PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

AGENDA ID: 17567

ENERGY DIVISION **RESOLUTION E-5009**

September 12, 2019

R E S O L U T I O N

Resolution E-5009. Approval of the Database for Energy-Efficiency Resources updates for Program Year 2021 and revised version for Program Year 2020.

PROPOSED OUTCOME:

- Revise the Database for Energy-Efficiency Resources (DEER) 2019 Update (effective 01/01/2019)
- Revise DEER2020 Update (effective 01/01/2020)
- DEER2021 Update (effective 1/1/2021)

SAFETY CONSIDERATIONS:

- This Resolution has no impact on safety.

ESTIMATED COST:

- This Resolution is not expected to immediately result in additional cost, however, some of the changes may have cost implications that cannot be known at this time.

By Energy Division's own motion in Compliance with D.15-10-028.

SUMMARY

This Resolution approves updates to the Database for Energy-Efficient Resources (DEER) for program year (PY) 2021 and a revised version of DEER for PY 2020 and 2019, in Compliance with D.15-10-028 and Resolutions E-4818 and E-4952. This update also addresses significant transitions for the DEER and workpaper system maintenance and operation.

All updated DEER assumptions, methods, values and supporting documentation are available on the DEEResources.com website.[1]

BACKGROUND

Past Decisions

The California Public Utilities Commission (Commission or CPUC) Decision D.15-10-028, Ordering Paragraph 17 states: "Commission Staff shall propose changes to the Database of Energy Efficient Resources once annually via Resolution, with the associated comment/protest period provided by General Order 96-B. However, Commission staff may make changes at any time without a Resolution to fix errors or to change documentation." D.15-10-028, retains the direction from D.12-05-015 that DEER values be updated for consistency with existing and updated state and federal codes and standards while incorporating these changes into the annual DEER update.[2] D.15-10-028 also retains previous direction on CPUC Staff latitude in updating DEER.[3] Additionally, Resolution E-4952[4] (DEER2020), adopted on October 11, 2018 clarified and specified some E-4818[5] (adopted on March 2, 2017) issues, as well as provided a large number of other significant changes, such as the peak demand period and building prototype and measure analysis software (MAS) control updates.

Timing and Applicability of DEER Updates

DEER updates flow into the portfolio development process by providing new savings estimates and other parameter updates for program design. New savings

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[1] See Main Menu→DEER Versions→DEER2021 on http://DEEResources.com

[2] D.16-10-28, at 80, states "D.12-05-015 allowed additional mid-cycle changes if there are new state and federal codes and standards that affect DEER values. Specifically, the decision stated in Conclusion of Law 84: "We generally agree with parties' request that ex ante values should be adopted and held constant throughout the portfolio cycle. However, mid-cycle updates of ex ante values are warranted if newly adopted codes or standards take effect during the cycle."

[3] D.16-10-28, at 80, quotes from D.12-05-015: "Conclusion of Law 80 states: 'Our Staff should have significant latitude in performing DEER and other policy oversight functions and, absent specific directives to the contrary, should not be required to consult with or otherwise utilize any other groups to perform this work."

[4] Resolution E-4952

[5] Resolution E-4818

estimates, and underlying assumptions, methods, and values inform the direction of current programs. These allow Program Administrators (PAs) to shift program eligibility requirements and incentive support mechanisms to deliver cost-effective savings. DEER updates may also reflect new market conditions. PAs are required to factor in new assumptions and values by a) knowing there is an update, b) understanding the fundamental assumptions for the update, and c) identifying necessary shifts to their programs to capture cost effective savings. Updates to DEER methods apply in workpaper development and custom project savings estimates as well as program deployment decisions.

Prior year's DEER updates that impact database system transitions for Program Year 2018-2020

The DEER update cycle normally targets the program year two years ahead of the current year, but also corrects any issues from the previous year's update and other unanticipated issues. This year's update is a continuation of last year's DEER2020 update due to implementing and/or correcting changes directed by Resolution E-4952, and facilitating the transition to Statewide workpapers for PY2020 and beyond. The significant changes implemented by DEER2020 included 2019 Title 24 updates, peak demand period, and reconfiguration of the commercial building simulation models, which essentially superseded all previous existing DEER savings estimates for PY2020.[6] The consolidated statewide workpapers that will become effective 1/1/2020 for PY2020 are using the updated DEER2020 values and will replace previous individual PA workpapers. Database clean up and alignment of relevant savings parameters resulting from the consolidation activity will be a major undertaking for the CPUC Staff and DEER contractors during 2019 and 2020.

Final list of priority topic area updates for DEER2021, revised DEER2020 and 2019

The final list of updated topic areas is summarized in Table 1. The policy guidance for these updates is described in the Discussion section and a more detailed technical description of the changes and additions is provided in

[6] All measures are technically impacted by the redefined peak demand period change, but the magnitude of the change may be insignificant for those that have relatively flat use between 2 pm and 9 pm.

Attachment A to this Resolution. Complete documentation and supporting material on the updated assumptions and methods and updated DEER elements such as database tables, calculators, and web pages are available at DEEResources.com.[7]

Eight stakeholders, including all four IOUs, submitted comments on the DEER Update document. Below are the issues raised most frequently in the comments:

- The role of the PA-sponsored Cal TF electronic Technical Reference Manual (eTRM) in the deemed ex ante system;
- Issues with EULs and RULs for behavioral, retrocommissioning, operational (BRO) measures;
- Issues related to the savings for smart thermostats;
- Potential use of other building simulation modeling tools.

We respond to comments on each of these topics and other issues in Section 5 of the Attachment to this Resolution.

[7] Supporting material is available under the main menu/DEER Versions/DEER2021. http://www.deeresources.com/index.php/deer-versions/deer2021

Table 1 - DEER2021 update measures

Effective PY	Update Topic Area	Sector		Measure/Tech Group					Ex Ante Value		
		Res	Non-Res	Lighting	HVAC	DHW	Envelope	Plug/Process	UES Baseline	UES Methods	Measure Definition
DEER methodology updates											
2020-21	Review & assessment of lighting measures	X	X	X					X	X	X
2020	Statewide workpapers for PY2020 and beyond	X	X	X	X	X	X	X	X	X	X
2020	Consolidate savings by climate zone to eliminate PA-specific records	X	X		X	X	X	X			
2021	Smart controllable thermostats	X			X				X	X	X
DEER revisions and corrections											
2019	Suspend AR below-code NTG adjustment factor	X	X								X
2021	Update and correct water heater calculators	X	X			X			X	X	X
2021	Correct duct sealing measure EUL	X	X		X		X				X
2020	RCA measures missing from DEER2020	X	X		X				X	X	
2020	Measures expired by DEER2020 Update but still offered	X	X		X	X		X	X	X	X
Review of EM&V studies											
2021	Review on-bill-finance NTGR	X	X								
Review of codes & standards											
2020	General service lighting standards	X	X	X					X	X	X

DISCUSSION

Pursuant to D.15-10-28, the Energy Division published a DEER Update document on the proposed list of updates for DEER2021 and revised DEER2020 and DEER2019 items on April 29, 2019. Many of the items mentioned in the Update document did not make it to the priority topic area list in this Resolution because of (a) resource constraints and contractor transition and (b) based on further research and comments CPUC Staff found that they are in-progress and lack a definitive solution that the Commission can act on currently. The list of topic areas that this Resolution will incorporate are summarized below and described in detail in the Attachment A to this Resolution.

A. DEER Methodology Updates

DEER methodology updates affect the methods and approaches used to generate measures savings and supporting energy savings parameters, such as net-to-gross (NTG), effective useful life (EUL), unit energy savings (UES), and incremental measure costs (IMC). An update to DEER Methodology would alter the savings values, database structure, building prototype models, use of DEER database measures in workpapers, or the effort to move away from utility-specific to statewide measures. The changes for this cycle include lighting baselines and the approach used to determine the equivalent non-Light Emitting Diode (LED) baseline for a given LED lamp wattage, smart thermostat issues, and changes related to the consolidated statewide measure approach.

A.1 Review and assessment of lighting measures for DEER2020 and beyond

Some lighting measures will no longer be DEER measures, because their existing savings values are superseded by the updated savings parameters adopted in recent workpaper review and dispositions, or they will be expired due to changing federal and state codes and standards.

The general practice and preference is to freeze DEER values until the next update cycle for greater market certainty and stability. However, the lighting market has transformed rapidly in the past year with higher efficacy lighting fixtures available for the market. Lighting baselines have changed due to both codes & standards and industry standard practice. Several changes were made

for linear lamps and fixtures, including the inclusion of Tubular Light-Emitting Diode (TLED) lamps in the standard practice baseline,[8] and using an equivalent lumens bin approach versus a wattage bin approach for mapping measures to baseline values.[9] Lamps are separated into categories (bins) based on their light output in lumens instead of the previous methodology that separated lamps into bins by wattage. Lumens is a preferred methodology because it allows the comparison of different lamps with equivalent light output.

For screw-in reflector, globe, and candelabra lamps, the Standards[10] scheduled to take effect in 2020 mean that all LEDs will most likely be in the standard practice baseline and these measures can no longer be offered energy efficiency incentive dollars as a normal replacement.[11] A result of these changes is that some of the PY2020 measures will be expired/sunset in the DEER database. A general description of the impacted DEER measures is provided in the attachment.

A.2 Statewide workpapers for PY2020 and beyond

DEER will expire old measures that are now consolidated into statewide workpapers, so moving forward program administrators and third-party implementers will have to rely on the consolidated measures[12] for their program offering.

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[8] The baseline was revised to include a mix of technologies per direction provided in the Resolution E-4952, adopted October 11, 2018 which requires 100% LED for this technology. The technology mix includes: light emitting diode (LED) fixtures and tubular LEDs (TLED) in the proportion of 67% and 33%, respectively.

[9] Resolution E-4952 requires a minimum efficacy of 100 lumens per watt for TLEDs. A TLED can directly replace existing linear fluorescent lamps without replacing the fixture. Based on a review of available TLED products, the TLED efficacy was raised to 111 lumens/watt which yields an 85.1 lumen per watt fixture efficacy accounting for ballast losses.

[10] Either the California Energy Commission Title 20 or the federal minimum efficiency standards depending on if the federal government decides to enact new standards.

[11] These measures can still be offered as accelerated replacement measures but the low remaining useful life of the existing lamps makes this impractical.

[12] Energy efficiency measures represent a technology/ process driving energy efficiency savings based on the technical analysis, inputs, and savings estimates which are documented in workpapers.

Currently each PA has its own set of measures so there are multiple workpapers and database records for a single technology but with different savings parameters and no standardization across the PAs. In late 2016, the CPUC directed the IOUs to develop statewide workpapers for new measures.[13] The CPUC guidance was intended to allow these savings parameters, such as the measure definition, technical analyses, inputs, applicable markets and building types, etc. to represent the interests of "more than one" PA. While this guidance streamlined the workpapers prospectively it was also critical to consolidate approximately 400 existing overlapping workpapers and database records across all PAs.

From mid-2017 the PAs and California Technical Forum (Cal TF) have been working diligently on consolidating measures into statewide workpapers. After a two-year effort these workpapers are ready for adoption for PY2020, with an effective date of 1/1/2020. Development, review and approval of these workpapers is taking place on an accelerated schedule this year. For PY2020 and beyond, workpapers must use a statewide approach. The impact of a statewide approach for DEER measures is that only a single energy savings value will be used for each climate zone instead of multiple PA-specific values. A list of the consolidated workpapers is available at Cal TF's website[14] and included in the CPUC's Monthly Workpaper Summaries.[15] The CPUC expects approximately 130 consolidated statewide workpapers. CPUC Staff and contractors plan to approve 97 workpapers by September 1, 2019 that can be used in the PAs program year 2020 forecasts. The remaining workpapers (~33) may or may not get approval in time for 1/1/2020 PY2020 start date and will be dealt with on a case by case basis.

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[13] The guidance states that "[o]nly one workpaper may be submitted for each set of programs/measures which are adopted by more than [one] program administrator; such workpapers have been termed "statewide workpapers" and program administrators have been directed to collaborate on such efforts." Commission ex ante team. "2017 Workpaper Guidance." Memorandum submitted to California Energy Efficiency Program Administrators. November 14, 2016. Accessed at: http://deeresources.com/files/2013_14_exante/downloads/2017_Workpaper_Guidance_Memo_OUT.pdf

[14] http://www.caltf.org/statewide-measure-list

[15] http://www.deeresources.com/index.php/non-deer-workpapers

A.3 Consolidate savings by climate zone (no longer PA-specific)

It is reasonable to expect a uniform savings value across PAs for a technology type in a single climate zone. The DEER2021 update will create new values that are consistent with this approach for PY 2020 and beyond.

Starting in PY2020, consistent with the use of Statewide workpapers, only a single savings value will be used for each climate zone instead of PA-specific values. This logical approach does not require modification to the existing database structure, only the addition of a new single statewide record to be used in place of the multiple PA-specific records. However, this change will require an update of the code used to process the building simulation and other data to no longer generate the PA-specific values. CPUC Staff and contractors will proceed with a short-term and long-term plan to update the database that will allow stakeholders to use the correct values. In the short-term the database will rely on consolidated workpaper values, which specifies which PA-specific value will be used in each climate zone. The longer-term remedy will be to eliminate generation of PA-specific results which will require modifications to the computer code used to process the building simulation results. This will ensure that a single measure offering in a given climate zone will receive the same savings, and be covered by a single, statewide workpaper.

A.4 Smart controllable thermostats

This DEER resolution is not modifying heating and cooling load data in this update for PY2020 and PY2021, because the underlying study data will not be complete until early next year, and revisions should be based on new updated information.

Some thermostat manufacturers disagree with DEER based cooling loads.[16] [17] The stakeholder comments suggested that DEER cooling loads used as the basis for savings are too low for some climate zones. Vendor comments on temperature values and schedules are narrowly focused, because these are only one element of the model and calibration process. The DEER residential building models are calibrated to average annual space heating and cooling energy use from an

[16] The cooling load is the amount of thermal and/or electrical energy needed to cool a space to meet a specified thermostat schedule over a period, for example these are annual cooling loads.

[17] Section 1.4 of Attachment A of this Resolution summarizes comments from the vendor.

authoritative reference source, the California Energy Commission's (Energy Commission) statewide Residential Appliance Saturation Survey (RASS)[18]. The current DEER data corresponds to the existing RASS studies.

The RASS is the primary method of collecting residential sector energy consumption and appliance profiles to support the Energy Commission's residential sector energy demand forecast model. All baseline simulations in the DEER are recalibrated so that heating and cooling annual energy use values are reasonably close to values published in RASS. Calibration is accomplished by adjusting and weighting together five different simulations each with a different combination of heating and cooling thermostat schedules as well as variations in exterior shading. Energy Commission's current RASS study is underway and is scheduled for completion in March 2020.

CPUC's DEER recalibration of cooling and heating loads for residential building prototypes will be reevaluated when new, updated RASS data becomes available in 2020. If the timing of the Energy Commission project coincides with the DEER Update cycle, then Staff and contractors may consider recalibrating DEER modeling for PY 2021. CPUC Staff will also consider workpaper submissions based on RASS values directly. Modifying underlying DEER values is resource intensive and Staff and contractors do not want to replicate the activity twice in a short period of time.

B. Updates for Correction of Errors

Major changes were made to the DEER system under the DEER2020 Update, for example, the commercial building prototypes and modeling approach were completely redone and the peak demand period was changed, but with limited resources and time to thoroughly assess those updates. Some of the errors and issues identified and addressed are discussed below, but we expect additional issues as they arise in preparing the PY2020 workpapers. Currently, these issues impact HVAC and water heating measures, duct sealing, refrigerant charge adjustment (RCA) measures, and suspension of a below-code NTG adjustment

[18] California Residential Appliance Saturation Study, https://www.energy.ca.gov/appliances/rass/

factor for accelerated replacement measures that was specified in Resolution E-4952.[19]

B.1 Suspend Accelerated Replacement (AR) below-code net to gross (NTG) adjustment factor

It is reasonable to suspend the dual code NTG for accelerated replacement, due to system limitations and limited visibility into accelerated replacement market penetration currently.

The DEER2020 update specified that accelerated replacement measures should have two NTG inputs; one for below code (AR) and one for normal replacement (NR) above code. The cost effectiveness tool (CET) managed by the CPUC is not designed to manage two NTG inputs concurrently. Staff, CPUC contractors and stakeholders worked together and exchanged information and provided inputs for a manual adjustment. There are challenges in manually adjusting the data and then reconciling it with system generated reporting data. Additionally, there is limited visibility into the extent of accelerated replacement measure uptake and the impact of the manual adjustment on third-party implementers. System upgrade on the CET may allow this functionality at a later time, but until then expending further resources to complete manual adjustments, verification and setting ad-hoc processes is not justified. Therefore, it is reasonable to suspend the adoption of the AR below-code NTG adjustment factor change. The issue may be revisited in the future if a dual-NTG becomes a priority. The current practice of using a single NTG value for AR measure application types (MATs) will remain unchanged.

B.2 Update and correct water heater calculator including Heat Pumps

DEER 2021 Update will correct inconsistencies and missing information discovered in the water heater calculators. Since these are data driven updates utilities need to collaborate with Staff and contractors to jointly resolve the underlying calculator errors. To allow a transition year, as the errors are fixed for PY2020 the current workpapers with as-is or interim values will remain approved.

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[19] DEER2020 Update Resolution, Section 5.4, pages A-42 to A-47, http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M232/K459/232459122.PDF

The water heater calculator(s) used for the 2019/2020 DEER Update specified that the most current water heater calculator in the DEER portal should be used. While reviewing related Statewide workpapers for PY2020 inconsistencies and missing calculator information was discovered by Staff. For instance, the calculator currently does not include electric water heaters and appears to have some errors in the gas water heater calculations. In addition, the current size range for residential heat pump water heaters is too narrow, and artificially limits the actual products that qualify. This limited applicability of the bin size is a deterrent to greater market penetration of measures that support building electrification and reduction in greenhouse gas emissions. The allowable bin size definition will be changed to allow for more than one water heater to be used in incentive programs. Work is currently being conducted to remedy these shortcomings and a revised water heater calculator[20] will be ready by mid-2020. The program administrators are required to work closely with Staff and its team of contractors – DEER and Workpaper review to ensure PY2021 workpapers are filed at least six months prior to effective date.

B.3 Revisit duct sealing measure Effective Useful Life (EUL)

It is reasonable to revisit classification of duct sealing measures and their associated effective-useful life of 3-years as a behavioral retrocommissioning measure. Resolution E-4952 (October 11, 2018) classified duct sealing as a BRO[21] retrocommissioning (RCx) measure with a 3 year EUL, based on the RCx criteria of being "restorative of performance". But Resolution E-4818 (March 3, 2017) indicated that duct sealing was a building weatherization measure. Prior to re-classification, the measure had an 18 year EUL so 3 years was a significant reduction and may be too short. CPUC Staff will work with the PAs to determine the best measure application type and set an EUL that is supported by research or other robust means for PY2021. In the interim a workpaper for the BRO measure has already been submitted and approved for PY2020. PAs have

[20] There are several versions of a water heater calculator in READI. The most current spreadsheet water heater calculator should be used to determine the energy savings for workpapers with water heater measures when it becomes available in mid-2020. Until then the most current calculator or Workpaper for electric water heaters should be used.

[21] BRO = Behavioral, retrocommissioning, or operational

indicated the measure will be discontinued after 2020 if the EUL is not extended because the measure is not cost effective at 3 years.

B.4 Residential refrigerant-charge adjustment measures missing from DEER2020

The DEER 2021 Update will add missing refrigerant charge measures. Utilities will need to collaborate with Staff and contractors to resolve the missing values. PAs reported that only a fraction of the refrigerant charge adjustment (RCA) measures were updated for DEER2020 and loaded into the Preliminary Ex Ante Review (PEAR) and Ex Ante (EA) databases[22]; the remainder were missing altogether. Furthermore, the missing measures are impeding the 2020 statewide workpaper development for the associated residential measures. MASControl3 was run to generate the missing MeasureID and EnergyImpactID records for the refrigerant charge adjustment measures as shown in Table A-7. This update will not trigger new workpaper development, however, the current residential workpapers are on hold until results are available in July 2019. The DEER databases will be updated with new values for use in PY2020.

B.5 Measures expired by DEER2020 but still offered

Utilities will continue to collaborate with Staff and contractors to identify missing DEER values for current offerings and generate those values for DEER. Some older DEER measures inadvertently left out of the DEER2020 update process will be recreated to extend them into 2020 and beyond. This includes some older (circa 2015) commercial refrigeration measures and HVAC measures that require a reassessment and update of baseline and market conditions.

C. Updates Based on Review of Evaluation, Measurement & Verification (EM&V) Studies

There is limited information available currently to make changes to net-to-gross (NTG) ratio for on-bill financing programs, so the current NTG shall remain effective. The current range of NTG values for on-bill financing is 0.55 to 0.60. The PAs suggested the ratios be updated to values from the Opinion

[22] PEAR and EA database access instructions can be found on deeresources.com: http://www.deeresources.com/index.php/ex-ante-database/accessing-the-ex-ante-data and http://www.deeresources.com/index.php/ex-ante-database/best-practices-database

Dynamics 2015 evaluation report that ranged from 0.49 to 0.80 across PAs and end uses, with a Statewide overall value of 0.64.

As suggested by PAs in DEER2020 comments, we reviewed a 2015 Opinion Dynamics evaluation of on-bill financing NTG values. While the study results indicate that the NTG values should be changed for some programs and end uses, due to changes in the market, program offerings have evolved since 2015, and representation of PAs in the study, we will not apply the values from this report but instead recommend a new more comprehensive study be conducted. The PAs should plan that the release of the study results coincide with the next EM&V and DEER update cycle.

D. New Code Revisions or Code Revisions Not Covered in Previous DEER Updates

The baseline for Screw-in lamps will need to be updated due to code changes. Most of the code changes were handled by the DEER2020 update, but there is one planned lighting update: screw-in lamps including candelabras, globes, and reflectors. In anticipation of this code change being implemented at either the state or federal level, DEER will be updated to reflect the new code. These lighting measures will move to 100% LED baseline for 2020 and will be retired from DEER.

Other Consideration for the DEER2021 Update

CPUC Decision 12-05-015 noted "that similar measures delivered by similar activities should have single statewide values unless recent evaluations show a significant variation between utilities and that difference is supported by a historical trend of evaluation results."[23] The PY2020 workpapers will be the first effective application of this statewide measure directive, and are the culmination of an extensive multi-year effort lead by the California Technical Forum in collaboration with the Program Administrators. This effort was preceded by the extensive changes implemented for the DEER2020 update, some of which were applicable to PY2019. In many ways, the DEER2021 update effort is merely a continuation of the DEER2020 updates, and there are very few updates for PY2021. However, with much of the PAs energy efficiency portfolios being bid

[23] D.12-05-015 at 54.

out to third-parties for design and implementation, we anticipate having to make changes for PY2021 under the DEER2022 update cycle. Comments received from stakeholders on the DEER Update document were also considered in assembling the items for this update.

COMMENTS

Public Utilities Code section 311(g)(1) provides that this resolution must be served on all parties and subject to at least 30 days public review. Please note that comments are due 20 days from the mailing date of this resolution. Section 311(g)(2) provides that this 30-day review period and 20-day comment period may be reduced or waived upon the stipulation of all parties in the proceeding.

The 30-day review and 20-day comment period for the draft of this resolution was neither waived nor reduced. Accordingly, this draft resolution was mailed to parties for comments, and will be placed on the Commission's agenda no earlier than 30 days from today.

FINDINGS

1. Decision D.15-10-028 requires that CPUC Staff propose changes to the Database of Energy Efficient Resources once annually via Resolution, with the associated comment/protest period provided by General Order 96-B.
2. Decision D.15-10-028 retains the direction from D.12-05-015 that DEER values be updated to be consistent with existing and updated state and federal codes and standards.
3. Decision D.15-10-028 also states that CPUC Staff may make changes at any time without a Resolution to fix errors or to change documentation.
4. The proposed updates to the DEER values are a result of a) Updates to Underlying Methodology or Correction of Errors, b) Updates for corrections and clarifications, c) Updates Based on Evaluation Study Results, d) New Code Updates, e) Review of Market and Research Studies, f) Addition of New Measures.

THEREFORE IT IS ORDERED THAT:

1. The DEER2021 and Revised DEER2020 Updates, listed in Table 1, as described in the Attachment and supporting documentation available on the DEEResources.com website, are approved with effective dates as listed.
2. The E-4952 Resolution requirement to implement a below-code NTG adjustment factor for accelerated replacement measure application types is suspended currently.
3. Pacific Gas and Electric Company (PG&E), Southern California Electric Company (SCE), Southern California Gas Company (SoCalGas), and San Diego Gas & Electric (SDG&E), the San Francisco Bay Area Regional Energy Network (BayREN), Southern California Regional Energy Network (SoCalREN), Tri-County Regional Energy Network (3CREN), Local Government Sustainable Energy Coalition (LGSEC), Lancaster Choice Energy (LCE), and Marin Clean Energy (MCE) must use the updated assumptions, methods and values for 2020 planning and savings claims, and 2021 planning, implementation and reporting.

This Resolution is effective today.

I certify that the foregoing Resolution was duly introduced, passed and adopted at a conference of the Public Utilities Commission of the State of California held on September 12, 2019; the following Commissioners voting favorably thereon:

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ALICE STEBBINS
Executive Director

Attachment A

Database for Energy-Efficient Resources Updates for Program Year 2021

DEER2021 Update Statement

September 12, 2019

ENERGY DIVISION
CALIFORNIA PUBLIC UTILITIES COMMISSION

DEER2021 UPDATE STATEMENT

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1. DEER methodology updates

1.1. Review and assessment of lighting measures

Effective Program Year: 2020, 2021. The lighting market has evolved in the last two years with rapid adoption of LED technology. In 2018, both mid-year dispositions and the DEER2019 revised baselines included a large fraction or 100% LEDs in the technology mix. E-4952 also moved lighting measures to DEER as there appeared to be greater certainty around the future of savings values. After Resolution E-4952 was issued, CPUC staff and consultants conducted additional research that led to mid-year (2019) lighting workpaper revisions. New research has been initiated recently which will affect future baselines. The potential delay in implementation of the Federal Standards for general service lighting lamps and the Energy Commission response to that has also added uncertainty to measures and workpapers.

While the backdrop of lighting measures is changing, it is very clear that lighting will play a diminished role in the PA's energy efficiency portfolios. Large volume screw-in lamp replacements will be discontinued as an offering in 2020. Since the baselines for linear LED technology are expected to improve steadily in the foreseeable future, the baseline efficacy of linear lamps (measured in lumens per watt or lm/W) requires periodic adjustment. For linear lighting measures, efficacies were updated in January 2019, effective August 2019 through December 2020, so PY2019 will have two different savings values. The measures values will be updated again (out of cycle) for the 2021 program year.

1.1.1. Linear lamps and fixtures

Effective Program Year: 2020. Subsequent to E-4952 the linear lamp and fixture measures were revamped significantly through non-DEER workpapers. There is no plan to migrate linear measures back into DEER. The important changes follow:

Equivalent lumen instead of wattage bins. Prior to the updates, lighting measures were defined or binned for a range of wattages (e.g. 5 to 8 watts, 9 to 12 watts). Now measures are binned according to equivalent lumens provided rather than on rated wattage (i.e. 4' linear between 4500 and 5400 lumens). The change to lumen bins is based on the premise that customers buy lighting replacements to meet service requirements (e.g. lumens) rather than the rated lamp watts. This change also allows measures to remain stable as efficacy continues to improve because the lumen requirement for a given application is likely to remain the same, but the wattage needed to achieve this lumen requirement will drop as efficacy increases. Lastly, as part of the re-binning, the sizes of the bins were reduced, improving the overall accuracy of calculations associated with each binned measure, while increasing the calculated savings.

Addition of TLEDs in the baseline. Tubular TLEDs are generally less expensive and efficient than either an LED retrofit kit (which includes light source, driver, and an optically designed insert for a troffer) or an LED fixture completely designed and optimized for LED technology. Since consumers select between TLEDs, retrofit kits, or a full LED fixture replacement when considering LED technology, TLEDs are included in the baselines of fixture and retrofit kit measures.

Linear measures will assume the mixed baseline noted in Table A-1. The assumed mixes are based on previous dispositions but replacing the fluorescent baseline allocation with TLEDs resulting in a 100% LED baseline. For linear lamp measures not explicitly addressed in Table A-1 or Table A-2, a baseline mix of 50% TLED and 50% LED luminaires will be assumed.

Table A-1 - Linear Fixture baseline technology mix

Measure Description	% TLED	% LED base
LED High/Low Bay, 4500 to < 5400 lumens	40%	60%
LED High/Low Bay, 5400 to < 6500 lumens	40%	60%
LED High/Low Bay, 6500 to < 7800 lumens	40%	60%
LED High/Low Bay, 7800 to < 9400 lumens	40%	60%
LED High/Low Bay, 9400 to < 11800 lumens	40%	60%
LED High/Low Bay, 11800 to < 14800 lumens	40%	60%
LED High/Low Bay, 14800 to < 18500 lumens	20%	80%
LED High/Low Bay, 18500 to < 23100 lumens	20%	80%
LED High/Low Bay, 23100 to < 30000 lumens	20%	80%
LED High/Low Bay, 30000 to < 39000 lumens	0%	100%
LED High/Low Bay, 39000 to < 50700 lumens	0%	100%
LED High/Low Bay, 50700 to < 65900 lumens	0%	100%

Table A-2 - Baseline LED percent Tech Type fractions by measure

Measure Description	% TLED	% LED base
Troffer	33%	67%
Ambient	33%	67%
Parking Garage	50%	50%

A study[1] examining interior lighting replacements standard practice is underway. This study is expected to be completed before the end of 2019. The PAs in collaboration with CPUC Staff and consultants, are instructed to use the results of this study to revise the technology mixes for 2021 measures.

Baseline LED Efficacy: Resolution E-4952 established a baseline of 100 lm/W for luminaires that house linear lamps by stating the following: "Nearly all available technologies exceed an efficacy level of 100 lumens per watt. Therefore, the code/ standard practice baseline for hard-wired fixtures that were not previously covered by 2018 Phase 1 dispositions shall be 100

[1] "Statewide Interior Lighting Standard Practices Study," sponsored by SCE and authored by TRC.

lumens per watt."[2] Subsequent dispositions[3] for workpapers established a baseline efficacy for Type A TLEDs at 111 lm/W, based on data collected by the PAs of currently available TLED products, as well as TLED performance reports and historical LED efficacy improvement trends detailed by the US DOE[4].

This efficacy revision affected all linear workpapers since TLEDs are included in the baseline technology mix of linear workpapers effective August 2019. Table A-3 summarizes the efficacies effective August 2019. These same efficacies will be referenced for 2020 measures.

Table A-3 - Linear Fixture Baseline Technology Mix

Tech Type	Current Workpaper (LPW)
High/Low Bay	105
Linear Ambient	105
Troffer	100
TLED	111

Historically, LED performance has improved by approximately 10-12 lm/W per year and this trend is expected to continue for at least the next five years. This efficacy improvement in LED chips is mirrored in the lamps and luminaires that utilize them. This trend suggests that the standard practice baseline for TLEDs will improve to approximately 133 lm/W in 2021 with corresponding improvements in fixture efficacy. While the trends are clear, actual values will require further research and the release of the Design Lights Consortium (DLC) Premium standards product lists which is expected the first or second quarter of 2020.

Linear lighting measures effective 1/1/2020 and expiring 12/31/2020 shall incorporate the baseline assumptions for the technology measure mix noted in Table A-1 and the lamp and fixture efficacies of Table A-3. Linear lighting measure workpapers effective 1/1/2021 must be revised and resubmitted for CPUC review and approval by June 30th, 2020 or 60 days after the release of the DLC Premium standards, whichever comes first. Existing DEER measures that cover these technologies, including the records added for DEER2020 that incorporate a 100% LED baseline will be retained for future use but expired.

1.1.2. Screw-in reflector, globe and candelabra lamps

Effective Program Year: 2020. For screw-in lamps, Federal Standards scheduled to take effect in 2020 will recategorize reflector, globe and candelabra screw-in lamps as General Service Lighting lamps, making them subject to the minimum 45 lumen per watt (lm/W) requirements.

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[2] See Resolution E-4952, page A-26

[3] http://deeresources.net/workpapers.

[4] DOE CALiPER Snapshot report on TLEDs from June 17, 2016 and DOE SSL Energy Savings Forecast from September 2016.

A potential delay in implementation of the Federal Standards for general service lighting lamps and the Energy Commission response to that has added some uncertainty to this transition. However, CPUC Staff conclude that these remaining screw-in lamp types will be subject to the 45 lm/W efficacy standard imposed by either Federal or Energy Commission standards on 1/1/2020. A 45 lm/W standard will eliminate halogen and incandescent lamps from the market and while CFL would meet this standard, they are not expected to retain a significant market share. The outcome of the new standard will be to move these lamp types to a 100% LED baseline and that the baseline will therefore substantially exceed 45 lm/W because LEDs are already much higher than that. A recent DNV GL retail shelf-inventory study[5] supports this conclusion. This study showed that LEDs already dominate retail shelf space; 62% of all consumer-grade lamps stocked in California retail stores were LEDs. This study was based on a very robust sample of 200 California retail stores surveyed in the first quarter of 2019.

As a result of the transition to 100% LED baseline, the existing screw-in lamp and screw-in fixture measures – both workpaper and DEER measures - will be expired 12/31/2019. A-lamps were previously eliminated from PA programs in 2018 for the same reason. A few niche-lighting exceptions to the 100% LED baseline may remain, such as low lumen and marine application lamps. There may also be an opportunity to implement measures for LED lamps or fixtures that are higher efficiency than the baseline efficacy. But large volume screw-in lamp replacements can no longer be offered as a normal replacement beginning 1/1/2020. Existing DEER measures that cover these technologies, including all records added for the DEER2020 update will be retained for future use but expired for 2020. This includes all DEER Lighting measures for UseSubCategory and/or Measure IDs as indicated in Table A-4.

Table A-4 – Screw-in lighting DEER measures impacted by Standards

Tech Type	UseSubCategory contains	MeasureID contains
Any	InGen-Screwin	ALL
Reflectors	Any	LED-PAR, LED-BR
Downlight retrofit kit	Any	LED-CanRet, LED-RefR
Candelabra	Any	LED-Candle
Globe	Any	LED-Glb

1.2. Statewide workpapers for PY2020 and beyond

Effective Program Year: 2020. The existing system of utility-specific workpapers is a management challenge for all stakeholders involved in the process. Workpapers are submitted by all four IOU- PAs, there are sometimes only slight variations in offerings and savings, utilities can adopt other utilities' measures via a "short-form", and different workpaper and

[5] "Upstream and Residential Downstream Lighting Impact Evaluation Report Lighting Sector - Program Year 2017", DNV GL, 4/26/2019, Study ID (CPU0193.01).

data formats are used by different utilities. But for PY2020 and beyond, all workpapers will use a Statewide approach, realizing the goal expressed in CPUC Decision 12-05-015 that "similar measures delivered by similar activities should have single statewide values unless recent evaluations show a significant variation between utilities and that difference is supported by a historical trend of evaluation results."[6]

The PAs and Cal TF have been working diligently on statewide workpapers that will finally be adopted for PY2020. The standardized workpapers and the associated electronic technical reference manual (eTRM) should greatly simplify the workpaper process. Development, review and approval of these workpapers is taking place on an accelerated schedule this year. A move to statewide workpapers will also end the need for DEER to create and present multiple, utility-specific values for a single climate zone. Similar measures delivered by similar activities will indeed have single, statewide values for a single climate zone. For PY2020 and beyond, workpapers must use a statewide approach and provide a complete set of values to cover the entire state and all its climate zones. CPUC Staff will continue to work with the PAs and Cal TF to examine the issues and process in detail and develop an improved process and procedures.

1.3. Consolidate savings by climate zone to eliminate PA-specific records

Effective Program Year: 2020. DEER currently provides savings for each utility within a climate zone, but that is counter to the CPUC directive that "similar measures delivered by similar activities should have single statewide values".[7] For example, the DEER2020 Measure "Furnace-Pkg-AFUE92" in CZ05 historically has three energy impact values, one for each utility serving that area (PG&E, SCE, and SoCalGas). The savings values are only slightly different due to minor differences in underlying weighting of building vintages, HVAC system types or other population characteristics. Starting in PY2020, instead of multiple PA-specific values only a single value will be used in the database (PA field value = "Any") for each climate zone.

However, many measures currently only have the PA-specific values, so a new record will need to be created in DEER. CPUC Staff will pursue both short-term and long-term options to fix this issue. The short-term solution adopts the approach used for the Statewide workpaper consolidation process by Cal TF: Use the value for the predominant PA where the predominant PA is based on the weights used by MASControl3 (wts_com_loc.csv table). The predominant PA for climate zones that encompass multiple PAs is shown in Table A-5. The longer-term remedy will be to eliminate generation of PA-specific results which will require modifications to the MAS Control system and post-processing of the MAS Control results.

Starting in PY2020 consistent with the use of Statewide workpapers, only a single savings value will be used for each climate zone instead of PA-specific values. Until statewide values (field

[6] D.12-05-015 at 54.
[7] Ibid.

PA="Any") can be created in DEER for the affected measures, Table A-5 presents the predominant PA and the corresponding savings value to be used for each climate zone. This update is needed for consistency with the move to Statewide workpapers.

Table A-5 - Predominant PA to use for Statewide CZ savings values

CA Climate Zone	Predominant PA
CZ05	PGE
CZ06	SCE, for electric measures SCG, for gas measures
CZ08	
CZ09	
CZ10	
CZ13	PGE
CZ14	SCE, for electric measures SCG, for gas measures
CZ15	
CZ16	

1.4. Smart controllable thermostats

Effective Program Year: 2021. Smart controllable thermostats (SCT) or just smart thermostats are a non-DEER measure, but as currently developed in the measure workpaper it relies on DEER's DOE2 building simulation results to expand the area-limited impact evaluation study results to other climate zones. Google Nest (Nest) has expressed concerns with how estimated savings derived from an impact evaluation targeting the Central Valley are extrapolated to climate zones not included in the original impact evaluation. They have also expressed concerns with the specific temperature settings and schedules used in the building simulation models, versus temperature settings and schedules observed in their own proprietary data. The DEER model estimates of cooling load come from building simulation models that are central to California's deemed energy efficiency process for years. The method simply assumes that savings as a percentage of cooling load are constant across climate zones. While this is a simplification, it is common to state thermostat-related savings in terms of a percentage of annual cooling and/or heating consumption, and also to not make a distinction in that value across climate zones.

Nest's temperature issues, temperature values and schedules are only one element of the model and calibration process. The DEER residential building models are calibrated to average annual space heating and cooling energy use from an authoritative reference source, the California Energy Commission's statewide Residential Appliance Saturation Survey (RASS)[8]. Each of the one- and two-story models—which incorporate the multiple thermostat schedules - are run and

[8] California Residential Appliance Saturation Study, https://www.energy.ca.gov/appliances/rass/

weighting factors are developed to calibrate the final results to RASS space heating and cooling, electric and gas normalized annual energy use values for each climate zone. One or more of the temperature schedules may also be adjusted slightly.

This calibration exercise is done each time the prototypes are updated for new code requirements, new code versions, and baseline equipment updates. The models are calibrated to normalized annual energy use and temperature settings and schedules are part of that calibration process. That said, calibration and adjustment is as much art as science, so if there is California-specific, publicly available data that can be used to validate or update the model parameters and assumptions or calibrate the models, it can be evaluated and potentially incorporated into the DEER models or used directly in workpapers. Re-calibration of the models should also be considered when new RASS results are available, as will be the case in mid-2020.

We appreciate the comments of Nest and other stakeholders. CPUC Staff will continue to work closely with the Program Administrators (PAs), the California Technical Forum (Cal TF), and subject matter experts (SME) to assess these concerns and determine if there are better methods and data sources for estimating savings for this measure. In addition, for a potential PY2020 workpaper update, SCG is sponsoring a study to re-examine gas savings, with analysis results and an updated workpaper scheduled for August-September 2019.

2. DEER error corrections

DEER error corrections or clarifications are those that impact the actual DEER values or application of the values. Correction to the DEER database and previous year's resolution are often needed due to the complexity of the DEER ecosystem and decisions and resolutions, the quick pace of the Rolling Portfolio timeline, and today's dynamic energy environment. Major changes were made to the DEER system under the DEER2020 Update; for example, the building prototypes and modeling approach were completely redone, and the peak demand period was changed, but without a chance to thoroughly vet those updates. Although many errors and issues identified after the DEER2020 resolution have been addressed and are discussed below, additional issues are cropping up as the PAs use the DEER2020 measures to develop the Statewide workpapers. An errata document is also posted on deeresources.com.[9]

2.1. Suspend below-code NTG adjustment factor for AR applications

Effective Program Year: 2019. The DEER2020 Update Resolution E-4952, Section 5.4 introduced the requirement for a below-code Net-to-Gross adjustment factor for accelerated replacement

[9] DEER2020 errata and clarifications: http://www.deeresources.com/files/DEER2020/download/ERRATAforDEER2020UpdateDocumentation_2019-02-13.pdf

measures.[10] This concept was adapted from the "Energy Efficiency Potential and Goals Study for 2018 and Beyond"[11] to adjust for savings already accounted for by Codes and Standards, and potential differences for below- and above-code free-ridership. The adjustment was intended to be effective for 2019 programs. However, CPUC Staff has asked the Program Administrators to forego making this change for 2019 claims and for future reporting and filing purposes. Notice of this change was previously communicated to the PAs via email and the DEER2021 Update document but is documented here for completeness.

Due to resource and time constraints it was not possible to make the needed structural data system changes that would offer a long-term implementation. Despite multiple meetings with utility staff and considerable effort, Staff also ruled out a manual and interim solution given the complications around communicating it to third party implementers, resulting over/underestimated savings, and uncertainty around tracking and verifying the manual interim solution. The difficulty of measuring such effects is a significant issue. The below-code NTG adjustment factor for accelerated replacement proposed in E-4952 is suspended.

2.2. Update and correct water heater (WH) calculators

Effective Program Year: 2021. As indicated in an email from CPUC Staff in May 2019, the water heater calculator (Water Heater Calculator v3.3) used to estimate water heater measure savings contains some errors and requires corrections and updates.[12] These errors were originally identified in a memo from SCG in March 2019. In addition, the PAs also suggested a change to the DEER heat pump water heater measure shown in Table A-6.

Table A-6 - Suggested revision to DEER measure definition

MeasureID	Measure Description (MeasDesc)	Standard Description (StdDesc)
RE-WtrHt-SmlStrg-HP-lte12kW-rep30G-3p24EF	Efficient water heater: ~~50~~ 46 to 55 gallon HP Elec (UEF=3.09) replaces ≤35 gallon Electric water heater (UEF 0.92)	Small storage Elec water heater: 30 gallon, UEF = 0.92, RE = 0.98, Cap = 4.5, UA = 1.31 BTU/hr-F

The PAs requested that the lower end of the HPWH range (50 gallon storage tank size) be changed to 46 gallons to better reflect the products on the market and expand the number of qualifying HPWHs. The general rule preventing PAs from offering this on their own is that the range for a DEER measure can be interpolated but not extrapolated. We reviewed ENERGY STAR, AHRI, and Energy Commission appliance database equipment lists and concur with this suggestion, and will incorporate this change into the calculator and DEER measure update. The

[10] DEER2020 Update Resolution E-4952, Section 5.4 Net-to-Gross for Accelerated Replacement Measure, pages A-42 to A-47, http://docs.cpuc.ca.gov/publisheddocs/published/g000/m232/k459/232459122.pdf

[11] http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M194/K614/194614840.PDF, Aug 23, 2017, Navigant Consulting, Inc.

[12] Email from Energy Division to PAs dated 2019-05-01 at https://deeresources.info/wpa/projects/15197.

Ex Ante Review team has requested the assistance of the PAs to address the errors and updates as a joint effort to be completed by May 1, 2020. This will provide enough time to update DEER measures and workpapers for program year 2021, and use the updated savings values for the PAs 2021 annual budget advice letter (ABAL) filings. For PY2020, the existing workpapers and calculators with minor errors have already been approved and will be used as-is due to negligible impact on the programs.

2.3. Revisit duct sealing measure EUL

Effective Program Year: 2021. Resolution E-4952 updated the classification of the duct sealing measure to a Behavioral, Retrocommissioning, or Operational (BRO) measure and changed the EUL value to 3 years. Resolution E-4818 indicated that measures involving non-mechanical building components (ductwork was included in this category) are eligible for building weatherization treatment. Duct sealing does improve building envelope integrity but is also part of the mechanical HVAC system. A workpaper for duct sealing as a BRO measure was submitted and approved for the PY2020 program, so an interim solution accepting the BRO classification is in place. However, a 3 year EUL for duct sealing and classification as a retrocommissioning measure does not make sense to many parties, so CPUC Staff will continue working with the PAs to determine the best measure application type and set an EUL that is supported by research or other robust means for PY2021.

2.4. Refrigerant-charge adjustment measures missing from DEER2020

Effective Program Year: 2020. PAs reported that only a fraction of the refrigerant charge adjustment measures were updated for DEER2020 and loaded into the PEAR/ExAnte databases; the remainder were missing altogether. Furthermore, the missing measures are impeding the 2020 statewide workpaper development for the associated measures. MASControl3 was run to generate the missing MeasureID and EnergyImpactID records for the refrigerant charge adjustment measures as shown in Table A-7. The DEER databases will be updated with new values for use in PY2020.

Table A-7 - RCA measures and energy impacts added to DEER

MeasureID	Version	Version Source	EnergyImpactID
NE-HVAC-RefChg-Dec-Typ-ntxv	DEER2020	D20v0	NE-HVAC-RefChg-Dec-Typ-ntxv
NE-HVAC-RefChg-Dec-Typ-txv	DEER2020	D20v0	NE-HVAC-RefChg-Dec-Typ-txv
NE-HVAC-RefChg-Inc-High-ntxv	DEER2020	D20v0	NE-HVAC-RefChg-Inc-High-ntxv
NE-HVAC-RefChg-Inc-High-txv	DEER2020	D20v0	NE-HVAC-RefChg-Inc-High-txv
NE-HVAC-RefChg-Inc-Low-ntxv	DEER2020	D20v0	NE-HVAC-RefChg-Inc-Low-ntxv
NE-HVAC-RefChg-Inc-Low-txv	DEER2020	D20v0	NE-HVAC-RefChg-Inc-Low-txv
NE-HVAC-RefChg-Inc-Typ-txv	DEER2020	D20v0	NE-HVAC-RefChg-Inc-Typ-txv
RE-HV-RefChrg-Dec-NTXV-typ	DEER2020	D20v2	RE-HV-RefChrg-Dec-NTXV-typ
RE-HV-RefChrg-Dec-TXV-typ	DEER2020	D20v2	RE-HV-RefChrg-Dec-TXV-typ
RE-HV-RefChrg-Inc-NTXV-16pct	DEER2020	D20v2	RE-HV-RefChrg-Inc-NTXV-16pct
RE-HV-RefChrg-Inc-NTXV-4pct	DEER2020	D20v2	RE-HV-RefChrg-Inc-NTXV-4pct
RE-HV-RefChrg-Inc-TXV-16pct	DEER2020	D20v2	RE-HV-RefChrg-Inc-TXV-16pct
RE-HV-RefChrg-Inc-TXV-4pct	DEER2020	D20v2	RE-HV-RefChrg-Inc-TXV-4pct
RE-HV-RefChrg-Inc-TXV-typ	DEER2020	D20v2	RE-HV-RefChrg-Inc-TXV-typ

2.5. Measures expired by DEER2020 but still offered

Effective Program Year: 2020. Some older DEER measures that are still offered by the PAs were either inadvertently or intentionally left out of the DEER2020 update process. These measures need to be recreated to extend them into 2020 and beyond. Commercial refrigeration measures and some HVAC measures have been reported so far. Staff and contractors are still investigating, but it appears that some of these were older measures in need of an update with new standard practice or baseline information, or because they used outdated weather files. Any pre-2020 DEER database measures that were not updated with a 2020 version cannot be used going forward because the peak demand period and building prototypes were changed. As a result, PAs wishing to continue to offer these retired measures will need to submit workpapers for these "new" measures. Because these measures are old and likely in need of updated information, a workpaper will be the best method for updating the measures. As a minimum, the update will need to include revised peak demand savings to reflect the new DEER2020 peak demand period. CPUC Staff will continue to work with PAs and Cal TF to resolve issues with these measures.

3. Review of EM&V studies

3.1. Review on-bill-financing NTGR study

Effective Program Year: TBD. CPUC Staff subject matter expert (SME) reviewed Opinion Dynamics' PY2015 on-bill financing (OBF) evaluation report (CALMAC Study ID CPU0181) and concluded that the evaluation is useful and does indicate some trends and differences. However, we recommend that an additional more current study using a consistent approach across all PAs be conducted, rather than using the results of this study. Figure A-1 presents Table 1-6 from the evaluation report along with some observations and key takeaways that should be considered for a subsequent study:

Figure A-1 - Excerpt of NTGRs from 2015 Opinion Dynamics Evaluation

Table 1-6. Net-to-Gross Ratios by PA (PY2015/16)

	Overall	Lighting	Non-Lighting
Statewide	0.64	0.69	0.56
PG&E	0.65	0.80	0.49
SCE	0.64	0.61	0.77
SDG&E	0.68	*Not estimated by technology*[A]	
SCG	*Not estimated*[B]		

[A] Due to small sample sizes, we did not estimate technology-specific NTGRs for SDG&E.
[B] Due to small sample sizes, we did not estimate a separate NTGR for SCG.
Source: 2015/16 OBF participant survey.

- The Opinion Dynamics study design followed the California protocols and achieved 90/10 relative precisions. The evaluation provides results by Statewide, PA program and two end use categories, Lighting and Non-Lighting. SDG&E results did not use the end use categories, and SCG was not estimated due to small sample sizes.
- Based on a default assignment range of 0.55 to 0.60[13], NTGR values in this report are generally more than +/- 5% different than the asserted default values, but vary at the program-measure category level. Generally speaking, a NTGR based on a study of a specific program and technology is superior to a generic default value.
- The results most likely represent a real trend. Evaluations of programs providing financing should consider trends in commercial interest rates, particularly the Prime Rate. While still historically low, the Prime Rate has steadily increased since 2015. With interest rates several points higher now than they were during the evaluated period, it is unlikely that NTGRs would be lower than those evaluated.

[13] Comments from SCE regarding the Opinion Dynamics report in the DEER2020 Resolution, E-4952.

However, there are several reasons that limit the applicability of the results of the 2015 study:

- The discrepancies in NTGRs between PG&E and SCE, combined with the gaps in measure coverage for SDG&E and SCG suggest the statewide totals are the best numbers to use for updating DEER NTGRs
    - Non-lighting NTGR would go to 0.56, which is not a large enough difference to justify the change.
    - A lighting NTGR of 0.69 is more than 5% different than the existing default values. However, Federal minimum lighting efficiency requirements have steadily increased since the study's completion and this NTGR might be too high in that context.
- The study does not account for differences in NTGR by market sector that are reasonable to expect for this type of program. On-bill financing is often a critical offering for cash-flow constrained economic sectors. This includes municipalities and local governments which would otherwise have to issue bonds to secure financing, and some private sectors such as hospitality. For such segments, these programs could have even higher NTGRs than those recorded in the PY2015 study.
- Programs listed as including on-bill financing represent approximately 9% of the statewide gross filed lifecycle kWh savings and 0.4% of lifecycle Therm savings in 2017 and 2018.[14] This makes them relatively important electric programs that justifies a more rigorous net savings assessment.

We recommend conducting a new study that would provide the following benefits:

- Base results on more recent program activity and market conditions, including Federal lighting efficiency requirements and a Prime Rate closer to historic norms.
- More directly assess the effect of a rising Prime Rate on program attribution.
- Sample in a way that covers all relevant measures at all PAs and accounts for differences by relevant market sectors such as municipalities and cash flow-constrained businesses

If a study is conducted and available before March 2020, it will be considered for review in the next DEER update cycle.

4. Review of energy codes & standards

4.1. General Service Lighting Standards

As discussed in detail in Section 1.1, the technologies covered by the latest Federal standards update expected 1/1/2020 are candelabras, globes, PARs and reflectors. The baseline for these

[14] According to a summary report obtained from CEDARS on 12 June 2019.

remaining screw-in lamps will be set to a 100% LED baseline starting in 2020. Although there is some uncertainty in the current regulatory environment for screw-in lamps, CPUC Staff conclude that nearly all high-sales volume screw-in lamps will be covered by a 45 lumen/watt (lm/W) efficacy standard imposed by either DOE or Energy Commission on 1/1/2020. A 45 lm/W standard will eliminate halogen and incandescent lamps from the market and while CFL would meet this standard, they are not expected to retain a significant market share. As a result, all DEER measures for these technologies will be expired as of 1/31/2019.

5. Comments on DEER2021 Update document and CPUC Staff/DEER team Responses

On April 29, 2019 CPUC Staff published to the Energy Efficiency Proceeding R.13-11-005 a memo outlining the intended scope of the planned update to the Database of Energy Efficiency Resources (DEER) and a solicitation of comments on that proposed scope. Comments were filed by Google Nest/ecobee Inc., Pacific Gas & Electric, Southern California Edison, San Diego Gas and Electric, Southern California Gas, Southern California Regional Energy Network (SoCalREN), California Energy and Demand Management Council (The Council), and the California Technical Forum (Cal TF). Those comments were grouped by topic and the most significant issues are summarized below along with a response from the CPUC Staff.

5.1. Impact on 2020 ABAL Filing

San Diego Gas and Electric (SDG&E):

SDG&E is requesting that the statewide workpapers for 2020 approval earlier than the statement "...completed by the end of 2019", so that it can inform the planning process for the 2020 ABAL. SDG&E is anticipating a mix of 2019 and 2020 approved workpapers to forecast, given the timing of the statewide 2020 workpapers. SDG&E seeks clarity if a mix of 2019 and 2020 workpapers are appropriate or is it expected that the forecast will only be based on approved workpapers.

CPUC Staff response:

If there is an approved statewide workpaper for PY 2020, then those values should be used, otherwise guidance will be provided on a case-by-case bases until further direction is provided in a future Commission decision.

Building decarbonization

Southern California Edison (SCE):

SCE requests future clarification of the methodology of the Three Prong Test to apply to fuel-switching measures. This includes definition of the efficiency of the baseline conditions and the measure conditions.

SCE supports future development of new load shapes that better represent more "electrified" customers and new TOU rates driving energy savings and energy usage outside new peak demand period.

Southern California Gas Co. (SoCalGas):

SoCalGas cautions the proposed consideration for DEER to model fuel substitution energy use and load shapes in future DEER updates.

Development of fuel substitution load shapes and impacts for measures offered solely for the purposes of building decarbonization should be deferred.

San Diego Gas & Electric (SDG&E):

SDG&E appreciates the recognition that work on updating DEER will need to be coordinated with Decarbonization efforts of R.19-01-011 so that inclusion and updated assumptions to relevant measures are done consistent with overall CPUC policies. SDG&E expects that there will be updates to existing policies such as the Three-Prong test for fuel substitution and ZNE EE savings to meet the overarching goal of Decarbonization.

CPUC Staff response:

The Three Prong Test will be addressed in an upcoming Proposed Decision. Details will be made available at that time. There will be additional opportunity to comment on the Proposed Decision.

5.2. Building Simulation Prototypes and Modeling

San Diego Gas & Electric (SDG&E):

With respect to DEER using building simulation tools, SDG&E recommends exploring EnergyPlus as a simulation tool with a Technical Advisory Group. There has been an increased use of the model for custom projects.

California Energy and Demand Management Council (The Council):

The Council supports the opening of DEER process to the use of other building simulation tools and recommends the pending resolution include language directing ED staff to begin exploring the adoption of EnergyPlus immediately.

Southern California Regional Energy Network (SoCalREN):

b) Update and expand the load profiles and prototype buildings to account for sector specific use type, occupancy and operations. Specifically, bifurcate the public sector segments (building types) in a way that aligns with building types owned by public agencies (e.g. community centers, high schools, police stations, water treatment facilities, parks, prisons).

Although identified as out of scope in this update cycle, the SoCalREN strongly urges the inclusion in this update cycle the consideration of opening DEER up to use of other building simulation tools and recommends the pending resolution to direct CPUC Staff to begin this process. The increased use of the EnergyPlus™ building simulation tool would harmonize both the CPUC and Energy Commission at both the practitioner level (custom project submittals/code compliance, and ex ante review) and eventually at the respective Commissions' administrative levels (IEPR, P&G study).

California Technical Forum (CalTF):

Cal TF Staff recommends that the CPUC Staff and its consultants participate in the "Modeling Charrette" as well as the development of the Technical Position Paper on building simulation modeling for code compliance, and custom and deemed measures.

CPUC Staff response:

CPUC Staff attended the May 30, 2019 Cal TF-sponsored Modeling Charrette and will continue to participate in the process as warranted. Switching building simulation tools and interfaces can involve a steep learning curve, and the creation or conversion of building prototypes and a system to perform the multitude of runs required and process the data into energy savings is not a small matter, so the decision to switch should not be made lightly. In addition, while eQUEST/DOE2/MASControl3 is an integrated package, an EnergyPlus-based system will be more like an a la carte selection of multiple components potentially from different vendors with different levels of support, subscription fees, etc. EnergyPlus is the simulation "engine" but a user interface to set up and track the building simulations, and a system to process results into database values are also needed.

On the other hand, a huge benefit of EnergyPlus as an open source tool is that new measures, new building types, etc. might be created more quickly. However, vetting the approach and results for non- eQUEST/DOE2 models will require a lot of time and effort, so for the near-term Energy Division will need to continue using the existing eQUEST/DOE2 MASControl3 system and building prototypes for deemed measure modeling, except for high impact measures that cannot be modeled in eQUEST/DOE2, .

CPUC Staff will continue to monitor Cal TF developments and meetings on this topic. The Commission is open to using tools other than eQUEST/DOE2 but there must be some consistency in the input data to the models. We also recognize the need for more transparency in these underlying input assumptions and will be working to improve the documentation. Discussions with other agencies/entities are currently taking place to establish a process and details for implementing other modeling tools.

5.3. Cal TF eTRM policy

California Technical Forum (CalTF):

Upon completion of the project, the eTRM will replace the existing Ex Ante Database and DEER as the only repository of Commission-approved deemed measure values.

Use the eTRM as the complete repository of all active and future statewide measures and supporting documentation.

Do not devote any additional funds or resources to improve the usability of the DEER database/website; doing so would be duplicative, time intensive, and be an unnecessary and imprudent use of ratepayer funds.

Work with Cal TF Staff, IOUs and Other Stakeholders to Develop a Transition Plan to Switch from DEER to the eTRM. The eTRM was never intended to exist "side-by-side" with DEER; from the start, it was intended to replace DEER.

Pacific Gas & Electric (PG&E):

PG&E supports the transition to an electronic Technical Reference Manual (eTRM) and recommends prioritizing this effort.

CPUC staff response:

The CPUC acknowledges the extensive effort by the PAs and Cal TF that went into consolidating and creating Statewide measures pursuant to Commission decisions, as well as creating an electronic repository for the workpapers and their associated data. However, unless and until a Commission decision directs the replacement of the current workpaper WPA system or the DEER database, energy savings claims must continue to be submitted via the existing WPA system and meet the existing DEER system requirements. In the meantime, Staff will continue to work with the PAs and the Cal TF to evaluate the viability and role of the eTRM during the normal course of workpaper review cycles, and the eTRM should be a useful PA tool for efficiently organizing and submitting statewide workpapers and associated data to the CPUC.

5.4. Smart Thermostats

San Diego Gas & Electric (SDG&E):

SDG&E recommends an additional topic area regarding the DEER Prototype assumptions surrounding the building type, MFm and the NormUnit. Currently DEER Prototype has a value of 1.0 tons. When collaborating with SCE and the statewide Smart Communicating Thermostat (SCT) working group, SDG&E provided actual data that supports an increase in capacity tons to an average of 2.0 tons. SCE has also provided data to help back up our findings. These adjustments to the DEER Prototype will be submitted shortly in the latest workpaper plan for SCT. SDG&E recommends that this update be incorporated into DEER2021

Google Nest/ecobee:

DEER thermostat schedules inaccurately reflect California Indoor Residential HVAC setpoints, affecting energy savings estimates for a range of cooling-related measures.

Google Nest and ecobee are happy to help in sharing aggregated and/or anonymized data to help inform this analysis. Further exploration into the low modeled cooling loads by Google Nest and ecobee identified the assumed thermostat settings in DEER as a major reason for the low load estimates.

Southern California Edison (SCE):

SCE requests future updates to DEER temperature schedules for improving accuracy of DEER and Non-DEER energy and demand savings in Residential Sectors.

CPUC Staff response:

See detailed discussion above in Section 1.4 about model calibration process and the primary calibration sources. However, CPUC Staff will continue to work closely with the Program Administrators (PAs), the California Technical Forum (Cal TF), and subject matter experts (SME) to assess these concerns and determine if there are better methods and data sources for estimating savings for this measure, and also when and if the building prototype models should be adjusted.

5.5. EUL for BRO measures

Southern California Edison (SCE):

Consider measure-specific EULs for BRO measures (i.e. – pump overhauls). Currently some BRO measures, like pump overhaul, have supporting data to justify use of higher EULs than the mandated 3 years for BRO measures. Where credible data exists, the respective BRO measures should utilize the higher EUL. SCE recommends a review of all BRO measures to assign measure specific EULs for each measure.

Southern California Regional Energy Network (SoCalREN):

SoCalREN advocates for the following to be a priority now rather than in future revisions:

EULs for BRO measures and NMEC whole building projects require additional analysis. Some operational measures for pump overhauls have EULs beyond 3 years and the claimable savings are not accurately represented in DEER. In general BRO and NMEC EULs should receive additional study to determine impacts on lifetime gross savings metrics.

CPUC Staff response:

This response only addresses the BRO EUL comments for deemed measures, as NMEC issues are more complex and addressed in the NMEC working group. Resolution E-4952 provides clear EUL defaults that reflect decision language and make sense for measures that might be considered normal operation and maintenance. However, the PAs and CPUC Staff are also generally tasked with providing the best estimate of savings for each measure. For instance, evaluations may indicate that there are unique instances (such as the duct sealing measure) in which the measure warrants being reclassified to an application type other than BRO. In these instances, staff may propose updated EULs that are different than the default values.

5.6. RUL correction for BRO measures

Southern California Edison (SCE):

DEER 2019: The BRO RUL values in CPUC Resolution E-4952, Table 8 [see SDGE Table 8 tab], should be corrected. The RUL for BRO measures should be corrected from 1 year to 0 years, since the RUL is not applicable to BRO measures. When evaluating TRC analysis for measures using the Cost Effectiveness Tool (CET), the RUL can be entered as "0" or left blank to receive the correct result.

CPUC Staff response:

This will be corrected in the current update cycle for all BRO measures.

5.7. DEER databases: Ex Ante and PEAR

San Diego Gas & Electric (SDG&E):

Revisit the need for operating and maintaining both the ex-ante (EAdb) and PEAR (PEARdb) databases (at page 6-7).

SDG&E appreciates ED Staff's review of the necessity of maintaining both the ex-ante and PEAR databases. SDG&E has noticed inconsistencies and how PEARdb is more "official" and up to date than the EAdb. We would like clarity on the plan on how these discrepancies are interfering with any CEDARS related values as READi exports to it every night. These values would be impactful for related claims and TRC runs and elevate the priority level higher considering 3rd Parties.

California Technical Forum (CalTF):

Discontinue maintenance and updating of multiple databases for ex ante values.

CPUC Staff response:

The official DEER values are stored in the ex ante database (EAdb) and major updates via the DEER Update cycle are only made once a year after the DEER Update is approved. The preliminary ex ante database (PEARdb) is used as a "sandbox" to store working new and/or revised values for the next DEER update cycle and allow them to be publicly reviewed via READI or other tools prior to DEER Update approval. Changes are made to the active EAdb once a year when PEARdb values approved by the DEER Update are migrated to the EAdb. However, the PEARdb also contains the source description table (*SourceDesc*) that is populated with approved workpaper IDs, and used by CEDARS, and this table is only maintained in the PEARdb. The process has become somewhat confused, and utilities pull data from one or both databases. No changes are currently planned for this process, but CPUC Staff are exploring options for simplifying the process.

5.8. Measure Load Shapes

A desire for hourly end use and measure load shapes for a variety of applications was expressed by several stakeholders, though a primary application was cost-effectiveness with an emphasis on temporal value of energy savings.

Pacific Gas and Electric (PG&E):

PG&E recommends prioritizing load shape updates and including this effort in the scope of the current update cycle. We support the effort to explore "methods and metrics for identifying and updating DEER measures that have more potential savings impacts when avoided costs are high," and emphasize that this effort can only be effective if the load shapes are also updated.

The current load shapes being used in cost effectiveness calculations were last updated in DEER2011. Avoided costs of electricity savings now vary dramatically by time-of-day and season. This is a critical obstacle to accurately claiming peak savings, calculating EE cost effectiveness and successfully integrating into the Integrated Resources Planning process.

PG&E has been collaborating with the Energy Commission on their load shape research and ensured that EE specific 8760-hour load shapes were derived to help with the effort to update load shapes in DEER. This report should be released in early 2019. PG&E recommends the results be available in DEER2020 or as soon as possible.

San Diego Gas and Electric (SDG&E):

CEDARS/CET were discussed in Section 2 but did not indicate what year these "significant assessment and planning efforts" will begin and/or be finalized unlike the other detailed DEER updates in the DEER Update document. As part of SDG&E's work on its CPMS, we are going through data conversion testing and found discrepancies in both PEARdb's support table and CEDARS as it relates to the "E3TargetSector" and associated "ElecImpactProfile". However, in READi they are mostly blank for SDG&E. On the other hand, CEDARS has these inputs located in the "AvoidedCostCombo" table.

It also appears that these combinations were updated recently. SDG&E encourages coordination between ED Staff's ex-ante, ex-post, EM&V, and reporting teams in their work on the CPUC's databases and provide communication on any future enhancements/changes for CPMS and CET design purposes. This will be critical when 3rd Parties begin submitting their TRC analysis to IOUs. SDG&E encourages ED Staff to prioritize this coordination efforts starting in 2019.

Southern California Edison (SCE):

Additional Update Future DEER: Add new DEER load shapes to current inventory. It has been a challenge to find appropriate load shapes for specific energy efficiency measures, like supermarket refrigeration.

California Technical Forum (CalTF):

Cal TF Staff recommends that CPUC Staff and its consultants identify statewide 8760 load shapes.

CPUC Staff response:

The new Contract Group A includes activities in parallel to the DEER update that focus on effective useful life and load shape updates that can be used for DEER, workpapers, and cost-effectiveness. For the DEER 2021 update, the focus of the load shape activity aligns with the previous resolution and targets load shapes for current measures (2020-2021). The load shape activities will then move ahead to new load shapes needed for 2021-2023.

We are aware of the Energy Commission load shape study[15] and it is being considered for the load shape update, although details beyond the publication will be needed since the study provides end use level load shapes, which can be used to move toward measure load shapes. The Energy Commission study discussion about measure load shapes also does not fully integrate all the needs of the rolling portfolio process, and it will be useful but will require additional integration steps.

The load shapes would be pushed to CEDARS/CET and READI peak demand values will be consistent with the full load shapes. The DEER resolution will not directly change CEDARS, CET, or other cost effectiveness rules and processes so the integration requires steps beyond this update for all Energy Division needs.

Load shapes for refrigeration and other measures may fall under the scope of statewide workpapers rather than DEER, but we agree DEER and workpaper measures should have a reference table or database of load shapes, and the intent of the load shape work being conducted under the current Group A contract is to develop a table and/or database of load shapes.

5.9. Add measure "sunset" dates

A desire for hourly end use and measure load shapes for a variety of applications was expressed by several stakeholders, though a primary application was cost-effectiveness with an emphasis on temporal value of energy savings.

California Technical Forum (CalTF):

Cal TF Staff supports development of a policy (after input from a broad range of stakeholders) for systematic measure updates and measure sunsetting.

Southern California Regional Energy Network (SoCalREN):

In regards to section 2.2 in Appendix A, SoCalREN disagrees with the concept of adding a "'sunset date' which would specify the 'shelf life' for the measure, versus the current approach of leaving the Expiry Date blank and update open ended." Public sector projects follow longer timelines than traditional commercial sector customers due to lengthy approval processes and other unique barriers. Expiry dates can cause start and stop challenges and uncertainty of program funds to complete EE projects. Short term expiration dates can dissuade the public sector from implementing projects. Furthermore, it is premature to forecast an expiration date for a measure without monitoring the adoption rate of the specific measure. Taking a bass diffusion approach (which is the method used in the Potential and Goals study), the expiration date would be aligned with the rate of market adoption.

[15] "California Investor-Owned Utility Electricity Load Shapes", CEC-500-2019-046, April 2019,

CPUC Staff response:

The measure "sunset date" concept is under review and may be appropriate for some measures but not for others. The sunset date is separate from the expiry date, and does not expire a measure but instead sets a recommended date for when the measure should next be reviewed and updated based on known conditions like scheduled Code & Standard updates, and confidence in the parameter values and assumptions at the time of the workpaper submittal. A workpaper might also be reviewed and updated before the sunset date if warranted by EM&V results or required by regulatory, market, or other unanticipated changes. The primary intent of a sunset date is to design workpapers with a longer shelf-life and minimize churn whenever possible. Updating every measure and workpaper every year may still be necessary due to market and program changes, but the goal is to try to reduce this churn as much as possible.