



eTRM Threshold Issues: Technical (Draft)

In preparation for transitioning from DEER to an electronic TRM (e-TRM), several issues have been identified that need to be addressed to ensure an efficient process leading to consistent principles and practices for measure development, leading to a “Best in Class” eTRM. Developing consensus agreement on how to address these issues at the onset will improve the development process and ultimately the usability and confidence in the e-TRM. Parties that need to be involved in addressing and finalizing approach to each of these issues include IOUs, POU's and CEC/CPUC Staff.

Each issue is described and a “strawman” approach is listed below the following summary table. In some cases, approaches taken by other jurisdictions are identified to help provide options for California to consider. The process of seeking input and finalizing approach will be to convene Cal TF subcommittee to review/refine response; review with full TF, then seek CPUC and CEC staff approval.

eTRM Threshold Issues				
Technical	Individual Measure Development	Issue	Status	Details
		What is a discrete measure?	Not critical path	EE Policy Manual definition too high level
		Measure complexity and parametric analysis	Proposal Affirmed	Cal TF staff proposal documented in TPP5 and affirmed by Cal TF for 1 year test
		Develop standard format for each measure	Critical path	Need to get input from reporting teams & CPUC staff to understand which fields are important & useful and which are erroneous/extraneous
		Develop workpaper requirements	Critical path	WPs are currently inconsistently developed
		Definition/agreement on Best Available Data	Proposal Affirmed	Addressed in TPP4
	Parameter Development	When should a measure be deemed vs. custom?	Straw Man Proposal	Goal is for this to determine what does and does not go in the eTRM.
		When should a measure be simplified engineering calc's vs. modeled?	Straw Man Proposal	Outlined in TPP5
		When should interactive effects be used	Additional items need to addressed	Subcommittee brought up addressing cascading affects and embedded energy-water consumption considerations
		How should interactive effects be derived?	Additional items need to addressed	Subcommittee brought up how do you make sure the same sources and methodologies are being used consistently and appropriately
		How should EUL be determined?	Not critical path	Need to define how dual baseline would be handled in terms of data structure
	eTRM Population	How should technologies or measure be grouped or organized?	Straw Man Proposal	Start with technology/end use groupings in DEER, compare to other TRMs
		Evaluate opportunity to consolidate current overlapping measures	Additional work required	Subcommittee expressed concern about making sure most recent data used, nothing missed from other utilities, timeline to accomplish, QA/QC step req'd
		Identify which measures to prioritize for review/moving into eTRM	In Progress	Under review by Process subcommittee

		Establish written QA/QC process and standards to ensure high quality, error free measures populate the eTRM	Subcommittee reviewing proposal	Cal TF Staff proposal being discussed in subcommittee. Subcommittee also recommended to embed "sanity checks" in data system to ID obvious errors.
		Determine what source will be used for building prototypes in the eTRM	Under review	Source data for current building prototypes in DEER difficult to obtain
	Models	Identify residential modeling tool	Under review	Evaluate options & make recommendation
		Decide level of <i>initial</i> cross validation required for modeled measures	Under review	Need to determine the value in such a validation if changing from DOE2.2 to EnergyPlus
	Other	Finalize data fields and requirements for Secure File Transfer(s)	Under review	Cal TF Staff gathering data
		Identify eTRM repository and cost	Under review	Will need to be bid. Bid evaluation criteria need to be developed.
Process		Develop collaborative approval process to expedite eTRM development and implementation	TBD	
		How will impact evaluation result be used to update assumptions for specific measures?	Subcommittee Needed	Subcommittee feedback: program delivery methods are an important consideration when discussing how to apply this data
Other		Process for determining whether metered or deemed/calculated approach should be used to establish savings	Subcommittee Needed	Cal TF Staff to establish Q2 Subcommittee Subcommittee feedback: belongs in Best Available Data discussion, need guidelines

Defining What Is a Measure?

Clear and consistent measure definition will need to be applied statewide.

Other Jurisdictions:

- From Illinois EE Policy Manual: Measure(s) mean an energy-using appliance, piece of equipment, audit, or practice that will result in measureable, reduced energy usage at a comparable level of service.
- NW RTF: Measures are classified by the RTF according to the method used in estimating savings. Four savings estimation methods are defined: Unit Energy Savings (UES), Standard Protocol, Custom Protocol and Program Impact Evaluation.
- Wisconsin Focus on Energy (FOE): FOE TRM describes three measure types: Prescriptive, Custom and Hybrid. Hybrid measure savings, like custom measure savings, vary by project, and are treated like custom measures in the TRM. The distinction between hybrid and custom measures is that the value of custom incentives also varies by project, while hybrid incentives are the same for each project.

The most common measure is probably the partially deemed algorithm where savings are based on a formula where input parameters are stipulated but allow for some flexibility based on project-specific conditions.

Recommendation: In deciding whether to create a distinct Workpaper for a measure, the following should be considered:

1. Can differences be addressed through look-up tables (if so, combine into single measure)

2. Is methodology for calculating savings the same (even if inputs to calculation different) and other measure parameters the same (if so, combine into single measure)
3. Are differences due to different climate types, vintages, building types (combine into single measure)
4. Is measure delivery distinct enough that measure parameters will largely vary (IMC, EUL, NTG, ISR) (Consider whether look-up table can address or separate measure is cleaner)
5. Is technology different? (e.g. LED vs. HID lighting)(Need different measure)
6. Is technology and/or measure definition same, but different manufacturer? (Strong preference is single measure)
7. Is fuel type different (combine into single measure and use look-up table)

Subcommittee suggested developing a decision tree based on the items listed to help guide the process.

Measure complexity and use of parametric analysis

“Measure complexity” in this context generally refers to a) how many different “measure combinations” should be developed for a measure to account for differences in how a measure is deployed, where it will be installed, and how it will be used, and b) the engineering approach used to generate savings estimates, either through building energy computer simulations or through simpler engineering calculations that require fewer inputs and assumptions, and c) the application of additional factors such as HVAC “interactive effects” to more accurately estimate energy savings.

Measure complexity and costs associated with developing and updating measures can and should be addressed through parametric analysis – understanding what parameters most impact key outputs (savings and cost-effectiveness analysis) and what measure combinations are significantly different. Open Studio, one of the EnergyPlus interfaces, allows for high-speed, high volume parametric analysis. The parametric analysis function can be used to identify which input parameters are drivers of key outputs, so that the greatest scrutiny and follow-up data collection and analysis can be focused in impactful input parameters. Furthermore, parametric analysis can be used to identify which measure combinations are truly distinct – if two different measure combinations do not yield truly distinct energy savings values when applied to a building prototype in a parametric analysis, then there the measure combinations should be combined into one.

Recommendations: Cal TF Technical Position Paper No. 5 (TPP5), Reducing Measure Complexity outlines recommendations based on measure impact and has been approved by Cal TF for one year test.

Develop standard format for each measure

Including applicable sector (i.e. commercial, residential), measure description, baseline condition, efficient (measure case) condition, savings methodology (deemed value or deemed savings calculation), Equipment Useful Life (EUL) and Incremental Measure Cost (IMC).

Recommendation: Review current template and identify ways to streamline requirements to only capture critical data. Include input from reporting teams & CPUC Staff to determine necessary fields to include.

Develop workpaper requirements

Develop standard format that can be utilized by interested parties to develop and submit measures. Currently workpapers are inconsistently developed. Note that in an eTRM, traditional workpapers would be eliminated, but similar information and data would be captured in a measure workbook.

Recommendation: Review current draft, simplify and only require information that is essential to measure development and verification. Outline how common data sets that may be used by multiple measures can be addressed by using relational databases (libraries of values).

Definition/Agreement on “Best Available Data”

One of the first questions that needs to be answered is does “Best Available Data” mean using the best that currently already exists, or does it imply some level of evaluation of current data and a potential responsibility to gather additional data if warranted. If so, questions about timelines, costs, etc. will also need to be addressed. In California this seems to have been interpreted differently by different parties, so developing and agreeing to specific criteria is important going forward.

The NW RTF provides the most specific guidance on this issue. The RTF must diligently review a study before approving the use of these values in the estimation of measure savings. A diligent review will include, but is not limited to understanding the characteristics of the sample studied, the study’s data collection methods and analysis methods, and the variability of the parameter estimates across the study sample. A diligent review will consider whether the sample is applicable to measures delivered in this region and if not, whether it is feasible to normalize the results for application to this region.¹ The process also addresses diligent review of relevant data sources and estimation methods and the preparation of complete and transparent documentation of methods and data sources.² The RTF also addresses requisite skill level for the analyst or support team responsible for developing a unit energy savings (UES) measure. For some parameters, which are not primary determinants of measure savings, the RTF may rely on consensus opinion from a panel of experts in lieu of primary data collection.³

While most jurisdictions have rather limited discussion of data quality, data rigor and quality is generally validated through a public, transparent peer review process so that experts can review

¹ Regional Technical Forum, Roadmap for the Assessment of Energy Efficiency Measures, June 17, 2014, p. 4.

² Id. p. 14.

³ Regional Technical Forum, Guidelines for the Estimation of Energy Savings, June 17, 2014, pp. 7-9

and comment on data and resulting values. Furthermore, resulting values and measures are documented in easy-to-use TRMs that clearly link the measure, savings values and other measure parameters and source documentation so that professionals who wish to use and understand the information know how it was derived and can independently validate and/or update it. The combination of high-level standards, a public, transparent peer review process, and documented, public Technical Reference Manuals is the approach generally used to ensure data quality and rigor in other jurisdictions.

Recommendation: Cal TF Technical Position Paper No. 4: Using Best Available Data to Determine Deemed Savings lays out a set of several recommendations to address.

When should a measure be custom vs. deemed?

Deemed savings values (or stipulated savings values) and deemed savings calculations are an important element of Technical Reference Manuals (TRMs). They provide a certain level of certainty to program implementers while providing a relatively low-cost method to estimate measure savings. Use of deemed savings is appropriate for well understood and well documented energy efficiency measures.

The savings estimates or calculations must be developed from reliable data sources or analytical methods. It is also important to determine if the deemed savings value is appropriate to the specific application. Deemed savings calculations are based on a formula where input parameters are stipulated but allow for some flexibility based on the project-specific conditions. In some cases look-up tables are used because they allow for an appropriate level of measure streamlining and customization within the context of an otherwise prescriptive program. In cases where lookup tables are provided, there is a range of deemed savings estimates that are possible, depending on site-specific factors such as equipment capacity, location or building type.

Recommendation: Where there is a high degree of variability of potential savings (i.e. operating conditions which can vary and aren't known can cause savings to vary by more than 10%) or the measure application is different than the conditions for which the deemed savings value was determined, custom calculations must be performed. It may be appropriate to move measures from custom to deemed if enough data can be gathered over time to validate/justify deemed treatment.

When should you use building simulation (modeling) vs. engineering algorithms?

The two main methods used for calculating savings are engineering algorithms and building simulations, and there are pros and cons to both. Additionally, sometimes a hybrid method is used where building simulations are used to develop inputs used in the algorithms. Unlike simulation models, engineering algorithms also provide flexibility and the opportunity to substitute local, specific information for specific input values. Simulation is most useful for estimating savings from commercial or industrial HVAC energy use. This includes HVAC efficiency and envelope improvement measures. Simulation is also commonly used to estimate the effects of HVAC interaction with lighting efficiency measures. Generally, based on the

complexity of the calculations one might expect building simulations to be more accurate than engineering calculations, but that will only be true if several things take place. A significant amount of detail to model the baseline and the efficient condition are available, and the simulation tool is used properly for the situation being evaluated.

Recommendation: Cal TF Technical Position Paper No. 5 (TPP5), Reducing Measure Complexity outlines recommendations for calculation approaches based on measure impact and weather sensitivity.

When do you need to include interactive effects? How are they determined (modeled vs. algorithm)?

There seems to be general agreement that the interactive effects of lighting measures on HVAC operations should be included. Beyond that, establish threshold estimated impact recommendation as to when other interactive effects should apply. The Northwest Regional Technical Forum guidelines consider “interaction” effects to be significant if the interaction changes a measure’s savings estimates by more than +/- 10%.

Recommendation: Adopt NW RTF guidelines, if “interactive” effects change a measure’s savings estimates by more than +/- 10% it needs to be included.

How to determine proper Equipment Useful Life (EUL)

In reviewing multiple TRMs, this seems to be the most poorly documented assumption. The most common reference nationally is to DEER EULs. In researching the origin of some of the DEER EULs, in addition to being difficult to find, it was determined that many of the sources were either very dated or had no data driven basis. Some type of organized regional or national effort would seem to be warranted, especially if savings estimates are to be relied upon over the EUL.

The draft Clean Power Plan Guidelines issued in August 2015 state that persistence studies should be conducted at least every five years and encourages participation in collaborative and joint research to improve the breadth and quality of EUL values. Future discussions may also need to address savings degradation over the EUL.

Recommendation: Add a component to the California EM&V process that gathers information related to EULs, initially focusing on high impact measures. In addition, reach out to manufacturers and industry organizations to determine what EUL data they have gathered. Also need a plan for outlining how dual baselines will be handled in terms of data structure.

How should technologies or measures be grouped or organized?

Other Jurisdictions:

Most TRMs start with the simplest breakdown which is residential and commercial & industrial (C&I). Popular residential categories include: lighting, HVAC, envelope, and water heating. Popular commercial categories include: lighting, HVAC, water heating, refrigeration, envelope and food service equipment. Several also have specialty categories like agricultural, behavioral,

renewable energy and consumer electronics. Logical groupings will make the e-TRM a more user friendly tool, especially for infrequent users.

Recommendation: Start with technology/end use groupings in DEER. Compare to 2-3 other high-quality, comprehensive TRMs to see if any technology/end use category should be re-grouped or added. If changes to existing DEER grouping recommended, develop clear recommendation and rationale.

Evaluate opportunity to consolidate current overlapping measures (i.e. develop a statewide savings methodology where there are currently similar measures across multiple utilities with different savings values)

This is an important step in developing a statewide tool and increases the credibility of savings values by agreeing on the same savings value for the same measure. Presently in DEER, there appears to be different savings values for the same measure, depending on the utility. This is likely due to variations in the savings calculation methodology developed in separate workpapers for the same measure by each utility. Addressing this will first require identification of the specific overlapping measures, then a joint effort to arrive at a common methodology to apply statewide. None of the other TRMs reviewed differentiated measure savings based on different IOUs in the same state (other than addressing climate zones). Addressing these overlapping measures will also make navigating the e-TRM easier, therefore making it more user friendly.

Recommendation: Cal TF staff to review inventory of current workpapers to identify overlap and potential opportunities for consolidation.

Identify Which Measures to Prioritize

Use e-Stat to identify all HIMs (statewide or for each utility) and also which measures make up 80% of the cost-effective portfolio savings and are expected to still be HIMs in two years (and also collectively constitute 80% of portfolio savings). Seek subcommittee input on prioritizing review/moving into eTRM, which ideally involves “lumping” measures together in like end-use categories for efficient review.

Establish Written QA/QC Process and Standards To Ensure High-Quality, Error-Free Measures Populate eTRM (Validation and Documentation)

Develop a written process describing how initial and subsequent updates will be validated. The written guidelines need to include clear roles and responsibilities for each participant/organization involved in the review process as well as checks and balances to ensure multiple levels of review (at a reasonable cost). Also, define what level of documentation is required and does is meet “Best Available Data” requirements established separately. Finally, address how to handle situations where consensus cannot be reached.

Recommendation: Cal TF Staff to develop outline of current and proposed process, then establish Cal TF subcommittee to review and evaluate options. Begin by evaluating the process

NREL currently uses for EnergyPlus. Embed “sanity checks” in data system to identify obvious errors.

Determine Source for Building Prototypes

Investigate available options to determine the best choice for building prototypes to use in the eTRM.

Identify Residential modeling tool

Certain members of the Cal TF expressed concern about the residential modeling capabilities of EnergyPlus.

Recommendation: Evaluate available options and recommend best tool for residential modeling going forward.

Level of *initial* cross validation required (EnergyPlus vs. DOE2.2)

Recommendation: This would not be a QC process per se, but meant to be a high level cross check. This cross validation would only be recommended for the initial e-TRM development and would not be an ongoing requirement. If values were within a certain range (say 25%) no further action would be required, but if further ranges seen investigate if one of the values (DOE2 or EnergyPlus) is in error.

Finalize Data Requirements

Identify what data must be available for downloading through Secured File Transfer to CPUC, CEC, IOU and POU purposes.

Recommendation: Alejandra Mejia gathering data, will work with parties to identify which data is really necessary going forward to streamline and reduce costs of data management.

Identify eTRM Repository and Cost

eTRM repository specifications must be finalized. The eTRM repository will need to be bid. Bid evaluation criteria need to be identified. Bid reviewers should include one from each IOU, and one each from SMUD and LADWP.

Develop a collaborative approval process to expedite e-TRM development and implementation (Cal TF/CPUC Staff)

Determine early on what information in DEER is available and useful in supporting the development of the new e-TRM. By doing this whole process jointly (i.e. as a collaborative) vs. in series, involved parties will have a better opportunity to collaborate and develop an understanding of others positions in real-time and significant efficiencies will be gained in the development and implementation schedule. Final e-TRM approval should come from the California Public Utility Commission (CPUC).

How will impact evaluation results be used to update assumptions for specific measures or programs?

Recommendation: Deemed measures should be regularly updated based on impact evaluation results. This issue may also be informed based on the next issue dealing with the future role of metered data. It would be useful to include the program(s) evaluator to develop this further. Program delivery methods are also an important consideration when discussing how to apply this data. This is a complex topic; a Cal TF subcommittee will be established in 2016 to further develop this item.

Identify Process for Determining Whether Metered vs. Deemed/Calculated Approaches Should Be Used To Establish Savings

It will be very dependent on the specific measure and the type of field data available. This topic is another piece of the “Best Available Data” discussion and will likely require guidelines for application. Presently, virtually all of portfolio savings are estimated, either through deemed or calculated methods. Since AB 802 and SB 350 focus on meter-based savings it will be important to address to what extent future savings should be metered/pay for performance versus deemed/calculated. It would be helpful to get insights from the program(s) evaluators on this topic. Note that this topic was also addressed as part of the CPUC Workshops on 1/26/16-1/27/16.