NOTES

California Technical Forum (Cal TF)

Meeting 48: Technical Forum (TF)

March 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** • Updates	Annette Beitel, Cal TF Staff
10:15 – 10:45	**Water- Energy Nexus** • History/Status of CPUC tool for calculating water – energy savings • Plan for ex ante consultant update • UC Davis Perspective **ACT: Cal TF Input**	Annette Beitel
10:45 – 12:00	**Measure Affirmation (HVAC and Other)** • High-level overview of consolidated measures • Review notable issues **ACT**: Cal TF Affirmation of Consolidated Measures	Ayad Al-Shaikh, Cal TF Staff
12:00 – 12:30	**Lunch**	
12:30 – 1:15	**Measure Affirmation (HVAC and Other) (continued)** • High-level overview of consolidated measures • Review notable issues **ACT**: Cal TF Affirmation of Consolidated Measures	Ayad Al-Shaikh
1:15 – 1:45	**Grocery Prototype Development** • Status of prototype update	Ayad Al-Shaikh

	• Plan for submitting commercial refrigeration measures; next month we will plan to affirm these measures	
1:45 – 2:15	**Lighting Measure Updates** • Best estimate of lighting measures for 2020 • Status of next steps	Ayad Al-Shaikh
2:15 – 2:30	**Break**	
2:30 – 3:45	**Overview of Plan for Modeling Charette** • Review of current challenges with modeled measures • What issues should be considered in a modeling charette to develop a high-level framework on consistent energy simulation modeling approaches between California's code compliance, deemed savings calculations and custom calculations? • Overview of framework for considering what measures should be modeled vs. developed through engineering calculations or other approaches (such as NMEC) **ACT:** Cal TF feedback on list of issues that should be considered in modeling charette and prior work re: same.	Ayad Al-Shaikh, Annette Beitel, Roger Baker
3:45 – 4:00	**Close** • Recap agreements & action items	Annette Beitel

Meeting Materials

- **Presentation:** Water Energy Nexus
- **Presentation:** HVAC & Other Measure Consolidation
- **Presentation:** Cal TF Modeling Charette: Overview of Plan for Comment

I. Attendees

	In-Person	*Via Telephone*
Cal TF Staff	Annette Beitel Jennifer Barnes Ayad Al-Shaikh Roger Baker	Tim Melloch
Cal TF Members	Steven Long, Lockheed Martin Spencer Lipp, Lockheed Martin Sepi Shahindard, Cadmus Greg Barker, Energy Solutions Armen Saiyan, LADWP George Beeler, AIM Chan Paek, So Cal Gas Larry Kotewa, Elevate Energy Martin Vu, RMS Doug Mahone, retired TRC Pierre Landry, retired SCE Chris Rogers, CleaRESULT	Gary Fernstrom, retired PG&E Tom Eckhart, ECONS Ed Reynoso, SDG&E Mary Matteson Bryan Independent Consultant Larry Brackney, NREL
Non-TF Attendees	Jay Madden, SCE Nancy Barba, Frontier Ramin Faramarzi, NREL	Andres Fergadiotti, SCE Keith Valenzuela, SDG&E Jia Huang, PG&E Bing Tso, SBW Shanna Dee, SDG&E Luke Sun, LADWP Akhilesh Endurthy, Solaris Dave Hanna, Independent Consultant Sue Hasselhorst, ERS Rachel Murray, DNV GL Mark Modera, UC Davis Kendra Olmos, UC Davis (for Water Energy discussion only) Randy Kwok, PG&E David Cranford Tai Voong, PG&E Patrick Hewlett, ERS Erik Page

I. Key Decisions and Action Items

In the March 2019 meeting, the Cal TF affirmed the following measures:

- 5.06, Demand Controlled Ventilation for Single Zone Packaged HVAC
- 5.49, Enhanced Ventilation for Packaged HVAC with Gas Heating or Packaged Heat Pump
- 5.56, Single Package Vertical Heat Pump, K-12 and Community Colleges
- 5.30, Refrigerant Charge, Commercial
- 5.31, Evaporator Coil Cleaning, Commercial
- 5.32, Condenser Coil Cleaning, Commercial
- 5.10f, Brushless Fan Motor Replacement, Residential
- 5.13, Fan Delay Controller for Air Conditioner, Residential
- 9.01, Pool Cover, Commercial

Water Energy Calculator

ACTION ITEMS:

Let Cal TF staff know if you are aware of any industry members who should be aware of or follow the development of the water energy updating.

ACT: Cal TF will put together a short white paper to describe issues:

- How should the process be coordinated?
- Who are the stakeholders and experts who should be involved?
- How can Cal TF support process and/or the consulting team?
- What are issues to consider, like pressure differences?

We will circulate it to the TF to review and maybe have a subcommittee meeting, if needed. And submit to Bing's team.

Food Service

ACTION ITEMS:

Gary Fernstrom to send this PG&E codes and standards study on commercial dryers to the Cal TF staff.

STAGE 2 ISSUES:

How to deal with energy efficiency measures when you are doing fuel switching?

HVAC

ACTION ITEMS:

Jay Madden to send Cal TF staff the ET report on interaction between refrigerant charge and compressor run time and any supporting documentation.

Gary Fernstrom to review slide notes for measure 5.10 Brushless Fan Motor Replacement, Residential, and give feedback to Ayad.

STAGE 2 ISSUES:
Add electric boilers to boiler offerings.

Consider including heat recovery as an option to the "Single Package Vertical Heat Pump, K-12 and Community Colleges" measure. This will create an additional offering to the existing measure if the savings/cost package proves to be cost-effective.

Other Measures
ACTION ITEMS:
Commercial refrigeration subcommittee to convene to develop a short list of measures that have a code baseline in the workpaper but could reasonably have an existing conditions baseline in practice, and develop a recommendation on these measures to the EAR team.

STAGE 2 ISSUES:
How do you take into account in a deemed setting, lumen reductions that are appropriate while still maintaining IES standards.

Calculate water savings for pool covers.

Modeling Charrette

ACTION ITEM:
Cal TF staff to schedule a call or reach out to folks for ideas for the modeling charette:

- Use cases
- Missing building prototypes
    - Who developed?
    - How old?
    - What are the assumptions?

II. Meeting Notes

Updates
Presenter: Annette Beitel

Modeling Charrette will be held in May.
The charrette will be open to the public, but TF members will be invited first; you can extend the invitation to others in your organization, within reason.

Water Energy
Presenters: Annette Beitel, Martin Vu

Doug Mahone: So, is Martin's recommendation to abandon the calculator?

Martin Vu: Based on its current condition, then yes. If there's an effort to spend the money to correct it, then don't abandon.

Pierre Landry: Then you are going to embed the calculator in to the eTRM?

Martin Vu: Yes.

Kendra Olmos: Using actual data will be much more accurate.

Armen Saiyan: Any thought on making updates to EUI over time? We are making drastic changes to improve our efficiency, so it is going to change.

Annette Beitel: Good point. There needs to be a mechanism to update EUI over time.

Doug Mahone: I heard you say that rolling up to regional average is inaccurate. But also within an individual utility there can be different EUIs based on elevation or differences in pumping, etc. How would you deal with differences within a utility?

Kendra Olmos: Our research center is looking at multiple utilities within CA using their actual data and pressure zones. Noticed that there can be 12-fold difference between pressure zones. Given that those studies have been repeated over and over again, to get accurate measures of savings and EUI, you need to break it down by pressure zone and how that equates to energy savings. Whether that's the solution to creating a calculator or method that utilities can follow remains to be seen. Would be nice to do

pressure zone by pressure zone analysis but we get push back from the water utilities because it's a computational nightmare. Is it realistic? Maybe, maybe not.

Pierre Landry: Where do you draw the line on the margin of error? Who decides when good enough is good enough?

Kendra Olmos: That's exactly the problem the regulators need to provide that guidance. And we haven't gotten that so we're in limbo. If they are going to accept deemed savings, great, at least they've made a decision. But they haven't decided.

Pierre Landry: Who else uses this calculator? Are we going to lose the benefits of a calculator?

Kendra Olmos: Nobody trusts the calculator and nobody uses it. Industry wide, it's distrusted at the moment.

Martin Vu: That sentiment is true. The utilities have their own calculator.

Annette Beitel: Our goal is to come up with a SW solution that both IOUs and POUs can use.

ACT: Let Cal TF staff know if you are aware of any industry members who should be aware of or follow the development of the water energy updating.

ACT: Cal TF will put together a short white paper to describe issues:

- How should the process be coordinated?
- Who are the stakeholders and experts who should be involved?
- How can Cal TF support process and/or the consulting team?
- What are issues to consider, like pressure differences?

We will circulate it to the TF to review and maybe have a subcommittee meeting, if needed. And submit to Bing's team.

Doug Mahone: The unique capability we (Cal TF) have is to think about how granular the answer needs to be from a deemed savings point of view. We've been dealing with this issue with every deemed value we've developed. We've got the same issue here.

Martin Vu: We've come up with the method for a deemed method so that should be your starting point.

Tom Eckhart: Challenge we had: the calculator approach got a lot of traction. What didn't get traction is the regulator's willingness to accept the value.

ACT: We'll add "political issues that need to be addressed" to the list of issues to consider.

Kendra Olmos: Using a utility specific approach is better than a regional approach. The next level of rigor is to do a pressure zone by pressure zone approach.

Armen Saiyan: There is a trade off with the areas with less volume and those with high volume.

Measure Consolidation
Presenter: Ayad Al-Shaikh

2.20 Conveyor Boiler

Mike Casey: Is the small quick service sector a larger market? Used more constantly during open hours.

Ayad Al-Shaikh: Quick service is the main market where these are used.

Doug Mahone: Are there interactive effects?

Ayad Al-Shaikh: No, all food service measures are handled the same. They are in a separate cooking area so they don't have interactive effects.

Jay Madden: Can you review with Chan in light of the recent food service disposition?

Ayad Al-Shaikh: Whatever happened in disposition, all should be handled the same way. We've submitted to Chan for review and comment but haven't heard back yet.

Refrigerated Chef Base

Akhilesh Endurthy: The calculation methodology has changed. The base case, Title 10 does not cover it but we are using it as a proxy. We did the calcs based on Title 10 and savings were lower. In the measure case, the savings average is 65%, the ET study showed that only 2 of 6 are qualifying. But it's a proxy baseline. Since only 2 qualify, SCE decided to use a different baseline. Maybe the bottom 3 would be the baseline and the top 2 would be the measure case.

7.13 Undercounter Type Dishwasher

Jay Madden: For next round, can we put in electric savings associated with electric water heater? As we head towards electrification, we're looking at food service.

Armen Saiyan: How do you treat these electrification measures as efficiency. In one case, you're adding load.

Jay Madden: We'll have to deal with (electrification) energy efficiency measures when you are doing fuel switching.

ACT: Add a stage 2 issues on how to deal with fuel switching.

Steven Long: So, water energy savings are all still being tracked in a separate WP?

Ayad: Yes, there is separate WP for water energy, which is not consolidated yet.

Martin Vu: Yes, I've been hired to update it. It's been adopted in 2017. It's using the calculator values because that's what's been approved. PG&E is claiming their water energy savings.

Jay Madden: SCE is reporting savings.

7.36 Gas Dryer Modulating Valve, Commercial

Gary Fernstrom: What size range is this measure being proposed for in terms of pounds? Large institutional or ones you find in multifamily and coin operated laundry?

Ayad Al-Shaikh: The smaller ones are in the 20 lb. range.

Gary Fernstrom: 20 lbs. splits the difference - it's getting into the bottom of the industrial range. The dryers that had modulating heat input didn't save much unless the fan was similarly controlled. Proposers should look at the research that PG&E did to understand the benefits.

Ayad Al-Shaikh: We should hold off affirming this measure based on that.

Gary Fernstrom: This commercial dryer study done with codes and standards may have been unnoticed by the WP team.

ACT: Gary Fernstrom to send this PG&E codes and standards study on commercial dryers to the Cal TF staff.

6.29 Flow Control Valves

Armen Saiyan: Do you want to create 4 new measures? It could be a permutation.

Ayad Al-Shaikh: We can handle different EULs with a different permutation. We don't want the measures to balloon within the eTRM.

Tim Melloch: The savings calcs would be the same but would this have better persistence? Since it's an inline product.

Ayad Al-Shaikh: Maybe that would show up in GSIA that we could assign differently.

Martin Vu: Have you handled ice machines and other measures based on size. Have you collapsed those? It's similar. Same calculation approach but different sizes.

Ayad Al-Shaikh: Ice machines have different offerings based on different types as well as different sizes. If the technology and action is different, we try to keep them separate measures. I'm hearing that we want to keep them separate.

6.30 Dual Set Point Boiler Control for Space Heating, Multifamily

Armen Saiyan: Are there multiples of this for multiple boilers?

Ayad Al-Shaikh: It scales the cost. Normalized by units.

Akhilesh Endurthy: Does this include in-unit and common boilers?

Ayad Al-Shaikh: No, just common area boilers.

Pierre Landry: It's a central hot water boiler.

Jay Madden: Can you add a stage 2 issue to add electric boilers?

ACT: Add electric boilers to stage 2 issues list

George Beeler: Is zoning a possibility?

5.60 Demand Controlled Ventilation for Single Packaged HVAC, Commercial

Jay Madden: SCE received a third-party developed WP a couple of weeks ago that has demand-controlled ventilation as a different technology. Called PG&E and SG&E to make sure that the third-party hadn't submitted it to them too. If the system is not call for heating and cooling and the CO2 level is low, the measure will cycle fan on and off instead of running continuously. We're working with the vendor and will have them write as a SW measure. May roll into this measure instead of making it standalone.

Andres Fergadiotti: Review the code because it requires the facility to maintain ventilation. You should confirm.

Jay Madden: The third-party WP I'm talking about addressed the baseline requirements for Title 24.

Armen Saiyan: Is that an eligibility criteria, that it has to meet Title 24. As add on equipment.

Ayad Al-Shaikh: we won't seek affirmation on these measures today

HVAC Measure Consolidation
Presenter: Ayad Al-Shaikh

Ayad Al-Shaikh: It would be good to get affirmation on all of these HVAC measures today.

5.49 Enhanced Ventilation for Packaged HVAC with Gas Heating or Packaged Heat Pump

Armen Saiyan: Would it make sense to consolidate the CP2 measure under this measure.

Doug Mahone: Are these new or add on?

Ayad Al-Shaikh: These are add on.

Armen Saiyan: Seems like a menu of different options.

George Beeler: Would energy recovery fit under this?

Ayad Al-Shaikh: No but here's another measure.

Andres Fergadiotti: Vertical heat pump it might fit under.

ACT: We'll add as a stage 2 issue for the heat recovery system.

5.56 Single Package Vertical Heat Pump

Greg Barker: What's changing?

Ayad Al-Shaikh: EER changes to 11.5.

Greg Barker: So, you have base and measure EER.

Doug Mahone: What is a vertical heat pump?

Jay Madden: It goes on a wall.

Ayad Al-Shaikh: If you have photos that we can use, please send them.

Doug Mahone: Heat recovery from ventilation air and exhaust?

George Beeler: From ventilation air.

5.30 Refrigerant Charge, Commercial

Armen Saiyan: When measures are actually deployed, how much do they not perform? If all are performing, what's the point of splitting?

Ayad Al-Shaikh: The intent is to figure out what needs to be done and you do that. Could be one or more or all. There's a concern with EAR team that, an incidence factor is part of that. If you do TQM and don't differentiate what you did or didn't do.

Ramin Faramarzi: Are we talking about energy savings or demand?

Ayad Al-Shaikh: Same rule applies for demand.

Ramin Faramarzi: Once you get to correct charge, your power consumption goes up from baseline because compressor is doing more work but your run time reduces.

Jay Madden: There's an ET paper out there on this.

Ramin Faramarzi: There's an ACEE paper too.

Ayad Al-Shaikh: Can you send the paper or link?

ACT: Jay Madden to send Cal TF staff the ET report on interaction between refrigerant charge and compressor run time and any supporting documentation.

5.10f Brushless Fan Motor Replacement, Residential

Andres Fergadiotti: In the future, there are potentially more efficient measure cases to include or change to. In latest round, the base case for permanent split capacitor motor is 2 stage. That DEER prototype has 2 speed motor already.

Gary Fernstrom: Two things: any motor replacement that results in the capability of running the fan at lower speed, it has enormous savings opportunity. However, if you look at motor efficiency alone, there's subtleties between motor types. Hope that someone is looking at making sure these subtleties are properly valued.

Ayad Al-Shaikh: Can you please look at the assumptions in the notes for this slide? We'd love your feedback on this.

ACT: Gary Fernstrom to review slide notes for measure 5.10f Brushless Fan Motor Replacement, Residential, and give feedback to Ayad.

Andres Fergadiotti: If you are doing accelerated replacement, there's PoE requirements.

5.13 Fan Delay Controller for Air Conditioner, Residential

9.01 Pool Cover, Commercial

Gary Fernstrom: Don't the new construction standards in CA require that every pool that is built has a cover?

Ayad Al-Shaikh: These are existing pools.

Gary Fernstrom: There's never going to be a pool that doesn't have a cover.

Ayad Al-Shaikh: When was the code written? Some of these pools have been around for a long time. If it was a pool that was built after the code, then it should have a cover. I'll make sure the measure specifies this.

Sue Haselhorst: It's in the WP already. There's a lot of evidence through Google maps that there are a fair number of pools without covers. Question is was there ever a cover in the past? The intention is to establish that there hasn't been a cover for some time. The code changed about 10 years ago.

Gary Fernstrom: Agree with the intention but we should delete the term "ever" with no qualification. That doesn't work.

Sue Haselhorst: We'll have to think about the PoE for establishing what a period of time is.

Akhilesh Endurthy: MAT is normal replacement so code applies?

Ayad Al-Shaikh: Could be a BRO or add on.

Armen Saiyan: Application is in residential pools as well but I forget why there's no measure for residential.

Gary Fernstrom: Residential pools are required to have a cover. Most customers don't heat their pools because gas is expensive. This is verified by RASS. So, it's not cost effective to offer a cover when pool is not heated.

Armen Saiyan: What if it prevents you from getting a cover? You don't need it if you have a cover.

Ayad Al-Shaikh: Wind speed and shading are the sensitive variables. 10 different cases with different shading, wind speed, etc. and took an average of that.

Jay Madden: If they can do the water savings calculation too. This should be a stage 2
ACT: Add stage 2 issue to calculate water savings for pool covers.

Gary Fernstrom: It's really, really significant.

Doug Mahone: Isn't there a safety issue if a child gets caught underneath.

Gary Fernstrom: They increase the liability which is why small hotels and motels don't use covers but despite that they are required by code.

Armen Saiyan: Some covers anchor on the deck.

7.36 Gas Dryer Modulating Valve, Commercial

Pierre Landry: This is going to vary depending on how quickly the clothes get dry.

Gary Fernstrom: In this size it's likely being served by indoor air so it's not climate sensitive.

Pierre Landry: My question is are you using the same value across all 16 climate zones. So, the same indoor air supplying these is not going to vary between climate zones.

AFFIRMATION: HVAC and Pool Cover

The Cal TF affirmed the following measures:

- 5.06, Demand Controlled Ventilation for Single Zone Packaged HVAC
- 5.49, Enhanced Ventilation for Packaged HVAC with Gas Heating or Packaged Heat Pump
- 5.56, Single Package Vertical Heat Pump, K-12 and Community Colleges
- 5.30, Refrigerant Charge, Commercial
- 5.31, Evaporator Coil Cleaning, Commercial
- 5.32, Condenser Coil Cleaning, Commercial
- 5.10f, Brushless Fan Motor Replacement, Residential
- 5.13, Fan Delay Controller for Air Conditioner, Residential
- 9.01, Pool Cover, Commercial

Gary Fernstrom noted that he would like to get rid of the term "ever" in the workpaper for 9.01 Pool Cover, Commercial but does not disagree with affirmation.

Grocery Prototype

Presenter: Ayad Al-Shaikh

Spencer Lipp: What is the trigger code that would make that ineligible.

Ayad Al-Shaikh: If the code happened in the past, similar to the pool cover, we can still claim it as long as the life hasn't lapsed.

Spencer Lipp: But what's the trigger now? It's been in code and we're going to retire it now. As with the VSD, it's an add on measure. I think we need to investigate what's the trigger. Other implementers may want to do this just like the POUs.

Ayad Al-Shaikh: What's the code trigger?

Spencer Lipp: In code, it's a big renovation or project, not a new component of the thing.

Greg Barker: Similar to replacing your lamps and ballasts. Even though there are lots of components.

Spencer Lipp: Sunsetting the measures like add on fans. Just because it's in code doesn't mean that it should be sunset. We have to look at the triggers in Title 24 and look at whether those triggers would force the customer to do the measure. Some walk ins are original to the building and the fans have been changed but that didn't trigger code.

Gary Fernstrom: I agree with Spencer. There are many, many cases where the baseline should be existing conditions, but we are forced to use code even though there isn't a realistic market opportunity.

Sue Haselhorst: If you are looking at a population average and is this a reasonable assumption after some period of time.

Annette Beitel: Let' s note the measures that this could apply to, then take it back to subcommittee. We'll summarize our recommendations and send to Sue. Over time, maybe we can develop a more actionable and reasonable policy.

ACT: Commercial refrigeration subcommittee to convene to develop a short list of measures that have a code baseline in the workpaper but could reasonably have an existing conditions baseline in practice, and develop a recommendation on these measures to the EAR team.

Spencer Lipp: If we boiled it down to a few measures, the broader issue would show itself. Now, the IOUs determine which measures are sunset. In the future if the IOUs don't control what we sunset, we may not have this issue.

Sue Haselhorst: We want to have confidence that the measure is installed in a place where it hasn't already been upgraded. Ideally, we want a blended assumption.

Annette Beitel: And we'll want some PoE guidance like snapping a picture.

Grocery Prototype Update
Presenter: Akhilesh Endurthy

Akhilesh Endurthy: Prototypes have not been updated since 2005.

Steven Long: Is this the approach for ISP determination?

Akhilesh Endurthy: I don't think the approach for ISP determination is very realistic.

Annette Beitel: PG&E has developed an approach for ISP determination.

Spencer Lipp: It came out this month for comment. I wouldn't consider the draft workable yet. It was part of the track 2 working group. It was sent to the email list.

Mike Casey: It's what are people installing now, not what is in now (vintage).

Akhilesh Endurthy: In this case it wasn't difficult for us to determine the ISP but if it's a borderline issue it's not so straightforward.

Spencer Lipp: What constitutes the vintage?

Akhilesh Endurthy: Original installation of the system.

Ayad Al-Shaikh: New measures are going to be built off of this so we definitely want you all to review and understand this.

Andres Fergadiotti: Have you done validation checks?

Akhilesh Endurthy: Haven't done validation checks but that's a good idea.

Ramin Faramarzi: Key drive is lay out and type of display case – linear feet. Less important what happens in the mechanical room. That assumption needs to be statistically supported.

Lighting Update
Presenter: Ayad Al-Shaikh

These measures are not for affirmation, but we want you to be up to speed so you are ready when we do put them up for affirmation.

Gary Fernstrom: There is additional opportunity if policy makers want to pursue it.

Greg Barker: Case made for fluorescent lighting: people might be replacing lamps and ballasts for a long time to come. Four years might be an underestimate. Policy makers might want to revisit that.

Sue Haselhorst: Not sure what market transformation is. But whatever we want to do we have to act quickly if we want to act by 2020. What are the levers we want to work on? If these are going to survive, we need to get that out now. What might be able to do.

Doug Mahone: Trying to remember the basis for measure. Revolve around maintaining lumens. That misses the opportunity to reduce lumens. In early days of retrofits, offices were over lit. Standards for lumens in offices and streetlighting have been reduced. Should be opportunities for reducing lumens.

ACT: Add to issues list: how do you take into account in a deemed setting, lumen reductions that are appropriate while still maintaining IES standards. We should Look at what other jurisdictions are doing.

Greg: Why don't we have measures to reduce lumens? It's hard to write that – it becomes a custom calculation (or NMEC).

Annette Beitel: Other jurisdictions have allowed for delamping.

Modeling Charrette
Presenters: Annette Beitel, Roger Baker

Will likely be Thursday, May 30th at the PEC.
Will cover basics today and revisit in April to solicit ideas. You can send your ideas to us between now and then.

Annette Beitel: Maybe have a mini discussion between now and April TF meeting to gather ideas.

ACT: Cal TF staff to schedule a call or reach out to folks for ideas for the modeling charrette:

- Use cases

- Missing building prototypes
    - Who developed?
    - How old?
    - What are the assumptions?