Notes

California Technical Forum (Cal TF)

Meeting 47: Technical Forum (TF)

February 28, 2019

10:00 a.m. – 4:00 p.m.

La Kretz Innovation Campus
525 South Hewitt Street, Los Angeles

Time	Agenda Item	Discussion Leader(s)
10:00 – 10:15	**Opening**	Annette Beitel, Cal TF Staff
10:15 – 12:15	**Stage 2 Recommendations for 2019** • Review process and results from scoring/ranking • Discussion leads to describe each item on the 2019 short list **ACT:** Identify resources/volunteers for each 2019 Stage 2 item	Jennifer Barnes, Ayad Al-Shaikh, Tim Melloch & Roger Baker, Annette Beitel, Cal TF Staff Armen Saiyan, LADWP
12:15 – 12:45	**Lunch**	
12:45 – 1:45	**Overview of DRAFT EAR Team "Workpaper Ranking" Review List** • Overview of feedback – H, M, L and measure areas for detailed review • Next steps • HVAC Measures Identified for Review	Tim Melloch, Ayad Al-Shaikh
1:45 – 2:30	**Custom Projects and eTRM** • Use of eTRM to standardize custom project documentation, standards and review **ACT:** Cal TF Feedback; Possible Next Steps	Ayad Al-Shaikh

2:30 – 2:45	**Break**	
2:45 – 3:15	**Hybrid Measures** • What is a hybrid measure? • Specific examples **ACT**: Feedback on concept of hybrid measures and good candidates	Ayad Al-Shaikh
3:15 – 3:30	**Close** Recap & action items	Annette Beitel

Meeting Materials

- Stage 2 List
- Presentation: Stage II Topic Discussions
- Presentation: Custom Projects
- Presentation: Hybrid Measures

I. Attendees

	In-Person	*Via Telephone*
Cal TF Staff	Annette Beitel Jennifer Barnes Ayad Al-Shaikh Roger Baker Tim Melloch	Jennifer Holmes
Cal TF Members	Steven Long, Lockheed Martin Spencer Lipp, Lockheed Martin Sepi Shahindard, Cadmus Ed Reynoso, SDG&E Mary Matteson Bryan Independent Consultant Greg Barker, Energy Solutions Armen Saiyan, LADWP George Beeler, AIM Chan Paek, So Cal Gas Larry Brackney, NREL Larry Kotewa, Elevate Energy Martin Vu, RMS	Gary Fernstrom, retired PG&E Chris Rogers, CleaRESULT Ryan Hoest, EcoVox Tom Eckhart, ECONS Lisa Gartland, Proctor
Non-TF Attendees	Jay Madden, SCE Luke Sun, LADWP Akhilesh Endurthy, Solaris Bob Ramirez, DNV GL Dave Hanna, Independent Consultant Jeremiah Valera, LADWP Nance Barba, Frontier Sue Hasselhorst, ERS	Andres Fergadiotti, SCE Henry Liu, PG&E Keith Valenzuela, SDG&E Jia Huang, PG&E Bing Tso, SBW Ben Lipscomb Jim Hanna, Energy Solutions Mike Baker, SBW Shanna Dee, SDG&E Mananya Chansanchai, PG&E

CALIFORNIA
TECHNICAL FORUM

I. Key Decisions and Action Items

Action Items:

- Spencer Lipp to look for and provide past inquiry about GHGs from one of his old customers and PG&E's response to their questions.
- Cal TF Staff will review the 14 2019 Stage 2 items and organize them into logical subcommittees. Will circulate a survey or other request for TF members to volunteer on a subcommittee. We welcome non-TF members on subcommittees too.

II. Meeting Notes

Opening/Updates
Presenter: Annette Beitel

Stage 2 Prioritization Process
Presenter: Jennifer Barnes, Tim Melloch

Mananya Chansanchai: What criteria was used in the breakouts to determine priority level?

Jennifer Barnes: The priority ranking was driven by the potential for energy savings by making the change. The subcommittees assigned the priority rankings.

RUL/EUL of REA Measures
Presenter: Ayad Al-Shaikh

Spencer Lipp: What are we replacing when we put a VFD on a well pump? There are always some components of replacement when you do these measures. How narrow do we go when we talk about REA?

Gary Fernstrom: The problem is not the rule, but the application of the rule. Someone needs to decide if the add on measure will outlive the thing it is being added onto. VFD and occupancy sensors are good examples. It's a no brainer if you understand the technology.

Steven Long: I'd vote for leaving it AOE and changing the rule that RUL equals 1/3 of EUL. It would apply where it physically makes sense/where the AOE would no longer exist if the host equipment fails.

Sue Haselhorst: Origin of the RUL rule is from when the equipment was at the end of its life. I can see a case where those are not equivalent concepts but we need more data.

Spencer Lipp: What happens when that equipment is replaced? If that equip is replaced, they are going to do the add on. For most add on measure installations that's not the case - there are other things that need to happen. For a VFD on chilled water pumps, you have to replace the valves. The 4818 reference is to the Track 1 WG and the CPUC snuck it in there because it was out of scope of the Working Group. That RUL component was out of scope but they stuck it in the resolution.

Armen Saiyan: Is the intent to explore the origin of each of those concepts?

Ayad Al-Shaikh: We don't have EUL for many measures. Part of this process is looking at some of those host IDs to understand what else we need. There are really two problems: host ID is missing and some don't fit into the category at all.

Gary Fernstrom: Key concept is whether the add on measure is integral to the existing equipment or not. Example, an economizer is integral to a package rooftop unit but VFD isn't integral to a pump.

Cost Updates/Methodology
Presenter: Tim Melloch

Jia Huang: WOO017 is out of date, it's from 2010/2012. Final report came out in 2014 so when Itron did the data collection, it was 2013.

Tim Melloch: So, it's about 6-7 years old.

Annette Beitel: My understanding is that this stage 2 issue isn't to change cost, but rather to have a white paper that would talk about the merits of different sources and which are the best approaches and would they vary depending on the measure. It would be interesting to know where all of the different costs are coming from and how old they are. In other jurisdictions, there is an attempt to do this. Cost has a huge impact on cost effectiveness. We want to come up with the evidence-based recommendations on what to do about cost updates. Would be great to get input from EAR team and SBW team.

Akhilesh Endurthy: The rule of thumb is that if the cost data is older than 4 years is out of date. If there are no current sources, we've been doing some escalation. That's what we've been doing.

Akhilesh Endurthy: There should be a process where programs share cost data. [Akhilesh volunteered to be on this subcommittee]

Annette Beitel: We're planning to handle these issues in subcommittees. This will typically require 2-3 subcommittee meetings. Cal TF staff writes up the results. We need your input, information, background and reality checks from working on these issues. Don't want to scare you off from volunteering.

Load Shapes

Presenter: Ayad Al-Shaikh and Armen Saiyan

Steven Long: Are these based upon data? What source of data are they based upon?

Ayad Al-Shaikh: Comes from a long time ago, probably modeling. We don't know, they are not well sourced.

Armen Saiyan: They are pretty out of date, probably from 1992.

Armen: CEC load shapes. Heard they are updating CEC for demand forecasting. They gave us guidance on what would be good for efficiency measures. They aren't mapped out to the measures so there is some judgement that needs to be applied.

Steven Long: Do other groups use load shapes?

Roger Baker: In Illinois, they are used for certain HVAC measures.

Gary Fernstrom: Are they IOU specific?

Ayad Al-Shaikh: It's semantics. It's actually electric impact profiled. How much energy is on peak and off peak. Then it becomes IOU specific. What we're going for here it purer. It's 8760.

Armen Saiyan: So it can be sliced and diced in different ways.

Henry Liu: We have been in contact with CEC and ADM. They have given me a preliminary set of data that wasn't complete; the original study was a function for the load shape and they use that to create 8760 for specific sectors. Waiting for a final report. Since we weren't involved in the study, our EM&V team is going to go through it to see if it's viable for use by the IOUs.

Annette Beitel: Were you going to work with other IOUs?

Henry Liu: Will work with other IOU EM&V teams. Once we get the data, we'll determine what to do. We don't know now.

Armen Saiyan: We're not locked into this but we didn't have any other good leads. These are end use load shapes, not measure load shapes.

Steven Long: How many are there?

Armen Saiyan: There are 13 forecasting zones instead of 16 climate zones – need to see how they are mapped. DEER load shapes are based on IOUs.

Steven Long: At some point, it was based on load shapes.

Bob Ramirez: Part of our contract is to focus on load shapes, need to also consider the impact of PV.

Ayad Al-Shaikh: Update process moving forward coordinating between CEC and CPUC.

Bob Ramirez: Only issue might be timing.

Annette Beitel: Don't load shapes include PV impact since used AMI data?

GHGs
Presenter: Annette Beitel and Armen Saiyan

Armen Saiyan: CEC has been asking POUs for more/better data on GHG reductions. Have been using a proxy. Our estimates are based on predictions, it doesn't show what the actuals are for a particular year. Sure there is a way to true it up. It's proxy but really relying on IOUs.

Annette Beitel: eTRM does not currently track GHGs but we think it should in the future and we are discussing the next set of enhancements.

Annette Beitel: This subcommittee would try to address the following types of questions. Should eTRM track GHGs? Should eTRM use same methodology as POU cost effectiveness tool that draws on CPUC data? Should there be a true up and how often? Should the GHG savings be registered and where? Who owns any benefits from GHG savings?

Spencer Lipp: I'll go back through some old information I had – one of my old customers was asking these questions and PG&E responded to us.

George Beeler: For GHG, we should use best available science. Methane persists a shorter time but it's far more potent. There are better numbers around that. Using natural gas from fracking uses a lot of methane in the process so we need to look at the source to get the overall picture.

Jay Madden: Or leakage from the source to the meter.

George Beeler: The book Drawdown is a great source for these questions.

Agricultural Measures
Presenter: Ayad Al-Shaikh

Treating as BRO measures with 3-year EUL and low savings so it's not cost effective.

Armen Saiyan: Why is this considered a BRO measure? You're overhauling the whole thing.

Ayad Al-Shaikh: The rules that get us into the name get us in trouble. Maybe we can present the data and see if that's enough to get us to the next step.

Steven Long: Why is it specific to the climate zone?

Spencer Lipp: RUL is # of years on average degradation rate to get down to the baseline efficiency?

Ayad Al-Shaikh: Correct, then you'd get another overhaul and bring it back up.

Spencer Lipp: And then they'd overhaul the pump. With or without the program?

Akhilesh Endurthy: That's a different question.

Martin Vu: True that every pump overhaul has to be tested to get an overhaul?

Akhilesh Endurthy: Only those over 25 HP.

Martin Vu: If we know nameplate of pump and the overhaul history, then is that sufficient evidence to change the RUL?

Armen Saiyan: Definition of overhauling and defining that as RCx. Has that always been the case?

Ayad Al-Shaikh: This idea of BRO is new. Was it REA before?

Akhilesh Endurthy: It has changed a lot. For smaller HP, it's the entire pumping system replacement. For larger system, it's more an overhaul. Maybe it depends on the size of the project as to whether BRO is appropriate.

Lighting Savings
Presenters: Tim Melloch

Greg Barker: Interested in first two (wattage reduction ratio and wattage range method) but there are some other methods that have been used that we should review. Delta watt covers a lot of variations. What you don't have here, accelerated replacement has been talked about but it's a line we haven't crossed yet.

Tim Melloch: What about interactive effects?

Greg Barker: A framework exists but there are some lingering questions about how that would be written out. Would want to hear from others about interactive effects? Would be tied to other modeling.

Ayad Al-Shaikh: Pushing for simplification like getting rid of PA distinctions.

Greg Barker: Some of PA differentiation, absolutely.

Spencer Lipp: What is the variation?

Ayad Al-Shaikh: For electric, it's 5% or so, maybe some outliers. Error on hours of operation will have a much greater impact on savings than interactive effects.

Gary Fernstrom: The problem is what the baseline is presumed to be. If we wanted to restore lighting opportunity we need to make the case that we're targeting our efforts to places where the baseline is not CFLs or LEDs. Problem is baseline, not methodology. Some LEDs are better than others, but it's miniscule. Baseline is what killed our programs. Think there are targeted opportunities where the baseline is not LEDs or CFLs.

Greg Barker: That's exactly the same as my suggestion of looking at accelerated replacement.

Spencer Lipp: Gary's point is valid, but that's a program design issue. If you give them an accelerated replacement value that's valid, then it's up to the program teams to design a program.

Armen Saiyan: Workpapers are designed around programs. Maybe we should flip it.

Annette Beitel: We're trying to have workpapers reflect a variety of situations. Address a variety of MATs and the program staff draw on the ones they needed. If a workpaper doesn't have a value for an application, it's up to the subcommittee to come up with that value.

Greg Barker: They just need to be fleshed out. There needs to be effort put into it. There is a hesitance by the people funding workpaper development. There's not a rule against it. Who wants to fund the first accelerated replacement (AR) lighting workpaper?

Spencer Lipp: It's a holdover from the old EAR team when it was difficult to push AR through. There are disadvantaged communities where LEDs would be a good measure (i.e. efficient lighting is not their baseline).

Greg Barker: Would be bad to let a lot of our measures expire out of the eTRM because there are not good AR values.

Martin Vu: Lessons learned is that former EAR team didn't hear these discussions, but they are here today. If AR discussions are going to succeed, the EAR team needs to be part of the discussions.

Collapsing Permutations
Presenter: Ayad Al-Shaikh

Annette Beitel: Is there a rule of thumb like collapse everything where the savings is within 10%?

Ayad Al-Shaikh: There are some measures where if you combined everything within 5%, you'd only have one permutation. So, it depends.

If we were only to tackle lighting, then we'd take care of the lion's share of the problem.

Armen Saiyan: Collapsing permutations shouldn't happen automatically, should be flagged and reviewed.

Sue Haselhorst: This is not random, it reflects climate zones so some IOUs could benefit while others are penalized.

Armen Saiyan: If it's locked into that and it's the only way to administer a program, that could be a problem.

Annette Beitel: Would we gather data at the more granular level? Would the evaluators want to use the more granular information if it only varied by 1-2%?

Bob Ramirez: If it's there, you want to use the highest level of detail. Rolling them together trades off ease of application versus full detail.

Steven Long: I support making a judgement call. You could have several measures that are similar but only one that's a problem but you'd want to treat them the same way.

Chan Paek: Is this for SW measures or DEER measures?

Ayad Al-Shaikh: No, it would be done in the eTRM. SW measures incorporate DEER measures.

Commercial Refrigeration
Presenter: Ayad Al-Shaikh

Henry Liu: Chris [Rogers] and his team collected the data from the survey's they've done and provided to Lincus and SCE.

Chris Rogers: That's correct. Once that is approved, we're ready to use that template to update any WPs.

Akhilesh Endurthy: We have the program and are in the final phases so the new prototype will be ready. Not working on specific cases, it's the prototype. Not specifically on the units.

Appliance Plug Load
Presenter: Roger Baker

DEER Basis factor, as far as we can tell, is from a series of simulations that model how different refrigerators function in different climate zones. Assumption is that in addition to HVAC interactive effects, the refrigerator's performance is also affected by the temperature of the space it's in. The adjustment factors range from 64% to 145% (derating on average of about 6%). Not sure how valid it is because house space is climate controlled so climate zone aren't much of a factor. Not sure where those factors come from.

Pools & Spas: Climate zone issues have been addressed. T24 issue addressed; issue was that MF was really a commercial operation since they have to comply with commercial regulations. Only issue is that the WP for non-MF, the savings are still based on field data rather than algorithms that MF was based on. Maybe calibrate to field data. This effort is just trying to harmonize approached between commercial and MF pools.

All Electric Food Service Measures
Presenter: Ayad Al-Shaikh

Chan Paek: In January, we received 5 dispositions on (consolidated) food service measures; required them to be updated by Sept 1, 2019. Need an ISP study, collect all of the tested data and do the analysis, and conduct a participant surveys – to determine measure requirement and baseline assumptions, then update and resubmit WP.

Next Steps
Presenter: Jennifer Barnes

ACT: Jennifer Barnes will circulate a survey requesting volunteers for each item.
Some items may be combined into subcommittees.
Work product may be a write up or an analysis to submit to the EAR team for guidance.

CPUC Draft WP Review Plan
Presenters: Tim Melloch and Ayad Al-Shaikh

Sue Haselhorst: This is a draft plan. The goal is to be less reactive and give a longer time horizon. Another goal is to have longer WP lives. When a WP is set it is good to use going forward – give some market stability. Looking at when we're going to be looking at a WP, at code changes, etc. So it's a matter of just approving it and not figuring out what needs to be done. Food service measure reviews were more of a traditional model where you get the WP and comment.

Annette Beitel: One of goals is for WP to be stable for longer period of time. Also, that the process would be looking forward to when it would need to be updated. We have a field in the eTRM with sunset. Can you look ahead and give us guidance on this date?

Sue Haselhorst: We don't know what this is right now. Know what ex post team is going to do for the next couple of years. Manisha's goal is to be accurate too. There's tension to make them up to date and be market stable. There are a lot of ex post findings that

we can't ignore and have to wrap into WP in a reasonable fashion. That's the goal but we don't have the details worked out yet. There's a goal to have expiration dates for all of them – how to assign those dates in way that's reasonable.

Annette Beitel: Knowing what the EM&V plan is. You know what those are?

Sue Haselhorst: There are HIMs so you know what those are.

Annette Beitel: In the evaluations, are you looking at NTG or other parameters?

Sue Haselhorst: They'll look at other parameters. It's important feedback.

Annette Beitel: Maybe indicate the HIMs in the eTRM.

Sue Haselhorst: Intention is to make this information transparent. It's a little scary to make it public at this time, but it's the goal. It's important that everyone understands what the risks may be.

HVAC items from the review plan:
Air cooled/water cooled chillers
SCE and PG&E doing proactive work.

Henry Liu: There's a parallel effort for rooftop units. Because of DEER tiers and requirements. Two years ago, DEER resolutions require us to meet both part and full load rating requirements. But manufacturer ratings are high part load and lower full load which eliminates a lot of the units on the market. The IOUs to collect performance data to understand these ratings.

VFDs on HVAC fans
Impact results are being brought into measures. Originally developed in DEER 2005, measure ID isn't in MAS control. Can't reproduce this measure today. Need to recreate the model.

Henry Liu: Have identified these old measures. Right now, we have talked to a consultant to put it on their roadmap, but that's as far as we've gotten.

HVAC measure likely to be sunset: VRF and Commercial Ductless AC
Problems with baselines used. VRF baseline is another VRF so there's small savings. This is a result of questions around the influence of the measure. If the baseline is another VRF, then it kills the measure. Ductless AC baseline is another ductless AC.

Jay Madden: If customer was replacing a 5-ton rooftop and putting in a 5-ton VRF. Is that what we are looking at?

Annette Beitel: Wouldn't talking to the distributors give a sense as to the market?

Ayad Al-Shaikh: Yes, talking to the implementers.

Annette Beitel: But the distributors would be more unbiased.

Jay Madden: Only a small intersection of distributors that sell both ductless and package systems.

Jim Hanna: A couple of strategies: go back to existing customers. Document what their base case is (DX systems) and their decision tree. Also talk to distributors and manufacturers. They are willing to talk to us about a go-forward strategy to document program influence.

Henry Liu: Also to talk with designers, get surveys with them to understand what motivates them to move from DX to VRF. Three prong test is still an issue.

Jim Hanna: Part of the survey is to understand the sales engineer's roles, if there was influence, and what the influence was.

<u>Custom Projects and eTRM</u>
Presenter: Ayad Al-Shaikh

Sepi Shahinfard gave an update on the development of ISP and POE guidelines:

- ISP guidebook is under review by CPUC management.
- POE was discussed during T2WG meetings but not included in E-4939:
  "Due to its complexity, "Task 2 Tiered Preponderance of Evidence requirements" will be addressed in a future resolution." And
  "…as to the proposal's evidentiary requirements for demonstration of equipment viability and program influence, the POE requirement to demonstrate equipment viability and program influence for accelerated replacements shall meet the requirements in Task 2 to be addressed in a future resolution."
  CPUC staff are currently working on this.

Martin Vu: Is this the same as the SW handbook?

Sepi Shahindard: Will address the documentation requirements. We'll handle the calculations.

Bob Ramirez: Could potentially be a mass market measures, then it could set the stage for that.

Spencer Lipp: This allows a lot more flexibly for implementers and designers to drive the mass market opportunities but hone in on the savings. It's an incremental step towards that. Part of it is data collection in the field and if it drives the calculations and savings, then maybe you have a deemed measure but at least you have a lot more specific information.

Martin Vu: About 10 years ago, Ron Ishii did the custom guidelines. Have you looked at that as a jumping point?

Spencer Lipp: Be careful about the level of data, mainly for injection molder, but it's a good place to start.

Martin Vu: Like Spencer said, ongoing data collection can improve those estimates.

Annette Beitel: Sue has a lot of experience with these. Can you comment?

Sue: Other jurisdictions have tools with a lot of variables that you put in. They are evaluated and calibrated regularly. Lots of lots of evaluations have been done to show that these work.

Armen Saiyan: From our experience with custom, we had a hard time evaluating applications. For measures that are modeled, we've seen models that are expressed with too many parameter changes that don't express the measure well. Want to standardize that parameters that express that measure. Done in deemed but could be done in custom. To regulate and shrink the way we evaluate and address these, give them a set of resources they can use. A custom procedural manual. An effort like this would consolidate and standardize.

Greg Barker: Mentioned pulling in hours of operation from a site. We're getting more smart devices, so let's get actual run schedules which would tell us more: more reliable dataset than an hours of operation estimate. These are available from manufacturers who would share with eTRM and IOUs if they gave them a value back. They've been cooperative with us on our federally funded grant project.

Annette Beitel: If a subcommittee were to develop a proposed approach for hybrid measures, they would have to address what the review process is. Deemed, hybrid, streamlined review. There would need to be coordinate with the EAR team.

LADWP Hybrid Measures

Armen Saiyan: Had issues with throughput in custom. Wanted to allow engineers to focus on true custom. Came up with this approach. Will talk about the parameters that we use.

Jeremiah Valera: Used look up tables. These are all the permutations in the eTRM. Forced the users of the forms to input certain parameters. The zip code would return the climate zone in the back end. Also building type will look up the value. It's an Excel spreadsheet. It's the early version of an online version we want to develop. It matches the inputs with the associated savings. Have two types: Deemed and Custom Calculated. We've been able to move some of the volume from custom to custom calculated.

Sue Haselhorst: How is incentive calculated?

Armen Saiyan: This is now 60% of the volume but is only 10% of the savings. Pay per kWh but with a cap. Gives us an initial estimate of savings so we know what rigor of evaluation to use.

Wrap Up

Presenter: Annette Beitel

Will be kicking off subcommittees – will ask for volunteers. We welcome non-TF participants in subcommittees.

Next month is her at LACI again. Will focus on HVAC and HVAC modeling along with two other items:

1. Water energy nexus – calculator that Navigant developed has some issues. Bing is tasked with that as part of their CPUC work. Also, someone from Davis.
2. Business Plan: have an item around modeling with two components. One is a white paper that Roger is leading. Other part is a modeling charette and coming up with recommendations on going forward with modeling in deemed. We've identified challenges. To frame questions that we'd consider in a charette.