



Cal TF Technical Position Paper (TPP) No. 9: Statewide Measure Development Guidelines and Internal QA/QC Procedures

Overview

Historically, the four California investor-owned utilities (IOUs) have developed and submitted new energy efficiency measures (the technical analysis, inputs, and savings estimates for which are documented in workpapers) to the California Public Utilities Commission (CPUC) for approval. Typically, each measure workpaper has been specific to the needs of the “sponsor” IOU, and each IOU has followed their own internally-developed guidelines and review requirements prior to submitting measure workpapers to the CPUC.

In late 2016, the CPUC directed the IOUs to develop *statewide workpapers* for new measures.¹ That is, the measure definition, technical analyses, inputs, applicable markets and building types, etc. need to represent the interests of “more than one” program administrator (PAs). Moreover, the CPUC, non-IOU PAs, and other third parties expect that non-IOU entities to have the capability to propose new measures in the future. Finally, inadequate performance of IOUs in the workpaper process have been identified as one source of low Energy Savings Performance Incentive (ESPI) scores in the past. *Thus, coordination among all program administrators (PAs) in the State to develop new measure workpapers has become critical.*

This Technical Position Paper (TPP) of the California Technical Forum (Cal TF) provides guidance for workpaper developers to ensure submitted workpapers meet data specification requirements and that peer review and quality assurance and quality control (QA/QC) processes² are in place that will ultimately result in higher quality workpapers. That is, workpapers embody an appropriate level of technical rigor, are well documented, and are transparent in how values were calculated and sources of inputs. In addition to clarifying

¹ 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.”

Commission ex ante team. “2017 Workpaper Guidance.” Memorandum submitted to California Energy Efficiency Program Administrators. November 14, 2016. Accessed at: http://deeresources.com/files/2013_14_exante/downloads/2017_Workpaper_Guidance_Memo_OUT.pdf

² In this context, “internal” refers to tasks conducted by an employee or representative of the organization that is developing a workpaper.

expectations for the current workpaper template, this document provides various tools and checklists for workpaper developers and reviewers that are intended to create a uniform process that will increase workpaper quality and thereby mitigate some causes for low ESPI scores.

These guidelines were developed based on extensive Cal TF Staff review of CPUC ex ante review (EAR) team feedback on utility-developed workpapers, Cal TF Staff review and experience with utility-developed workpapers, and input from utility and consultant workpaper developers over the past three years. Cal TF Staff reviewed the following documents to identify issues and trends that the EAR team has identified with the utility non-DEER workpapers:

- Dispositions, preliminary workpaper reviews, workpaper reviews, and abstract reviews (past two years); and
- ESPI reports for year-end 2015 and mid-year 2016.

Cal TF Staff summarized its assessment of issues with non-DEER workpapers in a presentation titled “New Measure Review Process: Lessons Learned and Recommendations for Future New Measure Review Process.”³ Cal TF Staff reviewed this presentation with the Cal TF Policy Advisory Committee (PAC) in December, 2017 and also with CPUC Staff in November and December, 2017.⁴ These guidelines and other related Cal TF efforts, including “Cal TF TPP 10: SW Measure Review Process” and the eTRM Repository development, are seeking to address all identified issues with workpaper development and review to improve the quality, cost-efficiency, and timeliness of new measure development, review, and updating.

Current Practice

Historically the IOUs have developed workpapers to address utility-specific program needs; and there was limited effort to coordinate measure development across all IOUs, statewide. In addition, each IOU follows their own unique internal process for measure development, QA/QC, and approval prior to submission to the CPUC. Furthermore, some IOUs have recently-developed written standards for internal measure development and review prior to submission; others do not. Finally, new measure development has not been coordinated between IOUs and POUs, leading to different input assumptions, savings calculations and values for the same measure. In some cases, the differences can be explained by different climate zones, delivery strategies, or costs. However, in the majority of cases, the differences stem from lack of coordination on statewide measure development. Cal TF Staffs have gathered and reviewed over 25 deemed measure repositories (known as Technical Reference Manuals, or TRMs) from around the country, both publicly-available and not. Every other state has statewide workpapers or measure characterizations that address utility-specific differences through a single document; California is unique in its widespread use of inconsistent utility-specific workpapers. As of June 2017, there are 417 utility-specific workpapers for 213 distinct measures.⁵

³ This presentation is posted on the Cal TF website, www.CalTF.org

⁴ Annette Beitel, meeting with K. Wu, CPUC Staff, November and December, 2017.

⁵ 2017 Statewide Measure list (June 2017).

Statement of Cal TF Need

To ensure high-quality, consistently developed and reviewed statewide workpapers that are submitted to Cal TF for review, Cal TF has developed statewide workpaper development, review, and approval guidelines for new and updated measures.

Objectives

The overarching objectives for statewide workpaper development, review, and approval guidelines for new and updated measures are to:

- Ensure that high-quality workpapers are submitted as part of the new eTRM process developed pursuant to written, publicly-available guidelines;
- Develop a process that is comprehensive, transparent, cost-efficient;
- Create a process that non-IOU entities can follow to develop workpapers;
- Address items that have historically lowered ESPI scores; and
- Ensure workpapers are reviewed and approved by CPUC Staff and any other applicable CA-regulatory bodies who have jurisdiction over deemed measure development and approval.

Support

The development of this TPP was informed by internal guidelines for 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). This TPP is also informed by a thorough review of the 2015 year-end and 2016 mid-year ESPI ex-ante review performance scoring reports for each IOU; EAR-team dispositions, preliminary workpaper reviews, workpaper reviews, abstract reviews; and input from workpaper developers and consultants

Cal TF Proposal

This document provides guidelines for the internal peer-to-peer engineering review, review and QC, and management approval of a workpaper. The guidelines provided herein are applicable to the following:

- The development a new measure workpaper;⁶
- The revision of an existing measure workpaper in response to Title 24 and Title 20 code changes, CPUC dispositions and guidance, and/or changes to values in the Database for Energy Efficient Resources (DEER) that leads to changes in a non-DEER WP;
- The revision of an existing measure workpaper to reflect results of one or more EM&V studies; and

⁶ It is important to note that before starting the development of a measure, it is important for workpaper developers, as well as other PA staff (portfolio managers, program managers, product developers) to understand the market for the measure including the current (baseline) practices, market barriers, customer awareness, and market potential, to inform in measure development and program design. Such research is not included in the workpaper development requirements or review process and is thus not

- The revision of an existing measure workpaper due to or other factors (e.g., availability of new technology, changes in market conditions, etc.).

The Cal TF proposal presented herein addresses three primary topics of the overall workpaper development process: 1) general guidance for workpaper developers, 2) guidance for an internal peer review and QA/QC process, and 3) guidance for internal management approval. These guidelines and the reference documents, tools, and checklists that accompany this TPP comprise the measure development guidelines and internal QA/QC procedures for statewide measures. Insofar as the eTRM is currently in development, these guidelines will be revised and updated accordingly as needs arise.

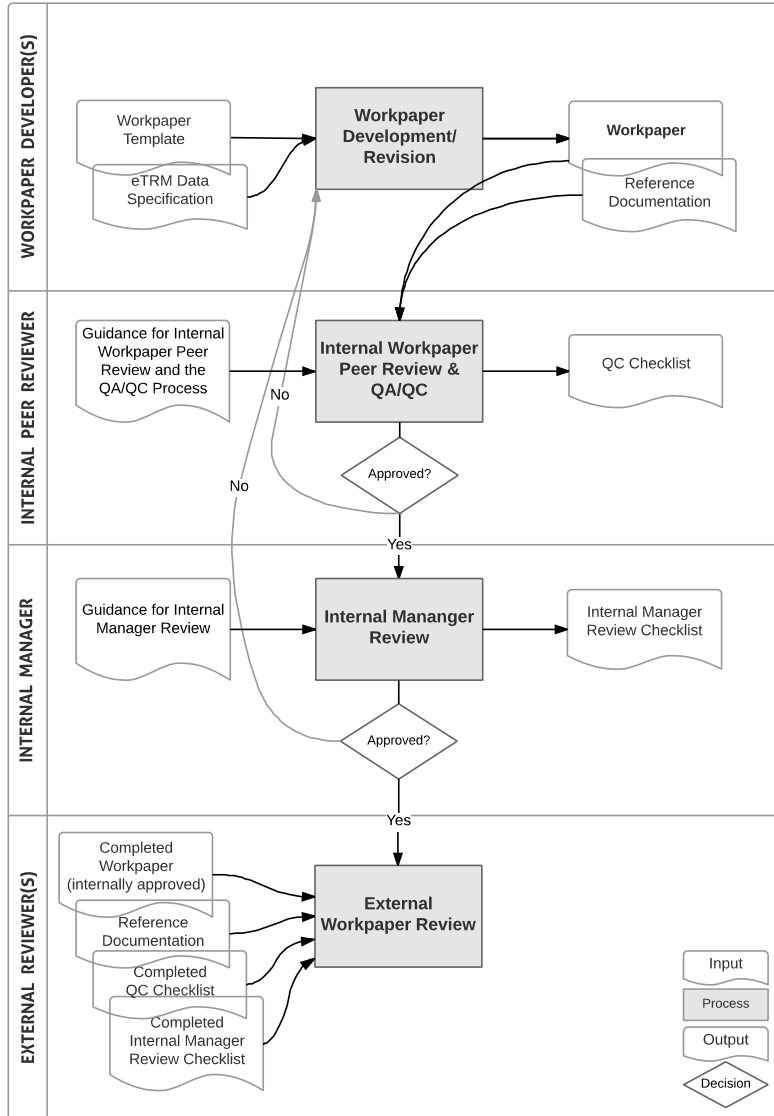
Figure 1 provides a high-level overview of the internal workpaper review and QA/QC process that is outlined in this TPP. As shown, this process involves workpaper developers, internal peer reviewer(s), and an internal manager.

The developer(s) prepares the initial workpaper utilizing the Workpaper Template.⁷ Once complete with all reference documentation, an internal peer reviewer conducts a thorough review and QA/QC, following the guidance provided in this TPP. The output of the internal peer review is a QC Checklist prepared by the peer reviewer. If the workpaper is approved, it is then reviewed by an internal manager. The output of the Internal Manager Review is an Internal Manager Review Checklist. If approved at this stage, the workpaper and all reference documents can be submitted for External Review. Note that the external workpaper review process by the Cal TF and/or the CPUC is not addressed in this TPP.

addressed in this TPP. However, such research could be included with the workpaper as reference material if warranted.

⁷ Once the CPUC approves the use of the eTRM repository and associated eTRM Data Specification template, workpaper developers will develop new measures in the Data Specification template, and not the current utility Workpaper Template.

Figure 1. Process Overview



Minimum Data Requirements/"Planning"/"Provisional" Measures vs. Full Measure Approval

The Cal TF seeks to clarify minimum data requirements for statewide workpapers and also proposes to establish two levels of deemed measures (provisional or "planning" measures and full measures) similar to TRM frameworks adopted in other regions, such as the Regional Technical Forum (RTF) in the Pacific Northwest. Minimum data requirements could include the following:⁸

- Unit energy consumption (UEC) data to determine appropriate base case
- Scientific descriptions of how the measure will save energy
- Equations and key variables that impact savings and demand reduction
- Range of savings and demand reduction estimates
- Uncertainties of savings and demand reduction estimates
- Laboratory or field measurements to support the savings and demand reduction estimates
- Retention studies to calculate the effective useful life (EUL)
- Variables that impact the EUL
- Customer survey data to calculate the NTG ratio

To establish minimum requirements, it is important to acknowledge the need for balance between measure priority, data needs, precision requirements, data collection costs, and timing of data availability. The first six proposed data requirements listed above are in fact reasonable for measure development, but the quality of the data and the associated uncertainty of estimates will vary considerably and depend upon the available budget for data collection. If California established a "planning measure" category with less stringent thresholds for precision, and a "full measure" category for full-scale program deployment and claimed savings, these first six requirements can be established in a way that would balance the sometimes-conflicting needs for deemed measure savings. The last three items listed above would be difficult to meet, particularly for new measures. It is reasonable to infer values associated with similar technologies with which the PAs have more experience and for which data is more readily available from impact evaluations. Ideally, PAs will propose to update deemed measure impacts (and/or inputs) as ex post EM&V data becomes available.

Since errors in the current workpaper/ex-ante database submission process were identified in the ESPI reports as a source of low scores, training and thorough instructions will be critically important to ensure proper data population and formatting.

⁸ Annette Beitel. Personal communication with Robert Mowris, June 30, 2017.

Guidance for Workpaper Developers

To support standardization, the Cal TF provides the following key tools for workpaper developers:

- Workpaper Template. The current Workpaper Template with embedded instructions is available for download from the Cal TF website, and is included in Appendix 1 of this TPP. For reference, the proposed eTRM Data Specification is also included as Appendix 2 of this TPP. The following section of this TPP, (Guidance for internal Workpaper Peer Review and QA/QC Process) provide additional insight into the expectations for workpaper content.
- eTRM Data Specification Template. This Excel spreadsheet provides the data fields required for measures for the eTRM, attached as Appendix 2. Instructions for the eTRM Data Specification are pending and will be added once the eTRM project is further developed.

Guidance for Internal Workpaper Peer Review and QA/QC Process

Internal Workpaper Peer Review and QA/QC – General Instructions

The purpose of Internal Workpaper Peer Review and QA/QC Process is to review all sections in the workpaper narrative to verify technical data, methodology, inputs, assumptions, and references to identify and eliminate errors.

Key elements of the Internal Workpaper Peer Review and QA/QC Process are summarized below.

- Workpaper Reference Material. Reference materials includes (but is not limited to) previous workpaper versions, technical analyses, field studies, EM&V studies, laboratory test results, and market studies. All reference documents are required to accompany each new and revised workpaper. The peer review will ensure the latest copy of the workpaper narrative (Word document) as well as all additional reference files are attached to be submitted with the workpaper. (either embedded in the to the Word document or as a separate zipped file (if large). The peer review shall document any missing reference materials and/or materials that are incorrectly cited.
- Workpaper Nomenclature. A new eTRM statewide workpaper nomenclature has been approved and is to be followed by all parties. The details of the new naming convention are presented in the document “New Naming Convention for Statewide Measures (Workpapers)” included in Appendix 7.
- Workpaper Template. The workpaper narrative must conform to the latest Workpaper Template that is downloadable from the Cal TF website, also included as Appendix 1.
- Consistency of Inputs and Outputs. A critical element of the internal peer review is to verify the consistency of values throughout the narrative (particularly between the body of the workpaper and the “At-A-Glance” section). Metrics of particular importance are energy savings, demand impacts, EUL, NTG ratio, and costs.
- Documentation of Methodology and Sample Calculation. The internal peer review shall ensure that the workpaper narrative includes documentation of methods to derive the estimates of energy savings and demand impacts. Note that a sample calculation must be provided, and the peer review should verify the energy savings and demand impacts

in the sample calculation are consistent throughout the document and is traceable to the “At-A-Glance” section in the narrative.

Internal Workpaper Peer Review and QA/QC – Instructions by Section

This subsection provides guidance for each section of the current Workpaper Template that require peer review. The output of the Internal Workpaper Peer Review and QA/QC is the QC *Checklist* (included in Appendix 3). The QC Checklist must be completed and signed off by the peer reviewer to confirm the QC review has been completed. If the reviewer cannot sign off (due to missing or incomplete information, for example), the reviewer must provide the workpaper developer with documentation of specific issues that must be addressed before the workpaper can be submitted to the Cal TF or CPUC for external review.

At-A-Glance Summary

The peer review shall review the At-A-Glance Summary for completeness and to confirm that values in this section are consistent with the narrative. The At-A-Glance Summary includes the following:

- Applicable Measure Codes – List all solution/measure codes
- Measure Description – Describe of the measure
- Base Case Description – Describe the base case technology that will be replaced with the energy efficient technology and state whether the base case is defined as existing equipment or code/standard equipment.
- Common Units (per lamp, per ton, etc.)
- Energy Savings (Base Case – Measure)
- Full Measure Cost (\$/unit)
- Incremental Measure Cost (\$/unit)
- EUL (years) – List all EULs and sources
- Measure Installation Type
- NTG Ratios – List all NTG ratios and sources
- Important Comments

Document Revision History

The Document Revision History section must document all workpaper revisions. The peer review shall confirm the document revision history is complete and includes: revision number and date, the author name and company, and summary of changes for each revision.

Revision History (Example)

Rev	Date	Author	Summary of Changes
00	6/1/15	John Smith (Utility XYZ)	<ul style="list-style-type: none">• Measure offerings and requirements• Calculation methodology and savings• Delivery mechanisms• DEER values: NTG, IR, Technology Fields, EUL, load shapes• Hours of operation• Costs• Adjustments in response to CPUC and Cal TF comments. Refer to table below.

Commission Staff and Cal TF Comments

The peer review shall ensure all CPUC and Cal TF comments are listed and adequately addressed. If, based on feedback from the ex ante review team, a measure is not revised and resubmitted due to the feedback, the workpaper developer does not need to respond individually to all comments but should provide a rationale or explanation of why the measure was dropped.⁹

CPUC Staff and Cal TF Comments (Example)

Rev	Party	Submittal Date	Comment Date	Comments	Workpaper Developer Response
00	CPUC	6/2/15	6/15/15	Comment 1	Response 1
				Comment 2	Response 2
				Comment 3	Response 3
	Cal TF	6/2/15	6/15/15	Comment 1	Response 1
				Comment 2	Response 2

Section 1: General Measure & Baseline Data

The General Measure & Baseline Data section of the workpaper includes six subsections, addressed noted below.

1.1 Measure Description & Background

This subsection provides a general description of the measure and key attributes that distinguish the measure from other similar technologies. This subsection includes base case and measure case metrics, program eligibility requirements, and restrictions. The peer review shall:

- Review all elements in this subsection for completeness;
- Verify that the tables have been completed to specify the base case, measure case, and program requirements; and

⁹ ESPI comments noted a need for WP developers to respond to comments provided by Commission staff. Under current practice, if a PA decides not to pursue a measure after feedback from the ex ante review team, there is often no feedback to Commission Staff on why the PA elected to drop the measure, so the measure is never “closed out.”

- Verify that all tables specify correct units and include citations to reference material.

1.2 Technical Description

This subsection presents a detailed technical description of the measure and shall include citations to relevant studies and reports on the development and demonstration of the technology and its applications. The Technical Description should include justification if proposing the measure as an Emerging Technology (ET) and ET values are used for NTG in Section 1.4 (see below).

1.3 Installation Types and Delivery Mechanisms

This subsection indicates the Installation Types and Delivery Mechanisms for the measure and provides justification why these were selected. Installation Types, Delivery Mechanisms, and Incentive Methods are listed below. The peer review shall review all elements in this subsection for completeness and accurate specification of installation type, delivery mechanisms, and incentive methods.

Installation Types

Installation Type	Savings		Measure Life	
	1 st Baseline	2 nd Baseline	1 st Baseline	2 nd Baseline
Replace on Burnout (ROB)	Above Code or Standard	N/A	EUL	N/A
New Construction (NC)	Above Code or Standard	N/A	EUL	N/A
Retrofit or Early Replacement (RET/ER)	Above Customer Existing	Above Code or Standard	RUL	EUL-RUL
Retrofit First Baseline Only (REF)	Above Customer Existing	N/A	EUL	N/A
Retrofit Add-on (REA)	Above Customer Existing	N/A	EUL	N/A

Delivery Mechanisms

Delivery Method	Description
Appliance Turn-in and Recycling	The program motivates customers, through financial incentives, to recycle appliances that are functional but inefficient. This prevents the continued use of those appliances, by both the current owner and potential future owners.
Audit - Information - Testing Services	The program performs a free assessment of a customer's facility and provides the customer with information and guidance on energy efficiency opportunities.
Financial Support	The program motivates customers, through financial incentives such as rebates or low interest loans, to implement energy efficient measures or projects.
Partnership	The program implements projects through a partnership between the utility and an institutional, government, or community-based organization.
Downstream Programs	See <i>Downstream Incentive in the Incentive Method Descriptions table.</i>
Midstream Programs	See <i>Midstream Incentive in the Incentive Method Descriptions table.</i>
Upstream Programs	See <i>Upstream Incentive in the Incentive Method Descriptions table.</i>

Incentive Methods

Incentive Method	Description
Direct Install	The program implements energy efficiency measures for qualifying customers, at no cost to the customer.
Downstream Incentive	The customer installs qualifying energy efficient equipment and submits an incentive application to the utility program. Upon application approval, the utility program pays an incentive to the customer. Such an incentive may be deemed or customized.
Exchange - Replacement	The utility program holds events where customers can trade functional equipment for similar but more energy efficient equipment, free of charge.
Giveaway	The program provides customers with energy efficiency equipment or services for free.
Midstream Incentive Midstream Buy Down	The program gives a financial incentive to a midstream market actor (distributor, vendor, or retailer) to encourage the promotion of efficient measures. Buy Down means that the incentive is required to be passed down to the end-use customer.
On-bill Finance – Loan (OBF)	The program offers financing for the cost of an efficient measure as part of the utility bill. This can be an add-on option to an existing program or can serve as an organizing principle for its own program.
Upstream Incentive Upstream Buy Down	The program gives a financial incentive to an upstream market actor (manufacturer or distributor) to encourage the manufacture, provision, or distribution of efficient measures. Buy Down means that the incentive is required to be passed down to the end-use customer.

1.4 Measure Parameters: DEER Data and Codes and Standards

Whenever possible, the DEER Measure and DEER Run IDs should be the first source considered to substantiate demand reduction and energy savings claims. It should be noted, however, that DEER is not an exhaustive measure database and may not include certain measures. In addition, DEER data utilized for workpaper development should be assessed to determine if it represents the most current “Best Available Data.”

The peer review shall ensure completeness and accuracy of the following:

- Completion of the DEER Difference Summary table and documentation if and why DEER values were not used,
- Specification of the measure NTG ratio and reference to source documentation,
- Specification of appropriate installation rate from the Remote Ex-Ante Database Interface (READI), and
- Specification of the measure EUL and RUL and source documentation.

This section of the workpaper also denotes federal or state standards and regulations that govern the minimum energy use requirements of the measure. Standards and regulations can impact the assumptions and inputs of the energy savings and demand reduction calculation methods. Commonly referenced sources include:

- California Title 24 Building Energy Efficiency Standards (Title 24),
- California Title 20 and other Appliance Efficiency Program Codes (Title 20),
- California Air Resources Board,
- Title 10 Federal Regulations Code,

- U.S. Environmental Protection Agency, and
- Water Resources Control Board.

The peer review should ensure completeness of this section and confirm that the workpaper references the most recent versions of the State and Federal standards and regulations.

1.5 EM&V, Market Potential, and Other Studies - Base Case and Measure Case Information:

This section of the workpaper should summarize relevant studies that were utilized to develop the workpaper base case and measure case specifications, and that informed the measure development (even if the study did not directly inform workpaper calculations.) This section should also highlight any insights related to industry standard practice (ISP) that could affect the base case for the measure. Commonly used sources include (but are not limited to) the following:¹⁰

- EM&V studies (gross and net impact evaluations, field studies, etc.)
- Baseline studies,
- Market studies,
- Potential studies
- Emerging technologies reports,
- Codes and standards reports, and
- Technology evaluations and demonstration

The peer review should ensure completeness of this section and ensure that complete citations are provided for all studies utilized for workpaper development. Studies referenced in this section should be included as workpaper reference materials, as previously noted.

1.6 Data Quality and Future Data Needs

The objective of this section is to document the quality of the data utilized as inputs in the workpaper calculations. The peer review should ensure completeness of this section, which should elaborate on any or all of the following:

- Are there other sources that should be investigated?
- Is the information used current or are more recent studies available?
- Was the information referenced developed with rigor, is it statistically significant (i.e. sample size, coefficient of variation, standard error of the mean, confidence interval bounds, etc.)?
- Is the data appropriate (applicable) to the measure being developed (i.e. geography, business type, technology, representative of the population)?
- Is there additional data that needs to be gathered to support this workpaper? How might additional data impact the inputs and estimated energy and demand impacts? (For example, new measures may require data collection as part of program implementation)

¹⁰ 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.

or for longer-term studies, and products may start out as low impact but move to high impact later.)

- Is a timeline specified for future data collection and workpaper revisions?
- When will data become out-of-date (e.g. costs due to changing market)?

Section 2: Calculation Methodology

The Calculation Methodology section should provide a clear, detailed, all-inclusive, and defensible explanation of the electric and/or gas energy savings and demand reduction calculation methodology. The peer review shall ensure this section provides the following:

- Explanations of all assumptions;
- Sample calculations;
- Savings calculations for both baseline periods for RET/ER measures with applicable code,
- Explanation of how the methodology meets current industry best practices for accuracy and acceptability;
- Provides references to relevant DEER, EM&V, and other sources that were utilized to inform the methodology;
- Supporting attachments that are embedded or referenced in the Attachments and References sections of the workpaper;
- Documentation for any industry standard practice used as baseline; and
- READI export or DEER Measure ID if any measures are taken directly from or created with READI.

Section 3: Load Shapes

The objective of the Load Shapes section of the workpaper is to document load shapes utilized for the impact estimates. If possible, developers shall use DEER load shapes, which are hourly, until updated load shapes are available. The IOUs also have time-of-use (TOU) load shapes which split a year into five or six time periods defined by utility tariffs. The IOUs may have Load Shape Viewers which can be used to determine the appropriate load shape.¹¹

The ideal load shape for impact estimates would represent the difference between the base case and measure case. The closest load shapes that are applicable to the measure in the workpaper should be listed in the “Building Types and Load Shapes” table.

The peer review shall review this section for completeness and confirm the workpaper utilizes the most appropriate load shapes for the measure.

Section 4: Base Case & Measure Case Costs

Workpaper developers shall utilize values and methodologies from the 2010-2012 WO017 Ex Ante Measure Cost Study Final Report, if possible, until updated values are available. If the WO

¹¹ Note that for SCE the “Occupancy” load shape is not in the Shape Viewer but is an acceptable load shape.

costs are determined to be incorrect, the workpaper shall cite specific research and other reference documentation for suggested revisions. Other sources for cost information may include (but are not limited to):

- Cost studies by PAs or the CPUC;
- Program and invoice data from PAs and their vendors;
- Online retailers 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 RS Means; and
- DOE or Title 24 rulemaking support documents.

The internal peer review shall ensure the workpaper describes the references and methodology used to develop the base and measure case costs. Costs should be broken down by material and labor costs, and should also indicate any incremental maintenance costs, such as water consumption or reduced replacement.

Attachments

The peer review shall verify all reference materials, calculations, and data utilized for the workpaper development. The peer review shall also verify that all reference materials are provided with the workpaper and that embedded attachments are accessible.

References

The internal peer review of the References section should include the following:

- Ensure that original reference documents are submitted with each workpaper. Internet links to documents are not accepted, as URLs may change or break.
- Sources used in the narrative are verified and validated.
- Full citations are provided for all references.
- References are linked through endnotes in the workpaper document to reveal how the references support specific workpaper content.
- Missing or incorrect use of references are flagged to be corrected (i.e. internet links).

Comments

The Comments section of the workpaper shall document all questions, comments, and issues identified during the Internal Workpaper Peer Review and QA/QC. This section shall indicate if any section of the workpaper could not be approved and why.

Upon completion of the Internal Workpaper Peer Review and QA/QC, the reviewer shall return the completed *QC Checklist* with detailed feedback to the developer to address comments and questions. Once all questions and issues have been adequately addressed, the developer can submit the workpaper for Internal Manager Review (see below).

Guidance for Internal Manager Review

After completion of the Internal Peer Review and QA/QC, signified by the peer reviewer signature on the *QC Checklist*, the workpaper developer will submit the workpaper for Internal Manager Review. The Internal Manager Review is not intended to duplicate the peer review summarized previously. Rather, the Internal Manager Review entails a higher-level of QA/QC, including (but not limited to) the following:

- Verification that internal peer review comments were adequately were addressed,
- Documentation of the extent of statewide coordination for workpaper development, and
- If the workpaper was previously reviewed by Cal TF and/or the CPUC, documentation of the extent to which issues were properly addressed and documented.

The output of the Internal Manager Review is the Internal Manager Review Form (Appendix 5), to be completed before the workpaper is submitted (or resubmitted) for external review by the Cal TF and/or CPUC.

Definitions

Base Case – The base case (also referred to as “baseline”) represents the “conditions, including energy consumption and demand, which would have occurred without implementation of the energy efficiency measure.” The base case for retrofit (RET) and retrofit add-on (REA) measures is defined as the existing equipment. The base case for replace-on-burnout (ROB) measures is defined as the efficiency level required by current code.

Database for Energy Efficient Resources (DEER) Database – DEER is a CPUC and California Energy Commission (CEC) sponsored database designed to provide well-documented estimates of energy and peak demand savings values, measure costs, and effective useful life (EUL) in one centralized data source. The intended users of the data are program planners, regulatory reviewers and planners, utility and regulatory forecasters, and consultants supporting utility and regulatory research and evaluation efforts. DEER Data can be accessed and downloaded through the database interface Remote Ex Ante Database Interface (READI) on the DEER website. The database is designed to be both an internet searchable tool as well as being available as a downloadable database. The link to the database is found on the internet at <http://www.deeresources.com/>.

Delivery Mechanism – A delivery mechanism is a delivery method paired with an incentive method. Delivery mechanisms are executed by PAs to enroll program participants that will implement energy efficiency measures.

Effective Useful Life (EUL) – The EUL is an estimate of the median number of years that a measure remains installed and is operational.

Energy Efficiency Measure (Measure) – Installation of equipment, subsystems or systems, or modification of equipment, subsystems, systems or operations on the customer side of the meter, for the purpose of reducing energy and/or demand (and, hence, energy and/or demand costs) at a comparable level of service.¹²

Ex-Ante Database (EAdb) – The ex-ante database contains all the current ex ante data that can be utilized for energy savings claims.

Impact Load Shapes – The impact load shape is the normalized, full-year, hourly profile that dictates the distribution of the UES. The load shape includes 8,760 values, one for each hour of the year. All 8,760 values sum to one. Multiplying the UES value (kWh or therm) by the value for any particular hour will yield the energy savings for that particular hour.

Load Shape – Load shapes are used for portfolio lifecycle cost analysis. A load shape indicates the distribution of measure energy savings over one year. A load shape is a set of fractions

¹² State of California Public Utilities Commission. *California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals*. April 2006. Page 225.

summing to unity, with one fraction per hour (or other time period). Multiplying a savings value by the load shape value for any particular hour yields the energy savings for that particular hour.

Net Impacts – Net impacts is the change in energy use and/or demand that is attributable to a particular program. Net energy use and/or demand impacts may implicitly or explicitly account for freeridership, participant and nonparticipant spillover, and induced market effects. These factors may be considered in how a base case is determined (e.g., common practice) and/or in adjustments to gross savings values.¹³

Net-to-Gross (NTG) Ratio – The NTG ratio is the ratio of net program impacts to gross impacts. The NTG ratio represents the portion of gross program impacts that are directly attributable to a specific program.

Remaining Useful Life (RUL) – The RUL is an estimate of the median number of years a technology or piece of equipment, that is being replaced or altered by an energy efficiency measure, but would remain in service and operational had the program intervention not caused the replacement or alteration. At this time, DEER assumes that RUL is equal to one-third of the EUL. The RUL value is only applicable to the first baseline period for an RET measure with an applicable code baseline.

Retrofit (RET) – The installation of new, more energy-efficient equipment to replace existing equipment that is working and has remaining useful life (RUL).

Preliminary Ex-Ante Database (PRdb) – The Preliminary Ex Ante Database is a supplement to the Ex Ante database (EAdb). PRdb provides access to data that the ex-ante team has recently developed, is currently reviewing or has newly approved.

Program Administrator (PA) – An entity selected by the CPUC and any subcontractor that is retained by such entity to contract for and administer energy efficiency programs funded in whole or in part from electric or gas Public Goods Charge funds.¹⁴

Remote Ex-Ante Database Interface (READI) – is a program that allows users to examine the CPUC's databases of ex ante measure information. The ex ante database (EAdb) and the preliminary ex-ante database (PRdb) can be viewed using the latest version of READI. The latest version of READI is available for download at <http://www.deeresources.com/index.php/ex-ante-database>.

Technology and Measure Costs – Deemed cost values in DEER include the following values:

- Basis material costs for baseline and measure technologies
- Basis installation costs for measures and technologies

¹³ Schiller, Steven R. Energy Efficiency Program Impact Evaluation Guide. State and Local Energy Efficiency Action Network. 2012.

https://www4.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf

¹⁴ State of California Public Utilities Commission. *California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals*. April 2006. Page 217.

- Regional multipliers for labor and material costs that account for cost variations by geographic region

Unit Energy Savings (UES) – UES values are the annual savings associated with a specific measure. Savings include annual total electric savings in kWh, annual total gas savings in therms, and peak period demand reduction in kW. Savings are expressed in terms of a “common unit.”

Workpaper – A workpaper contains the calculations and justification to document cost-effective energy savings of an energy efficiency measure.

Appendices

Appendix 1 - Workpaper Template with embedded instructions



Statewide Work
Paper Template v0 SC

Appendix 2 - eTRM Data Specification Template (instructions forthcoming)



Data Spec02192017
ver. 2.0.xlsx

Appendix 3 - Peer Reviewer QC Checklist



QC CHECKLIST for
Work Paper narrative

Appendix 4 - Data Source Quality Analysis Template



Data Source Quality
Analysis Template 2.0

Appendix 5 - Internal Manager Review Checklist



Internal Manager
Workpaper Review.doc

Appendix 6 – TPP7 (includes description of Cal TF Peer Reviewer responsibilities along with approval form/checklist)



TPP+No. +7+QA+Q
C+Expectations+for-

Appendix 7 – New Naming Convention for Statewide Measures (Workpapers)



New Naming
Convention for State'