



**California Technical Forum (Cal TF)
Technical Forum (TF) Meeting #8
March 26th, 2015
Pacific Gas & Electric
245 Market St.
San Francisco**

I. Participants

Annette Beitel, Cal TF facilitator
Jenny Roecks, Cal TF staff
Alejandra Mejia, Cal TF staff

Tom Eckhart, TF Member
Spencer Lipp, TF Member
Yeshpal Gupta, TF Member
Sherry Hu, TF Member
Steven Long, TF Member
Pierre Landry, TF Member
Armen Saiyan, TF Member
Martin Vu, TF Member
Christopher Rogers, TF Member
Mary Matteson Bryan, TF Member
Ron Ishii, TF Member
John Proctor, TF Member

Pete Ford, San Diego Gas & Electric (SDG&E)
Grant Brohard, Pacific Gas & Electric (PG&E)
Chris Li, PG&E
Greg Sullivan, Presenter, UCONS
Christine Hanhart, UCONS
Ed Impala, Honeywell
Andres Fergadiotti, Presenter, Southern California Edison (SCE)
Yun Han, Presenter, SCE
Greg Barker, Presenter, Energy Solutions
Alina Zohrabian, PG&E
Pauravi Shah, PG&E

On the Phone

Srinivas Katipamula, TF Member
Doug Mahone, TF Member



Bruce Harley, TF Member
George Roemer, TF Member
Lawrence Kotewa, TF Member

Eli Caudill, Conservation Services Group (CSG)
Scott Higa, Presenter, SCE
Ann Marie Blanckenship, SCE
Chris Ganimian, Energy Analysis Technologies

II. Key Decisions and Action Items

Ductless Mini-Splits Abstract

- ACT: Clearly define measure delivery strategy.
 - Workpaper for will be determined by delivery strategy
- ACT: Answer behavioral questions.
 - Will need operational data across seasons
 - John Proctor to share year-long study information with UCONS.
 - Smart meter data is also an option
- ACT: UCONS to reach out to PG&E and SCE with defined data requests
 - SCE to provide aggregate swamp heaters data to UCONS
- ACT: SCE and PG&E to consider leveraging Emerging Technology data.
- ACT: IMC must use labor and measure costs.
- ACT: Sherry Hu to share SCE WP with UCONS
- ACT: UCONS to address possibility of incorporating controls
- ACT: UCONS team to use a 15 year EUL
- Measure approved to proceed to workpaper development.

Residential Quality Installation (RQI) & Work Order 32 Impact Evaluation

- ACT: Cal TF staff (Alejandra) to follow up with John Proctor about HVAC study.
- ACT: Cal TF staff to launch RQI technical subcommittee.
 - TF members interested in participating should reach out to Jenny.
 - Subcommittee should focus on duct leakage and airflow through the system—"right sizing" is ill defined and savings potential may not actually be there.
- ACT: Subcommittee to summarize other available information into table to be presented to the CPUC.



- Preliminary list of sources: PG&E lab studies, Purdue, Texas A&M, SCE, Proctor Engineering, LBNL, Mark Modera, Florida Solar Energy Center.
- ACT: Subcommittee to identify faults in current study as well comparing with other available information.

LED Recessed or Surface Mounted Panels Workpaper

- ACT: Cite validation of measure viability and savings values from ET report in workpaper.
- ACT: Use 0.85 ET NTG.
- ACT: Add explanation of absolute photometry in measure case vs. relative photometry (fluorescent).
- ACT: Use 15-16 year EUL subject to check of the fluorescent measure life.
- **Workpaper approved.**

LED Retrofit Kits Workpaper

- ACT: Include simple payback calculation in workpaper.
- ACT: Use Lighting Power Density (LPD) of 1.2 W/ft² code baseline as the second baseline.
- ACT: The following elements in the program should provide preponderance of evidence is satisfied by the following attributes:
 - Pictures to demonstrate base case is operational
 - Direct install component of program
 - Provide simple payback calculations
- **Workpaper approved.**

III. Ductless Mini-Splits Abstract

Tom Eckhart, UCONS—

Power Point Presentation

Bruce Harley—These rarely run at full capacity, so at part load they are more efficient.

Bruce Harley—We know that there are major American manufacturers trying to get into this space because they know it's a huge opportunity. However, I would warn us that there are some that aren't doing it well. We've had to come up with



cold weather performance standards here in the Northeast, but I'm not sure that would be needed in the West.

Pierre Landry—I have a memory of upstream programs for manufactured homes in the Northwest—where does this measure fit in with those programs?

Greg Sullivan—Manufactured homes are built without HVAC equipment. HVAC equipment is installed on site after shipment, so it has been sort of decoupled from those very successful upstream programs.

Pierre Landry—My second question is why we need this program, since you are saying that manufacturers are so interested.

Tom Eckhart—The utility incentives are needed because this is a very poor customer sector. That being said, we *would* have to account for some free ridership.

Sherry Hu—I believe SCE already has a workpaper for this measure.

Tom Eckhart—This is a different application than the one supported by the existing workpaper.

Spencer Lipp—What is the difference?

Tom Eckhart—The SCE workpaper doesn't look at zonal cooling and it's purely based on modeling. Our proposal uses impact evaluation data.

Steven Long—The problem we have run into with this measure in the past is how to quantify the behavioral aspects.

Pierre Landry—Is anyone living in the DOE test homes?

Greg Sullivan—No.

Tom Eckhart—We would really have to look more into the behavioral piece.

Steven Long—So, are you looking at potentially nine scenarios?

Greg Sullivan—No. We're looking at two: manufactured with central and manufactured with window units. One measure would target both scenarios for the measure.



Tom Eckhart—In our past experience we have seen that roughly 80% of the homes have central units.

Pierre Landry—So it's really just one measure?

Tom Eckhart—Yes.

Armen Saiyan—Are these units still rated with SEER or IEER?

Greg Sullivan—We are still seeing all SEER ratings.

Steven Long—So really what you are looking to adjust is the baseline from the whole home to part of the home.

Tom Eckhart—Essentially.

Steven Long—You could do that technically without any new data, you would just have to do some modeling work. You would only be left with the behavioral piece.

Greg Sullivan/Tom Eckhart—You would be scaling the cooling load too. The Northwest has done some modeling along these lines with actual billing data, and they've derated back up heating for back rooms by 20% to 25%.

Greg Sullivan—We are also expecting some challenges depending on the relative openness of floor plan.

Bruce Harley—Wouldn't you want to capture the heating savings?

Steven Long—As part of the three-prong test for fuel switching, the individual measure would have to pass the TRC test.

Sherry Hu—I think you will have to take duct leakage into account. Secondly, in my experience with fuel switching for manufacture homes, I expect you should pass the three-prong test.

Chris Li—I would warn that the TRC might be a challenge there; because part of the three-prong test is that it must be at least the individual measure TRC must equal 1.



Tom Eckhart—Our focus with this measure has been that it won't work unless the customer can see a monetary benefit. For this to be the case in California, you need a substantial cooling load.

Steven Long—Doing a direct install program may help you make it early retirement.

Chris Li—But you would then have to use full measure cost for direct install programs.

Martin Vu—You have to model that range because it really affects how you calculate costs and measure life.

Steven Long—It is definitely clear that you have to really define how you are going to offer it, because that will affect all of your calculations.

- ACT: Clearly define measure delivery strategy.

Pierre Landry—How is gas heating done in these homes?

Tom Eckhart—Largely forced air heating.

Annette Beitel—So, the UCONS team has brought this measure to the TF in abstract form with the goal of receiving feedback on the following specific questions:

- The form of the workpaper—whether the existing SCE workpaper fits this particular measure.
- What to use for TRC cost inputs
- EUL and baseline
- What additional research needs to be done?

Steven Long—The delivery strategy will really drive the answers to baseline, type, EUL, TRC.

Tom Eckhart—In this case we are hoping to do direct install leaving the existing system installed.

Steven Long—I'm not sure CPUC Staff would allow for that type of measure.

Armen Saiyan—Could you couple it with some sort of control device for the existing equipment?



Pierre Landry—I think you need data on the behavioral questions—how these systems are run in real life.

- ACT: Answer behavioral questions.

Pierre Landry—If the mini split sized right, I don't imagine people will turn the previous equipment on. People only think about their HVAC settings if it gets hot inside.

Steven Long—My thought on the delivery question is to disable the existing unit. Otherwise you will need some sort of operational data for at least four seasons.

Tom Eckhart—We could easily set up a sample of homes to track. We don't have an available sample on eastern Washington.

Spencer Lipp—You may be able to get the data you need if the customers have smart meters.

Annette Beitel—To summarize the TF's recommendations:

- ACT: UCONS team to clarify the measure delivery strategy
 - WP form will depend on final delivery strategy
- ACT: Behavioral response data is needed if delivery strategy will leave existing system in place.
- ACT: UCONS to reach out to PG&E and SCE with defined data requests
- ACT: SCE and PG&E to consider leveraging Emerging Technology data.
- ACT: IMC must use labor and measure costs.
- ACT: Sherry Hu to share SCE WP with UCONS
- ACT: UCONS to address possibility of incorporating controls

Greg Sullivan—Is there an existing measure for swamp coolers?

Steven Long—We do offer that program, and it does leave the existing HVAC unit in.

- ACT: SCE to provide aggregate swamp heaters data to UCONS

Sherry Hu—The EUL should be 15.

- ACT: UCONS team to use a 15 year EUL



Steven Long—NTG could be 0.85 or 0.7. It depends on the delivery strategy.

John Proctor—We have done a full year study on this particular measure, so I will touch base with UCONS off line.

- ACT: John Proctor to share year-long study information with UCONS.

Annette Beitel—In closing, is the TF Ok with this measure proceeding to full workpaper development?

Group—Yes.

- Measure approved to proceed to workpaper development.

IV. Residential Quality Installation (RQI) & Work Order 32 HVAC Impact Evaluation

Andres Fergadiotti and Scott Higa, SCE—

Power Point Presentation

Annette Beitel—What did the reduction in savings do to the TRC?

Scott Higa—The TRC for the program was very low to begin with (below .5), and this reduced it even further.

Steven Long—This measure is driven by policy from the Long Term Strategic Plan.

Andres Fergadiotti—This evaluation is bringing down the assumptions of efficiency gains from oversize equipment to almost zero.

John Proctor—That goes against what all other field studies have found. The other studies found that the average unit is oversized by a factor of two, not 10%. Furthermore, even if the average installations exceed Title 24, that doesn't mean we shouldn't focus on the units that don't.

Armen Saiyan—So what I'm getting from this is that contractors have begun to seal leaks better regardless of participation in the program.

Yeshpal Gupta—How old is the DEER data?



Group—It is a modeling output from 2008.

John Proctor—This is an area where the failure to pull permits really affects the baseline. This study did not perform “test ins” so they don’t know what participant leakage was prior to the program. The leakage of the non-participants is a proxy for the leakage of the participants prior to QI. We have two-year-old data with a sample size of 80 that contradicts these findings.

- ACT: Alejandra to follow up with John Proctor about HVAC study.

Group—The problem is that the study did not check if nonparticipants had or hadn’t pulled permits.

John Proctor—Best available information contradicts the Work Order’s findings on over-sizing. Manual J is very pliable—you can easily get whatever result you want. Furthermore, it over-estimates load. The amount of over-sizing relative to Manual J isn’t the question we need to answer; the real issue is the amount of over-sizing relative to actual load.

Annette Beitel—Question number one is if the TF recommends that SCE incorporate the Work Order findings into their workpaper and essentially kill the measure, or if we can recommend that if there is other data that can be used to update the workpaper.

Question number two is if the TF wants to create a subcommittee to deal with this issue.

Chris Ganimian —I’d like to point out two things: All of the Manual J activities done by participants were supervised by Staff. Number two is that the Work Order 32 did not use Manual S, but used ARI ratings for oversizing.

John Proctor—Of the parameters on slide 15, the most important one is duct leakage, the second most important one airflow through the system.

- Subcommittee should focus on duct leakage and airflow through the system.

Scott Higa, SCE—Expectations of SCE Program Team for Cal TF Process slides

Steven Long—Where did the NIST data come from?



Scott Higa—I'm not as familiar with where the data came from, but the NIST study utilized different modeling software informed by different data sources.

Annette Beitel—So, to return to the questions for the group:

- 1) Should a subcommittee be formed? There is broad interest in HVAC measures and the Res QI measure in particular. . The subcommittee will probably meet twice per month. If anyone is interested in participating, let Jenny know.
- ACT: Cal TF staff to launch RQI technical subcommittee.
 - TF members interested in participating should reach out to Jenny.
- 2) Whether Andres should take the information from WO32 to update the workpaper, and I think the answer is clear that other information and analysis should be considered. It would be helpful to get thoughts from those in this room about other data, information, or questions that could help inform the subcommittee. There is a NIST study that warrants some analysis before the first subcommittee meeting.

John Proctor—I can make a list of available information and send it out.

- ACT: Cal TF Staff to follow-up with John Proctor about list of other studies on Res QI/Res QM.

Steven Long—If there are different studies, we can summarize the information in a table.

Annette Beitel—Off the top of your head, what studies do you suggest?

John Proctor—PG&E has done lab studies in the past 15 years on the effective airflow and refrigerant charge. Purdue, Texas A&M, and SCE have data. We have field data from CA on air flow, refrigerant charge (old and new construction), and duct leakage (total, to outside). LBNL has done studies, and Mark Modera has been involved in some.

In my opinion, the equipment sizing issue..."properly sized" is ill defined, and actual studies don't necessarily support that this saves energy. It depends on the duct system. FSEC (Florida Solar Energy Center) did a study on ducts.

- ACT: Subcommittee to summarize other available information into table to be presented to the Res QI/HVAC subcommittee for consideration along



with W.O. 32 that could also be used to update the Res QI/Res QM subcommittees.

- Preliminary list of sources: PG&E lab studies, Purdue, Texas A&M, SCE, Proctor Engineering, LBNL, Mark Modera, Florida Solar Energy Center.

Pierre Landry—Does WHPA have money to do research or is it only advisory? If so, they may want to support equipment studies to firm up baselines.

Martin Vu—Has anyone talked to Commission Staff about deviating from WO 32?

Annette Beitel—I think Staff would say to use WO 32. However, if the group can present evidence to support deviating from WO 32, making an alternative recommendation could be one of the subcommittee objectives. Any proposed deviation from WO 32 would need to be presented to staff, but subcommittee should first consider merits of alternative studies/data that may suggest departure from WO 32.

Steven Long—At least getting all of the data in one place can demonstrate the range of data that is out there.

Scott Higa—The QI/QM programs are part of the Long Term Strategic Plan goals.

Ron Ishii—I agree with the idea that we need evidence to support deviating from WO 32. At that point, what is your feeling about Staff's willingness to entertain alternatives?

Pierre Landry—There are people behind QI/QM who would be open to looking at alternatives with supporting data.

Annette Beitel—We've spoken with Staff at the beginning about bringing information that deviates from DEER and using that information, and Staff was supportive. There is a difference between one-on-one disagreements versus a well-drafted document based on a public collaboration process. If done in a rational, thoughtful, supportable way, I think it is worth approaching staff with alternatives given the policy drivers for these measures. Because SCE is a national model, we could bring in ENERGY STAR and ASHRAE to speak to value of Res QI as well.



Chris Li—Can we invite ED to participate on the subcommittee?

Annette Beitel—Staff has told us repeatedly that they have resource constraints and would prefer to have Cal TF develop the work independently and provide deliverables to them for review.

Armen Saiyan—Before proceeding, we should determine if there are any faults.

Annette Beitel—Yes, we should identify weaknesses in addition to comparing with other data.

- ACT: Subcommittee to identify any issues or questions current study (WO 32) as well cataloging and comparing with other available information.

V. LED Recessed or Surface Mounted Panels Workpaper

Greg Barker, Energy Solutions—

Power Point Presentation

Steven Long—So you are suggesting not using the 12-year fixture life EUL from DEER?

Alina Zohrabian—That DEER value was derived from CFL down lights that have higher odds of failure so we are proposing a 20 year EUL.

Tom Eckhart—I recently heard LBNL validate the 20 year number, but also warn that technology is improving so fast that decision makers might choose to replace earlier.

Bruce Harley—It seems to me that the frequency of renovation is what will drive the lifetime.

Group—But there doesn't seem to be data to back that up that renovation assertion.

Spencer Lipp—If technology improvement were really driving replacements, we wouldn't have any T12 left out there.

Alina Zohrabian—The CPUC team has not given us the sources for their numbers.



Armen Saiyan—If you figure renovation *is* a factor, then its probably going to vary widely between smaller commercial and large commercial facilities.

Alina Zohrabian—Exactly, so our 20-year number figures to be an average of the different building types.

Steven Long—Was any of the ET data or analysis used in the workpaper?

Pauravi Shah—The ET report came out in September 2014, and we started developing this measure after it came out. It validated energy savings and usage values that were used in the workpaper.

Steven Long—So the ET report confirmed the validity of the measure.

Sherry Hu—That's the whole purpose of having those reports.

Group—Agreement.

- ACT: Cite validation of measure viability and savings values from ET report in workpaper.
- ACT: Use 0.85 ET NTG.

Armen Saiyan—So the assumption is fewer fixtures that have an equivalent output?

Greg Barker—The assumption is that customers will be intentional about their chosen lumen output. The alternative of grouping fixtures in enormous ranges by their wattage is less indicative of actual savings.

Yeshpal Gupta—How are you going to address the benefit of installing an over lit system?

Greg Barker—Our assumption is that the customer would have installed the same level of luminescence with linear fluorescent lamps.

Mary Matteson Bryan—I think those issues are inherent in every lighting measure.

Greg Barker—There will always be unknowns, and we need to balance our desire for information with the real need to keep the program easily accessible for the customer.



Pierre Landry—In reality, if this program replaces linear fluorescents with LED lamps, will it be one troffer for another? I'm concerned that we will have over lit spaces and that will erode savings.

Greg Barker—The program hopes to educate the least sophisticated lighting consumers. The technology is so expensive that we're not really expecting customers will buy the lamps mindlessly.

Armen Saiyan—Are you trying to keep it below the 40 fixtures that would trigger code?

Greg Barker—We're not going after controls purchases, because those two don't always go hand in hand.

Armen Saiyan—So you aren't considering the cost of the controls?

Greg Barker—They are left out because they are not attributable to the program.

Alina Zohrabian—It's pretty impossible to track those purchases for a downstream program like this one.

Mary Matteson Bryan—And the customer would have to purchase controls even if they were replacing with linear fluorescent lamps, so that cost isn't incremental to the measure.

Armen Saiyan—39 foot candles seems on the high end, but I guess that's for ambient conditions.

Greg Barker—It is higher than the requirement, so that is what matters.

Sherry Hu—For the fluorescent fixtures you considered 75% for the fixture efficiency, what efficiency did you use for the LED lamps?

Greg Barker—They are 100% efficient because of the photometric measurement difference and because there is no output lost to magnetic ballasts.

Sherry Hu—I understand. Can you add that explanation to the workpaper?

- ACT: Add explanation of absolute photometry in LED measure case vs. relative photometry (fluorescent).

Pierre Landry—How does your bin to range approach work out in the real world?



Greg Barker—You can tune fixtures to just about any output in any given range. The range approach gives a probability of success.

Armen Saiyan—I was also concerned with what the distribution would look like.

Greg Barker—We are focusing on the fixtures between 2,200 and 2,600 lumens—anything outside of that would be disqualified from the program to minimize implausibility.

Pierre Landry—Do you know what the distribution of products looks like in the market?

Greg Barker—The distribution tends to narrow as you focus your ballast factors, so you end up with something closer to a unimodal curve.

Armen Saiyan—Your base case uses the one office case, but you are offering the program to a broader set of applications. How are you dealing with that?

Greg Barker—The 0.85 office case was the most aggressive needs use, so we are comfortable with all the other applications.

Annette Beitel—What does the group think about using the 20 year EUL?

Steven Long—In essence this is a replacement for fluorescent, and fluorescents are life limited by ballasts, so this measure is less limited than the lamp it is replacing. We don't seem to have any data to justify using renovations as a limitation. Is the 50,000 hours the DLC's minimum?

Alina Zohrabian—Yes. That works out to around 16.4 years for the common use type.

Greg Barker—However, you can reach the 50,000 hours as soon as 10 years for health uses and as late as 33 years for motels.

Pauravi Shah—Do we really want to limit the measure life to the absolute minimum requirement?

Steven Long—Wouldn't you expect the common type to be the most frequent use?



Greg Barker—It depends on how you think about the common building type. It is a weighted average, not just the typical use.

Alina Zohrabian—I would be comfortable with using the 16-year EUL from the common type, since that's what I think most of our measure applications will be.

Group—Yes.

- ACT: Use 15-16 year EUL subject to check of the fluorescent measure life.

Martin Vu—Does the 50% quality language apply here?¹

Alina Zohrabian—No, that decision language only applies to replacement lamps.

Mary Matteson Bryan—But even the DLC's lower limit is higher than 85% of the market, since the DLC is a quality filter.

Annette Beitel—What does the group think about the savings calculation?

Armen Saiyan—I would be concerned about the realization rate with this range of values.

Alina Zohrabian—But you would have that risk with really anything.

Pierre Landry—I'm concerned about the distribution of the market in real life.

Annette Beitel—It sounds like this is a good candidate for interim approval, and then we can adjust when we have better data from implementation.

Sherry Hu—I would point out that we are already being conservative with the measure case by using three tiers.

Alina Zohrabian—We plan on implementing this program through our catalogue—collecting data would affect the delivery channel and costs.

Ron Ishii—So, how would this program be evaluated?

¹ This is in reference to Commission guidance to only incentivize products with quality in the top 50% of the market.



Pauravi Shah—Typically these studies look at participant and non-participant groups.

Sherry Hu—And since this is an ROB measure, Title 24 will be the baseline.

Group—This addresses all of our concerns about base case distribution.

Annette Beitel—Any concerns with the per kilo lumen cost calculation?

Group—No further concerns; workpaper approved.

- **Workpaper approved.**

VI. LED Retrofit Kits Workpaper

Yun Han, SCE—

Power Point Presentation

Martin Vu—Are you replacing lamps *and* ballasts?

Yun Han—Yes, the entire thing.

Spencer Lipp—If it's early replacement I don't see how you wouldn't be able use the T12 baseline. The guidance is you can use them if customers have a stockpile.

Pete Ford—We're allowed one third of the lamp life for T12s.

Spencer Lipp—I was told that program was renewed for 2015. If that's still the case, I would support you using the T12 baseline.

Armen Saiyan—You are still verifying the base case?

Yun Han—Yes, but the question is if the information we collect will be enough to satisfy ED's preponderance of evidence requirements.

Annette Beitel—Is there anything in writing that describes ED's preponderance of evidence?

Alina Zohrabian—There is a document that outlines 11 points that need to be satisfied, but it is only for custom projects.



Steven Long—A lot of those requirements don't make sense for the deemed programs. We've submitted our proposal on what we plan to do for direct install, but we haven't heard back from them in months.

Yun Han—This is set up as both early retirement and ROB.

Annette Beitel—So, the real question is what evidence you have to collect to prove that this isn't free ridership—base case pictures won't do that.

Steven Long—Part of the write-up for the preponderance of evidence is that the direct install component shows that the measure wouldn't have been installed in absence of the program.

Martin Vu—Are you using surveys in your custom trial?

Yun Han—The custom trial is taking pictures of the ballast and asking a question about when it was installed.

Martin Vu—Typically what the lighting contractors do is install a sample set and then return to install the rest if the customer is satisfied.

Yun Han—I think that would make ex ante delivery over complicated.

Steven Long—It seems to me that we should do the EUL like we did for the LED panels paper. Should it be 15 years?

Pete Ford—Is the 283 kWh the first year savings?

Yun Han—Yes.

Group—Ok with the reflection model.

Armen Saiyan—I would use Title 24 as the second baseline regardless of technology.

Steven Long—But we've been told to use T8.

Group—Ok with LPD code baseline for second baseline.

- ACT: Use Lighting Power Density (LPD) of 1.2 W/ft² code baseline as the second baseline.



Grant Brohard—So, for your savings you just multiply the DEER operating hours by the wattage reduction? What if some schools already have good half power consumption patterns—does anyone know of any data to answer this question?

Steven Long—Not unless some of the ongoing impact evaluations are looking at that.

Annette Beitel—It seems like for this particular workpaper it would be useful for us to spend some time on both SCE's three page write up about preponderance of evidence *and* ED's 11 point document for custom projects.

Steven Long and Spencer Lipp—That 11 point document says it is a set of examples of types of evidence for custom projects, and it isn't a Commission decision.

Martin Vu—To me, taking photos of installed ballasts and writing down the age is enough to show that the equipment was there and therefore the measure was early retirement.

Annette Beitel—So, with those elements, does this group feel comfortable that the measure should be classified as early retirement?

Group—Yes.

Sherry Hu—Commission guidance also asks us to provide simple pay back calculations for the measure in the case it hadn't been direct install.

Alina Zohrabian—They ask for it because they want it to be more than one-year simple payback.

Mary Matteson Bryan—The simple payback for this measure would definitely be greater than 2 years.

- ACT: Include simple payback calculation in workpaper.

Martin Vu—It troubles me that the units are different than the other workpaper we just approved.

Mary Matteson Bryan—It seems that this methodology is appropriate for this measure since it is allowed to use existing foot candles.



Sherry Hu—The guidance also wants the workpaper to document alternatives in the market, document existing conditions.

Steven Long—The alternatives are T8, pictures would document initial conditions.

Sherry Hu and the group—Yes, the 11-point document seems really geared to custom projects.

Mary Matteson Bryan and Pierre Landry—Use or no use of Prop 39 funds should not affect measure type (early replacement or ROB).

Spencer Lipp—I wouldn't require all that much documentation of date of install, since we can all determine if a lighting system will be operating for another year simply by looking at it and making sure all lamps are in good working order. A picture of the whole room shows that the owner is clearly maintaining their system if most lamps are operating.

Martin Vu—I'm concerned that we are not demonstrating how the program is influencing the school to act.

Mary Matteson Bryan—How can a free direct install program not influence a customer?

Group—Agreement.

Annette Beitel—So, to summarize, the group is comfortable with how the workpaper is projecting to prove the measure is early retirement.

Group—Yes.

- ACT: The following elements in the program should provide preponderance of evidence is satisfied by the following attributes:
 - Pictures to demonstrate base case is operational
 - Direct install component of program
 - Provide simple payback calculations

Annette Beitel—So, with the EUL changes, the baseline, and the preponderance of evidence, is the group comfortable with approving the workpaper?

Group—Yes.



- Workpaper approved.

VII. Closing