

Cal TF PAC Teleconference Update



MONDAY, JUNE 17, 2019

Agenda

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- Cal TF Modeling Charrette
- eTRM Meeting with CPUC Staff/Consultants
- eTRM Enhancements
- Low-Income Subcommittee
- eTRM Extension

Cal TF Modeling Charrette Update



ANNETTE BEITEL
JUNE 17, 2019

Building Simulation Modeling in CA

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CEC	CPUC	Other	Future
<p>Code development</p> <p>Code compliance</p> <p>Demand forecast</p> <p>CEUS</p> <p>Policy analysis & Implementation (e.g. SB 350, SB 1477)</p>	<p>Deemed measures</p> <p>Custom measures/projects</p> <p>Project analysis (SBD)</p> <p>EM&V (i.e., potential studies?)</p>	<p>Forecast load impacts</p> <p>Benchmarking</p> <p>Local ordinances</p> <p>GHG targets</p>	<p>LA Project</p> <p>Large-scale regional models to identify where interventions will be most cost-effective</p>

Charrette Goals

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- Morning: Level Set and Identify the Current State in California
- Afternoon:
 - ❑ Identify future opportunities
 - ❑ Identify **Actionable Solutions**
 - ✦ Short term (< 1 year)
 - ✦ Medium term (1 – 5 years)
 - ✦ Long term (> 5 years)

*Focus on **California** needs and solutions !!!*

Participating Organizations

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Regulatory

CEC
CPUC

Utilities

LADWP
SCE
PG&E
SDG&E
SoCalGas

DOE/Labs

DOE
NREL
PNNL

Cal TF

Cal TF

Trade Organizations

IBPSA-USA

Non-Profit

The Energy Coalition
Elevate Energy

Implementation

Energy Solutions
Onsite Energy
AESC, Inc.
Lockheed Martin
CLEAResult
Synergy
NORESO
San Francisco Office of the
Environment
Sustainable Returns

EM&V

SBW Consulting
DNV GL
ERS
SKEE

Engine Developers

IES Ltd.
SAC Software Solutions
Red Car Analytics
Big Ladder Software
Bruce Wilcox
NORESO
Model Efficiency

Engineering/Implementation Support

Solaris-Technical
RMS Energy Consulting
Maddox Energy Consulting
2050 Partners
Resource Refocus
TRC

University

UC Davis - WECC

Cal TF Business Plan Goal

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Develop High-Level Proposed Approach for Achieving Statewide Consistent Approach To Building Simulation Modeling in California.

“Consistent” is not intended to mean “the same” or “identical” modeling

Identify common goals and propose approaches to harmonize modeling to:

- ❑ **Reduce inefficiencies** – leverage taxpayer/ratepayer investments, encourage collaboration
- ❑ Maintain or improve **modeling rigor**
- ❑ Identify what constitutes **sufficient evidence** such that results of a new model are **reliable for savings calculations**
- ❑ Achieve **consistent documentation** so results are **transparent** and can be **reproduced** and **peer reviewed**

CPUC Staff (Manisha) Comments

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DEER 2021 Draft Scoping Memo explores use of other building simulation tools beyond DOE2:

“This is another issue that has been raised in many venues, especially with the increased use of the EnergyPlus™ building simulation tool for other state-sponsored work (e.g. California Energy Commission Title 24 compliance tools) and custom projects.”

Staff is seeking stakeholder input:

- Why do we (CPUC) need to change from status quo?
- How do we get to the desired outcome?
- How to fund transition effectively, particularly cost of converting DEER prototypes?
- How can staff gain confidence with use of other building simulation tools?

Assessment should lay out **questions, issues, needs, concerns** and establish a **systematic plan** for deciding whether new tools and prototypes should be developed and **establish a timeline for the development and execution.**

Also . . . “What is necessary for us (CPUC) to feel comfortable that alternate modeling engines are producing accurate results and not over-inflating savings?”

Martha Brook (CEC) Comments

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- Establish sustainable, effective roles for state government
 - Better to reference industry standards than for governments to establish, maintain and update all standards, including model tool sets
 - Govs should only fund the application layers needed for policy development & implementation
 - Govs could help launch but then collaborate with others to support model test stds, MAP database (see below)
- Leverage past investments in CA and US
 - We have already paid multiple times to model every building in CA, for example
 - ✦ MAP == Model Amnesty Program → statewide model database: inputs & outputs
- Use all approved model results: distributions are better than singular estimates for decision making

Statutory and Regulatory Requirements

re: Modeling

10.3. (Rule 10.3 of Commission's Rules of Practice and Procedure) - Computer Model Documentation.

(a) Any party who sponsors testimony or exhibits which are based in whole, or in part, on a computer model shall provide to any party upon request, the following information:

- (1) A description of the **source of all input data**;
- (2) The complete **set of input data** (input file) as used in the sponsoring party's computer run(s);
- (3) **Documentation** sufficient for an experienced professional to understand the basic logical processes **linking the input data to the output**, including but not limited to **a manual** which includes:
 - (A) A complete list of variables (input record types), input record formats, and a description of how input files are created and data entered as used in the sponsoring party's computer model(s).
 - (B) A complete description of how the model operates and its logic. This description may make use of equations, algorithms, flow charts, or other descriptive techniques.
 - (C) A description of a diagnostics and output report formats as necessary to understand the model's operation.
- (4) A complete set of output files relied on to prepare or support the testimony or exhibits; and
- (5) A description of post-processing requirements of the model output.

See also Public Utilities Code section on computer modeling (Secs. 1821 and 1822.)

Other Stakeholder Goals

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- Build common understanding of “current state”
 - Use cases
 - Building simulation models, rulesets
 - Broad areas of agreement
- Improve Tracking and Coordination: How can CA better track and coordinate existing efforts to improve modeling (transparency, usability, etc.) while reducing costs?
- Anticipate and Plan for Future Needs and Opportunities: How can modeling be used to meet future needs (such as analysis for grid, electrification, GHG reduction)?
 - Advanced modeling capabilities
 - New opportunities for modeling
- Emerging Trends: Identify emerging technical and policy trends that can benefit from modeling

Prior Collaborative Efforts to Understand / Improve Modeling

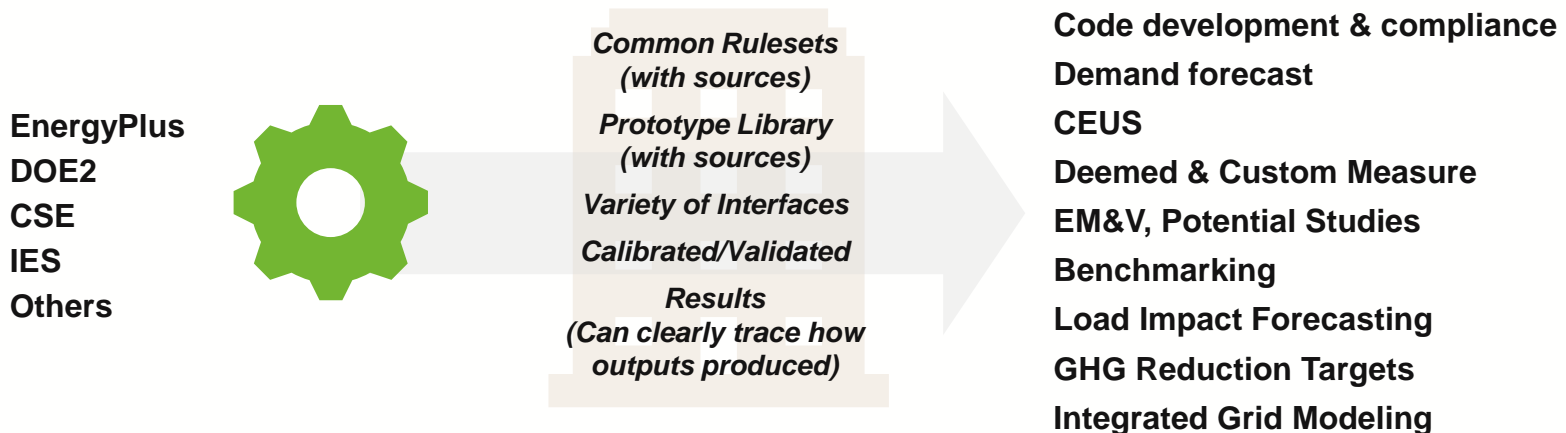


- Rocky Mountain Institute (2011)
 - ❑ Not CA-specific.
 - ❑ Voluminous materials produced; information on specific models out-of-date but good section on history of modeling.
- CPUC Energy Modeling Tools Workshop (2015)
 - ❑ To exchange information on the predominant whole building energy modeling simulation tools in the market to understand what's out there, how it's used, and how we understand the strengths and weaknesses of each tool.
 - ❑ Did not produce specific action items or "next steps."
- Cal TF Technical Position Paper (January 2016 Cal TF affirmed)
 - ❑ Compared DOE 2.2/EQuest and EnergyPlus/Open Studio for developing deemed measures for eTRM.
- SCE Software Symposium (2017, 2018)
 - ❑ Focus on improving code compliance software tools.

Desired Future State (Starting Point)

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- A variety of building simulation models are available and accepted for range of uses
- Ability to easily create well-documented new measures and prototypes
- Ability to use modeling for new uses and opportunities (such as large-scale parametric analysis)



Cal TPP – California Focus!

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- Goals (needs)
- Background – Prior Collaboratives and Literature Review
- Current State and Current Challenges (issues, concerns)
- Metrics to evaluate options
- Desired Future State
- Future Uses
- Path Forward
 - Broadly socialized
 - **Actionable solutions** and proposed implementation path.
 - Short-term (< 1 year)
 - Medium-term (1 – 5 years)
 - Long-term (> 5 years)

Feedback and Next Steps

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Very impressive! I'm really glad I came.

Thanks again for your dedication, thoughtfulness, initiative and desire to improve the process and system! We've all got a lot of work ahead of us....

- Survey
 - Input on process, “key topics” and who would like to contribute
- Work Product
 - Modeling TPP
 - Update TPP 3
- Next Modeling Meeting
 - October 2 and 3

CPUC Staff and Ex Ante Consultant & Cal TF Staff Discussion *Relationship Between DEER and eTRM*



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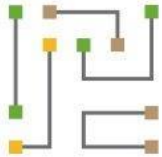
Overview

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- June 6 – 7 (1.5 Day Meeting)
 - CPUC Staff requested
- Attendees
 - CPUC Staff (Manisha, Peter B., Bob H.)
 - Cal TF Staff
 - Consultants (from DC, MA, SoCal)
- Key Objectives
 - Can eTRM replace “DEER”?
 - Launch Plan ***
 - Timing ***
 - Governance
 - CPUC Staff/Consultant Needs

Can eTRM Replace DEER in DEER Ecosystem?

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eTRM
best in class

- Statewide Measures
- DEER Measures + MASControl
 - Post MASControl processing
- DEER Measures + Other Tools
- DEER IDs and SW Measure IDs
- DEER Support Tables
- CET
- CEDARs
- Other DEER functions?

Discussion Topics

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- Identifying and Moving DEER References into eTRM

- Process and benefits

This is a treasure trove of information and will be useful across the country

- Review Cal TF Staff Comments on draft DEER Scoping Memo

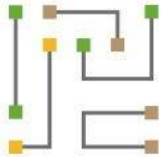
- Review comments that relate to eTRM and consolidated SW measures
 - Review Cal TF comments
 - ACT: Discuss whether eTRM and consolidated measures meet proposed enhanced functionality requirements for DEER and “DEER WP” described in draft Scoping Memo.

- Governance Options

- Ownership of eTRM Tool
 - Control of Values
 - Proposed Option #1 – Current model – IOUs/POUs
 - Proposed Option #2 – Joint CEC/CPUC Ownership
 - Other Options? (none proposed)

Timing - Proposed

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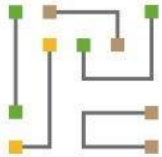


eTRM
best in class

- Timing (Discussed)
 - “Soft Launch” November 1
 - Values start being used – January 1, 2020
 - WPA – switch from WPA – January 2021 (?)

Launch Plan

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eTRM
best in class

- Launch Plan Outline

- Business Case

- ✦ Transparency, well-documented, administrative, cost

- Process

- ✦ CPUC/CEC
 - ✦ IOUs/POUs
 - ✦ 3P

- Communications and Training

- Roles and Responsibilities

- Proposed Regulatory Path

- Next Steps

- Draft Launch Plan: End of July

- Socialize and seek input from key stakeholders

Other

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- eTRM Proposed Enhancements (Working Group)
 - Review proposed 2019 enhancements, with focus on relevancy to CPUC needs
 - Feedback from CPUC Staff/Consultants
 - ✦ **Accuracy**: Are CPUC-approved values in eTRM? (Does eTRM correctly compute approved values?)
 - ✦ **Control** of CPUC-approved Values
 - ✦ Workflow Management
 - ✦ Early visibility of measures (even ET . . .)
 - ✦ Interface with CET
 - ✦ Reporting/dashboard features and flexibility

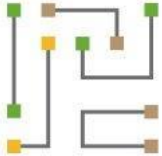
eTRM Phase 3 Enhancement List



ROGER BAKER
JUNE 17, 2019

Phase 3 List

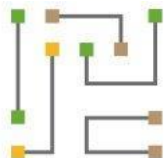
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- Original list had 54 items
- SBW/OMBU provided rough estimates of development hours
 - Ballpark estimate ~\$469k
- Additional items added to list
 - GHG incorporation
 - Water-energy nexus
 - Measure characterization-only export
- Updated list (post-charrette) circulated to IOU/POU funders
 - Enhancements translated to 64 Functional Requirements
 - Updated list provided to SBW/OMBU for repricing based on updated requirements

Key Enhancements

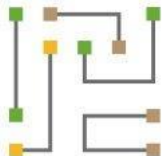
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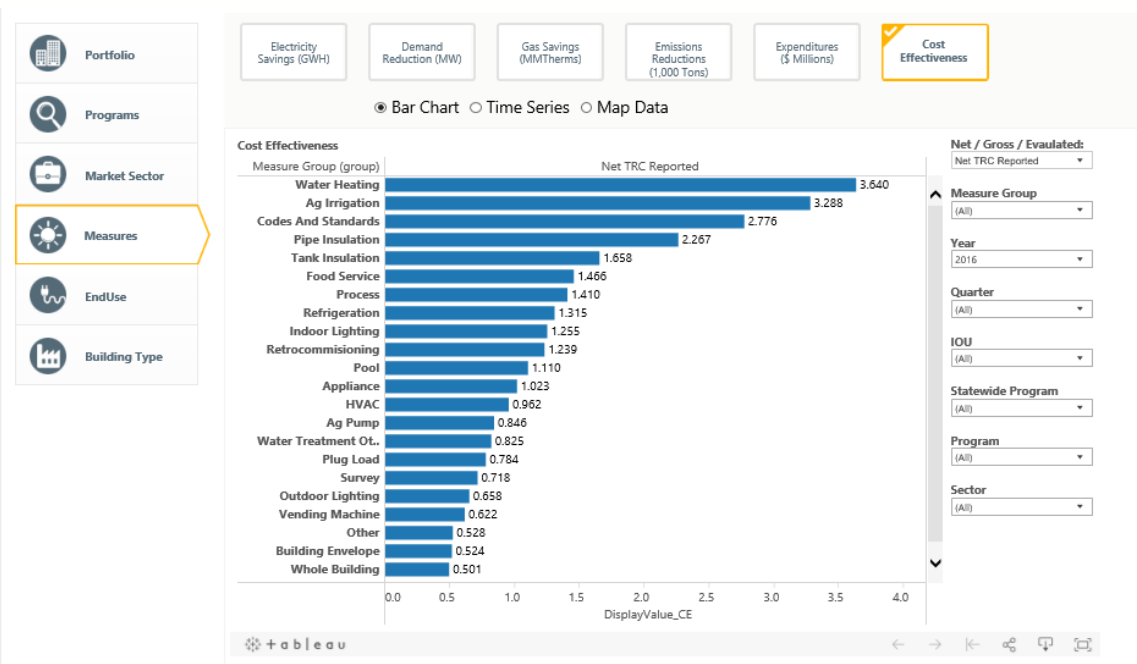
- Reporting Tools
 - Enhanced built-in reports
 - Tableau for graphs and advanced reports
 - “Behind-the-scenes” connection for advanced, administrative reports
- Configurable Security
 - Flexibility to meet needs of multiple-party review and measure management
- Automated Workflow
 - Augments existing workflow by automatically managing approval path
 - Notification to approvers when measure is in queue
 - Visual representation of where measure is in approval process
- Interface with Cost-Effectiveness Tool (CET)
- Hourly Savings/GHG Calculation
 - Library of 8,760 hour saving profiles that can be attached to measure permutations
 - Directly support GHG calculations, using hourly emission rate data

Reporting Tools

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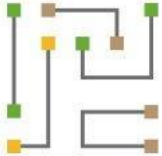


- Enhance existing reporting capabilities
- Add graphical reporting engine (Tableau Public Version)
 - Allow user-customizable reports
 - User access to data would be security-constrained
- For power users, read-only database connection would be available



Configurable Security

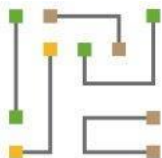
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- eTRM currently supports two User Roles
 - Base User
 - Administrator
- Plus three measure-specific roles
 - Measure Developer
 - Measure Reviewer
 - Measure Manager
- Roles are hard-coded into the software
 - Additional roles under this paradigm requires software developer resources
 - Changing capabilities for existing roles also requires programmers
- We propose to replace hard-coded security with a configurable “security layer” for eTRM

Automated Workflow

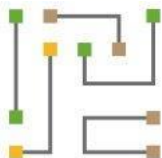
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- Allow standardized measure workflows to be defined
 - Status changes managed by workflow
 - As each person in “chain of review” completes task, measure can be “accepted” or “rejected”
 - ✦ Accepted measure advances forward in process
 - ✦ Rejected measure is returned to measure developer to be remediated
- Workflow manager would automatically notify next-in-queue for review
 - Typically done by email notification
 - Measure may also be placed on reviewer’s dashboard
 - Notification may be programmed to notify person or group
- Specialized workflows could also be built
 - Identify affected measures when shared table is updated, notify measure owners

CET Interface

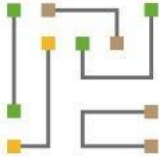
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- Enable eTRM permutations to be run through Cost-Effectiveness Tool (CET), return and populate results into measures
 - CET is currently managed as an online, batch-based tool
 - Measure data is formatted into specified flat file, which is then uploaded to CET website.
 - When processing is done, results file can be downloaded
- Approach developed during charrette would be workspace-based, with automatic connection to CET
 - Each user would have dedicated workspace
 - ✦ Select measures, enter quantities, add program costs to develop “program”
 - ✦ Click to run – eTRM would send data to CET via back-end API
 - ✦ CET would return variety of cost-effectiveness values (similar to existing batch process)
 - ✦ User would be able to save results, export, share

Hourly Load Shapes

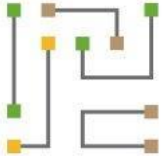
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- Existing Electric Profiles and Natural Gas Profiles
 - Profiles are used to support cost-effectiveness calculations
 - May or may not be useful representations of hourly measure savings
- Ideal solution would have 8,760 hour profiles of energy savings for each measure
 - Various sources available
 - ✦ ADM load-shape profiles built for CEC
 - ✦ DEER profiles
 - HVAC measure profiles would likely vary by climate zone
 - Outdoor lighting measures would be latitudinally dependent
 - Other measures would be utility-independent
 - Profiles should be equally applicable for IOU and POU in same geographic zone
- Would also support GHG hourly estimates

GHG Impact

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- For each measure, an hourly savings profile is assigned
 - 8,760 hour profile
- A GHG hourly profile is selected
 - Can be utility specific, or may be CAISO profile (from CNS calculator)
 - One table used for each year

Measure Savings: 45 kWh

Hourly Profile Table				X	CO2 Table				=	Hourly Reduction			
M	D	H	ES		M	D	H	CO2		M	D	H	CO2
1	1	1	0.02%		1	1	1	0.030		1	1	1	0.00027
1	1	2	0.02%		1	1	2	0.025		1	1	2	0.00023
1	1	3	0.04%		1	1	3	0.025		1	1	3	0.00039
1	1	4	0.05%		1	1	4	0.025		1	1	4	0.00056
...
12	31	24	0.01%		12	31	24	0.040		12	31	24	0.00018

Sum: 2.45

M = Month of year
 D = Day of month
 H = Hour of day
 ES = Energy Saving fraction
 for Hour
 CO2 = CO2 Rate for Hour

Low Income Subcommittee



CALIFORNIA
TECHNICAL FORUM

JENNIFER BARNES
JUNE 17, 2019

CPUC Directives Related to LI Program

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Deemed Savings Directive (D.17-12-009):

“...we have become increasingly aware that our continued reliance on billing analyses may have limitations...beginning in 2018, the ESA Program will utilize deemed savings values for all program measures, in alignment with mainstream EE program activity.”

“We direct the IOUs to coordinate with the California Technical forum to recommend prospective savings values and revisions to its EM&V methodologies for the low-income program.”

Subcommittee Objectives

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- Recommend an approach/process to convert non-low income measures to low- income measures
 - Identify associated/required research (which parameters would need to change)
 - Determine if low-income building prototypes would need to be developed for modeled measures
- Identify necessary revisions to the ESA EM&V methodologies
- Document recommendations in a Cal TF technical position paper (TPP)

Cal TF Low-Income Subcommittee

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Cal TF Members

- Pierre Landry, Retired SCE
- Tom Eckhart, UCONs
- Larry Kotewa, Elevate Energy
- Sepi Shahinfard, Cadmus
- Armen Saiyan, LADWP

ESA Representatives

- CPUC
- PG&E
- SCE
- SCG
- SDG&E
- NRDC

Key Findings

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- IOUs have not yet implemented/developed deemed savings values based on mainstream EE programs/DEER
 - ESA measure savings based on impact evaluation findings
 - ✦ Whole-house billing analysis
 - ✦ Few measures have valid measure-level savings
- ESA measure definitions do not align with mainstream program measures
 - ESA base case = existing conditions
 - ESA measures are not required to be high efficiency
 - Some measures combined
 - ✦ Furnace Repair/Replacement
 - ✦ Evap Cooler + Room AC
- IOU ESA measure offerings are not aligned between IOUs

Next Steps

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- Cal TF Staff to draft guidance document
 - Background
 - ✦ Regulatory Directives
 - ✦ Subcommittee Objectives
 - ESA Program Description
 - ✦ Key differences between ESA & Mainstream programs
 - Cal TF Staff Review of ESA
 - Description of Issues
 - Recommendations
 - ✦ For deemed measure development
 - ✦ Opportunities for IOU standardization

Proposed Extension: Custom



AYAD AL-SHAikh
JUNE 17, 2019

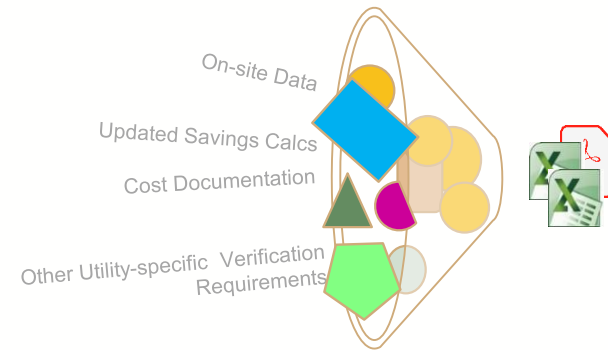
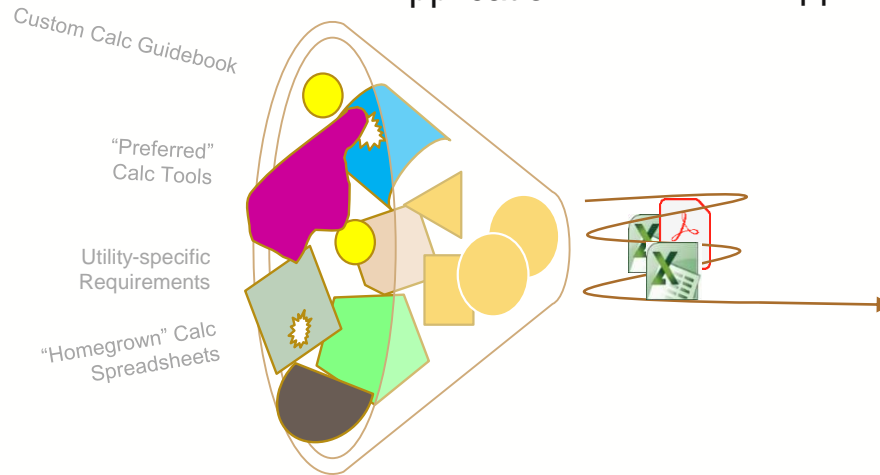
eTRM: Custom Starting Point

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Application

Approval

Installation



Pre-Installation Submittal

- Calculations performed with preferred tools or homegrown spreadsheets
- Lack of clarity for data collection requirements or if assumptions are acceptable
- Perception of missing pieces of information
- Rules and knowledge of precedence are onerous
- Screening and approval process requires iterations
- Duration from application submittal to approval is lengthy, costly and unpredictable

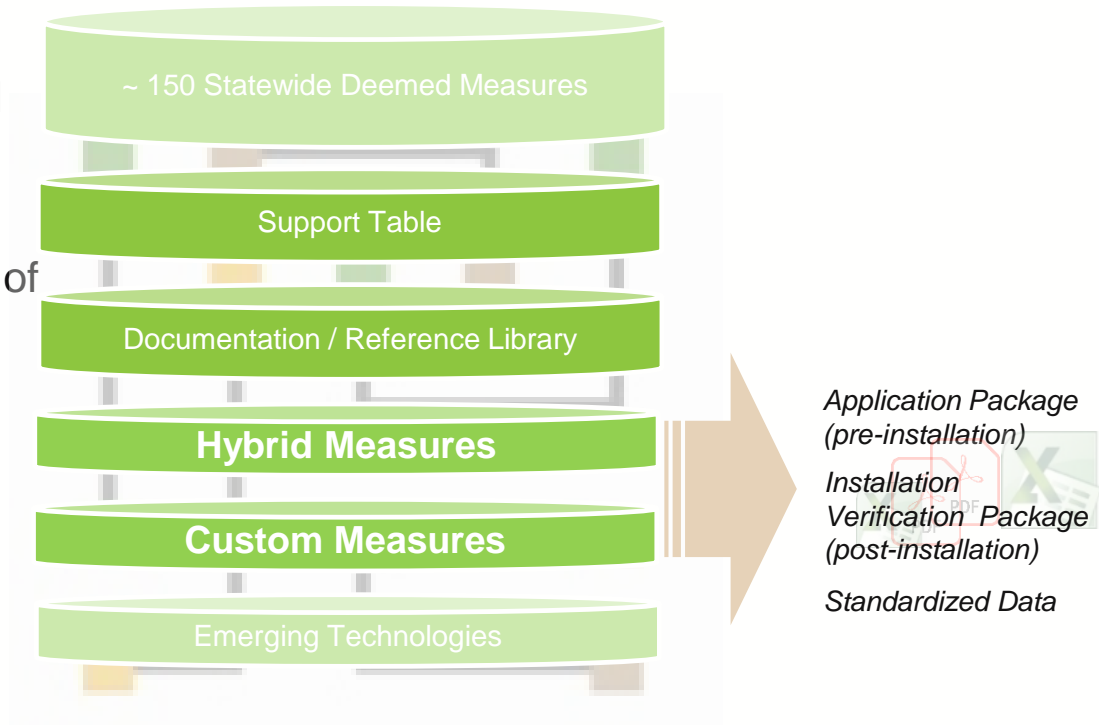
Post-Installation Submittal

- Must comply with installation requirements
- Savings analysis updated with varying levels of supporting documentation
- On-site data collection varies
- Cost documentation varies

eTRM: Hybrid & Custom Future State

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- Standardized application & installation reports
- Standardized calculations
 - Includes locked down parameters
- Guidelines on base case (additional data if existing conditions baseline)
- Guidelines on M&V requirements
- Organized and complete repository of regulatory requirements
 - ISP, ET, Baseline studies
 - Dispositions, etc
- Documentation requirements
 - Viability / operation
 - Influence
 - Project cost
 - Links to QPLs
- Documentation of workflow



Upcoming



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ANNETTE BEITEL

Upcoming

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- eTRM
 - Ready for public (viewing) (Nov 1) (values effective 1/1/20)
 - Launch Plan – agreed-upon
 - Key eTRM enhancements underway
 - Ready for IOU and 3P use
- Modeling
 - TPP
 - Actionable, broadly socialized recommendations for near-term (2020), medium-term and long-term
- Low-Income Measures
 - Plan for *harmonizing* and creating deemed LI measures for placement in eTRM
- 2020 (possibilities)
 - Plan for hybrid measures
 - Custom standardization – process improvement/elements in eTRM?
 - Cal TF measure review