field studies, EM&V studies, laboratory test results, and market studies. Although studies within California will be the most relevant, studies from outside of the State should be considered and utilized, particularly for non-weather sensitive measures.

The measure development and subsequent QA/QC necessarily includes confirmation of appropriate documentation such that all aspects of the measure are transparent, and the derivation of impacts and cost effectiveness metrics are reproducible. Specific guidelines pertaining to documentation that apply to any and all fields are provided below.

### Measure Developer

All assumptions, input values, and data sources must be appropriately cited.

All cited references must be provided to the designated eTRM Administrator to be uploaded to the eTRM reference library. Once a reference is uploaded to the eTRM reference library it can be embedded as a reference in a measure characterization field text, in a static table, in a value table column or associated with an entire value table.

The cited reference should be the *original* source of data/information if available, rather than a secondary source.

Manufacturer test data is not acceptable documentation of equipment performance; only data from an independent, third-party organization are accepted to develop baseline and measure performance parameters.

Internet links to documents are not accepted, as URLs may change or become inactive/no longer in service and/or the information presented on a website may be modified after it is referenced. A PDF of a website page must be created and appropriately cited to substantiate an online reference.

Personal communications (conversations, interviews, lecture material, telephone conversations, letters, e-mail messages, and social media posts) are not valid references for inputs used to derive UEC, UES, costs, or other cost effectiveness inputs. Personal communication for descriptive or supporting information is acceptable if correctly documented with the name, organization, title of the contact, as well as the date and subject of the communication.

A proprietary reference or data file must be appropriately cited and available throughout the measure review and approval process and upon request by authorized staff thereafter.

All proprietary data that is not authorized for the eTRM reference library but is necessary to accompany the measure through the review process shall be clearly identified as Proprietary.

### Peer Review QA/QC

- ✓ Validate all values/inputs/assumptions in the cited reference. Flag all values/inputs/assumptions that are not supported by the cited reference.
- ✓ Ensure each cited reference conforms to standards of “best available data”. Flag any values/inputs/assumptions for which the reference does not meet “best available criteria”.
- ✓ A copy of each cited reference is submitted with the measure. A cited reference for which the reference file is not provided should be flagged as such.
- ✓ Identify all assumptions, claims, data for which a reference and citation are required but not provided. Flag an input, assumption, statistic, finding, or claim that is not supported by a reference.
- ✓ Verify that all reference materials can be uploaded in the eTRM reference library. Flag all citations/references that include proprietary data/information and cannot be uploaded to the eTRM reference library.

The following table lists the types of references that are commonly used for measure documentation.

Reference Type	Examples	Documentation
Saturation Study	Commercial End Use Survey (CEUS) Residential Appliance Saturation Survey (RASS)	Copy of the report and appendices.
Regulatory documents (i.e., CPUC Decision, Resolution, Disposition)	Resolution E-4818 Comprehensive Workpaper Disposition for: Screw-in Lamps.	Preferred: Copy of the regulatory document Minimum: Decision/Resolution number and proceeding number Referenced location (i.e., page #, table #, ordering paragraph)
California standards	Appliance Efficiency Regulations (Title 20) Building Energy Efficiency Standards (Title 24)	Preferred: Copy of the document Minimum: Agency Standard or report year Standard or report name Report number Referenced location (i.e., section, page #, table #)
Federal Regulations	Code of Federal Regulations Energy Policy Act	Preferred: Copy of the document Minimum: Agency Regulation title and number Section and/or table number
Test Standards or Industry Guidelines	ASHRAE handbook	Agency Publication title Standard date Standard title, number, and section
Laboratory Test Report	Food Service Technology Center (FSTC) Appliance Performance Report	Copy of the report and all appendices
Qualified/Certified Product List	FSTC Qualified Product List (QPL)	Preferred: File with download of dataset Date of download Minimum: Authoring organization Database/specification name URL Parameters used to filter or develop list Parameter bounds/values Date of download

Reference Type	Examples	Documentation
Calculation Tool Model	Motor Master AirMaster Plus ENERGY STAR calculator	Preferred: Downloaded tool/calculator Date of download Version number Minimum: Authoring organization Tool name Version number URL Input parameters and values used Date of download/accessed
DEER	Unit energy consumption (UEC) Unit energy savings (UES) NTG EUL GSIA Measure costs	Copy of regulatory directive (resolution, disposition) that directed the adoption of value(s). For UES values from DEER: DEER ID MASControl version CSV file of values Any filters applied Documentation of any adjustments (interpolation, extrapolation, etc.) Engineering equation For NTG, EUL, GSIA, cost from DEER: DEER update report and/or spreadsheet Original source of DEER value Master documentation spreadsheet
Evaluation	Impact Evaluation of 2013-14 Upstream and Residential Downstream Lighting Programs.	Copy of the evaluation report and all appendices. If appropriate, copy of regulatory directive (resolution, disposition) that directed the adoption of value(s).
Other Study Types Potential Study Measure Cost Market Briefing	Commercial Refrigeration Potential Study Measure Cost Study	Copy of the report and appendices.
Field Monitoring Study	Emerging Technology study	Copy of the report and all appendices.
Conference Paper	Paper in ACEEE Summer Study on Energy Efficiency in Buildings Proceedings	Copy of the paper with proceedings title, issue, issue/volume number, page number of proceedings.
Journal Article	ASHRAE Journal	Copy of the article with publication title, date, issue/volume and page #.
Memorandum	KEMA memo on EULs	Copy of the memo and any appendices or support documents. If appropriate, copy of the regulatory directive to adopt memo results, analysis, and/or recommendations.

Reference Type	Examples	Documentation
Dataset	Program tracking data Web-scraped cost data Weather data California Energy Commission (CEC) Modernized Appliance Efficiency Database System (MAEDS)	Data set in Excel or other common format, with clear documentation of author, contents, date, and source. If derived from online databases or product listings, a download of the data should be provided along with the URL, the filter parameters, and access date. If a download is not available, record the URL, the filter parameters, and access date.



## Resources

To support measure development and peer review QA/QC, the Cal TF provides several tools and resources for measure developers and reviewers. All measure development resources are posted on the “Tools” page of the [Cal TF website](#) and are available in the eTRM by clicking on the [User Guide](#) link. Two prominent resources are:

The *Statewide Measure Characterization Template* is a Word document that contains all Characterization fields. A measure developer can use this template to draft content of some or all of the Characterization fields. This template includes “boilerplate” text and tables for some fields that can be customized to ensure standardization and consistency across eTRM measures. (Note that this template does not support automatic uploading of Characterization fields; Characterization fields in the eTRM must be done manually.)

The *Style Guide* provides guidelines for writing conventions, such as word and number usage, expressions of common units of measurement, and citation style.