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Gavin Newsom, Governor

Date: April 29, 2019

To: Energy Efficiency Proceeding Service List R.13-11-005

From: Energy Efficiency Branch, Energy Division, California Public Utilities Commission

CC: ALJ Julie Fitch; ALJ Valerie Kao; Pete Skala; Jennifer Kalafut; Manisha Lakhanpal, Peter Biermayer

Subject: Solicitation for Comments on Scope of Update for Database of Energy Efficiency Resources for program year 2021 (DEER2021) and error corrections for program year 2019 and 2020

Energy Division Staff invite comments on this proposed scope to update the Database of Energy Efficiency Resources for program year 2021 (DEER2021) to be adopted by a Resolution in Q3 2019.[1] Our scoping effort for this memo started with informal feedback from and discussions with the Program Administrators (PAs). We also considered current market conditions, conventional DEER update sources such as EM&V results and research studies, and analysis of energy efficiency regulatory oversight operational needs. Ideally this effort would target updates needed for program year 2021, but due to the significant changes made in the previous cycle and evolving regulatory requirements, some error corrections and clarifications are also needed for the previous 2020 and 2019 DEER updates.

In addition to the business-as-usual DEER update, the convergence of significant changes offers a unique opportunity to take a fresh look at options for improving the overall "DEER- workpaper ecosystem." Significant developments include the DEER 2020 major revision of building prototypes and peak period, a new consultant, the move away from utility-specific to statewide workpapers, and development of the California Technical Forum's (Cal TF) electronic Technical Reference Manual (eTRM). The dynamic and evolving California energy environment also requires anticipating and preparing for future needs such as decarbonization and integration of energy efficiency (EE) into the integrated resources planning (IRP) process.[2] To proactively address issues that will likely impact future DEER updates, we briefly discuss some of the most pressing issues in this memo. Commission staff will take further action on these items based on stakeholder comments and feedback.

[1] See D15-10-028, OP 17, http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M155/K511/155511942.pdf.
[2] "Staff Proposal for Incorporating Energy Efficiency into the SB 350 Integrated Resource Planning Process (EE-IRP)" https://pda.energydataweb.com/#!/documents/2083/view.

1 DEER Update Schedule, topic areas and submitting comments

Comments on this scoping memo are due 05/13/2019. Table 1**Error! Reference source not found.** presents the proposed timeline for this year's DEER update cycle.

Table 1. DEER update timeline

Schedule	Activities
04/29/2019	DEER Scoping Memo notice
05/13/2019	Party comments due
06/17/2019	Draft Resolution & webinar notice
07/01/2019	Public webinar
07/15/2019	Party comments due
08/15/2019	Final Resolution adopted

Energy Division Staff identified many topic areas in need of an update. A summary of the update topic areas and items within each topic area are provided in Table 2 with details presented in Attachment A. Table 2 also includes our assessment of the priority and level of effort needed to accomplish each item. The final list of updates to be implemented for the DEER2021 Update will be based on Commission priorities and resources, time available to meet the DEER update Bus Stop, and stakeholder comments. What cannot be accomplished for the 2019 Bus Stop can be considered for the next DEER update cycle, or raised elsewhere via an appropriate procedural vehicle, such as a proceeding. The updates fall into seven topic areas and most are consistent with past updates, but we've also added a new area to address future needs. The topic areas addressed in this memo are categorized under:

1. DEER methodology updates
2. DEER error corrections
3. Review of energy efficiency Evaluation, Measurement, and Verification (EM&V) studies
4. Review of Codes and Standards
5. Review of market and research studies
6. New measure additions

Energy Division Staff is seeking input for the following questions:

a) Do you agree with the DEER2021 update priorities described in this memo and listed in Table 2?
b) Are there additional topic areas and/or issues that should be prioritized for the current update cycle to meet 2021 program needs or correct previous errors?
c) For the topic areas listed in Table 2 and Attachment A, what resources or methods in addition to those already listed in this memo should we consider? Please support your recommendations with publicly vetted and reviewed data and studies.

Please post comments to http://www.energydataweb.com/cpuc/search.aspx after searching for "DEER Scoping Memo for PY2021 (DEER2021)" in the "Search Text" field.

Contact Peter Biermayer at Peter.Biermayer@cpuc.ca.gov with any questions or clarifications.

Table 2. Draft DEER2021 update priorities

Priority	Effort	DEER Version	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													
!!!!	$$$$	2020-21	Comprehensive review & assessment of lighting measures	X	X	X					X	X	X
!!!!	$$$$	2021	Complete measure definitions to reduce workpaper maintenance	X	X		X			X	X	X	X
!!	$$	2020	Consolidate savings by climate zone (no longer PA-specific)	X	X		X	X	X	X			
!!	$$	2021	Revisit the DEER data tables specifications for workpapers	X	X								X
DEER error corrections													
!!!!	$	2019	Suspend AR below-code NTG adjustment factor	X	X								X
!!!	$	2019	Facilitate new Measure Application Types	X	X		X	X	X	X	X	X	X
!!!	$$	2020	Update and correct water heaters (WH)	X	X			X			X	X	X
!!!	$	2020	Correct duct sealing measure EUL	X	X		X		X				X
!!!	$$$	2021	Chiller efficiency and tier issues		X		X				X	X	X
!!	$$	2020	Heat pump water heater size range	X	X			X					X
Review of EM&V studies													
!!!	$$$	2021	Use 2017-19 EM&V Plan study results	X	X	X	X	X	X	X	X	X	X
!!!	$	2021	Review on-bill-finance NTG	X									X
Review of codes & standards													
!!!	$$	2020-21	General service lighting	X	X	X					X	X	X
!	$$	2021	Residential gas-fired boilers	X	X		X	X			X	X	
Review of market and research studies													
!!!	$$$	2020-21	Lighting market studies	X	X	X					X	X	X
New measure additions													
!!![H]	$$$$	2020-21	Measures expired by DEER2020 Update but still offered	X	X		X	X	X	X	X	X	X

[H] High-Impact Measures (HIM) only

2 Considerations for future DEER update cycles

In this section we discuss some of the issues that will need to be considered for future DEER update cycles with a special focus on improving the current DEER-workpaper ecosystem and grid-level issues. Most of these changes will also require significant assessment and planning efforts before they can be implemented. We will also need to coordinate with the Commission's IT staff, California Energy Data and Reporting System (CEDARS) -Cost-Effectiveness Tool (CET) staff, and the PAs. We will also strive to follow the Commission's internal Data Change Management Protocol which covers procedures to be followed when data system structural changes are needed. If any of these items are determined to be a priority for stakeholders, then we will assess them for inclusion in a future update cycle, but they are currently not scoped or budgeted as DEER update activities. Commission staff will take further action on these items based on stakeholder comments and feedback.

Issues that may be discussed and considered for future DEER updates include:

Electrification/decarbonization, temporal value of energy savings, and statewide baseline study data

- Electrification: fuel substitution load shapes and impacts. Anticipated changes to the regulatory approach used for fuel substitution measures and the push towards electrification (Building Decarbonization proceeding R.19-01-011[3]) are very likely to impact DEER in the near-term and drive the need to model the fuel substitution energy use and load shapes. Targeted residential end-uses are gas-fired space heating and water heating and potentially cooking, with all-electric housing projects now being built across the state. Commercial end-uses, in addition to space and water heating, include food service, institutional laundry, and process equipment. The use of electric hot water heaters as energy storage (thermal batteries) is another application to consider. The DEER system could be used to model the impact of converting a central air conditioner/gas furnace unit to an electric heat pump, which may be a real measure offered under the Building Decarbonization effort that is underway. PAs and other stakeholders would need to identify the needs and applications.

- Identify and prioritize measures with increased temporal value. Consistent with the DEER2020 peak period change from 2-5 p.m. to 4-9 p.m. and the desire to better reflect avoided costs, Energy Division Staff could look at methods and metrics for identifying and updating DEER measures that have more potential savings impacts when avoided costs are high because they may become more important to the portfolio. For example, residential lighting and air conditioning (AC) in the evening hours will have increased impact while commercial lighting and AC may have less impact since many businesses close at 5 p.m. or 6 p.m. It could also be useful to show the percent of measure savings that occurs during and outside of solar PV generation periods. The presence of PV at a customer site is not currently accounted for in the DEER or workpaper savings estimates. It should be relatively easy to identify how much annual energy

[3] "Order Instituting Rulemaking Regarding Building Decarbonization", Feb 8, 2019, http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M264/K629/264629773.PDF

savings occur during periods of PV generation, but adjusting DEER savings for PV would make it more difficult to hit savings goals.

- CEC statewide sector-characterization baseline studies. The statewide CEC Residential Appliance Saturation Study (RASS) and Commercial End Use Study (CEUS) sector characterization studies are currently underway. The data from these studies will be available mid-2020 and can potentially be used for a variety of updates. Energy Division's subcontractor DNV GL is leading the 2019 RASS and also led the two previous studies, so is already very familiar with the RASS survey form and results that will be available. Data collection for the current CEUS is focused on equipment saturations and end use load shapes and should be useful for calibrating models and developing building type, HVAC system type, and building vintage weights that are currently used by DEER. Another study that can potentially be mined for updates is the CEC Electric End-Use Load Shapes study.[4] Energy Division Staff will not use these studies for the current update, but they are mentioned here because they will be used for a future update once the results are available.

DEER website, tools, and database system integration and updates

The items described here are intended to improve the transparency, efficiency, and usability of the various tools used to generate and view the DEER database content. The DEER ecosystem contains multiple components designed to improve the usability of the website and DEER databases. These are a few of the primary system improvements that have been suggested in various venues and that we will explore and consider implementing in future DEER cycles. As previously mentioned, we would need to work closely with Energy Division IT Staff, CEDARS-CET staff, and the PAs to ensure the system continues to function as needed.

- Catalog, review, and document all active DEER measures and remove old measures. The DEER2020 dataset and program cycle include major updates to building prototypes, peak demand period, and the adoption of a statewide workpaper approach. It also represents an opportunity to update the DEER databases (and workpapers) since there are likely several outdated measures that were not updated in 2019 or 2020 that should be formally expired and or deleted. Several key items are needed to accomplish this task. The first is a catalogue of the active workpapers, and such a list has already been compiled by the PAs and California Technical Forum (Cal TF) via the eTRM as part of their 2020 Statewide workpaper effort. A catalogue all active DEER measures, calculators, and any other related files would also be needed. Finally, but most important, is selecting a method for documenting the DEER measures, that is, the narrative needed to describe the measure and its development, similar to workpaper content. Use of the eTRM for this purpose could be explored. After completing an assessment, the results would be used to draft a plan to clean and update measures with high-impact measures addressed first. Any data removed from the database would be transferred to another database and backed up, not just deleted. All live

[4] The report should be available April 2019. The study is briefly described on the subcontractor's website: https://www.admenergy.com/experience/cec-load-shapes-data-science/

DEER measures would be documented via a workpaper-like document or possibly in the eTRM. This effort could also be the first step in getting more measures back into DEER with the goal of reducing the total number of workpapers.

- Overhaul the deeresources.com website. There is a strong need expressed by many parties for DEER to be more accessible, transparent, complete, and usable versus the current collection of workpapers, DEER database data, calculators, workbooks, and information embedded in system zip files located across multiple web pages that cannot be easily searched. There is also a lot of dated – though historical – information on the websites, which can and should be archived. Some of the information could also be more useful and readily accessible if compiled into a user guide or rulebook similar to the PG&E Rulebook[5] or past documentation efforts such as the 2005 DEER user guide.[6] The move to statewide workpapers with information and data being consolidated into the eTRM can likely also be leveraged. The website also has a very simple login (DEER, 2008) that could be updated to use a unique login for every user and could be used to gather usage and user stats.

  The deeresources.com website is a primary resource for stakeholder communications about the DEER ecosystem including the remote ex-ante database interface (READI) tool used to access the DEER databases, so the redesign would require Commission coordination and oversight. This overall effort could be more valuable than all the other updates combined as it would document key assumptions and processes and could expose old data and information that is no longer used. Due to the magnitude and scope of this effort, it would need to be a multi-year effort and the first step would be identifying where system is truly broken and what essential "no regrets" updates are needed.

- Revisit the need for operating and maintaining both the ex ante and PEAR databases. DEER is actually two separate databases, the ex ante database (EAdb) and the preliminary ex ant database (PEARdb). Historically, a version of the EAdb was frozen and used for each program year, while the PEARdb was used to preview changes. However, currently the PEAR database seems to be the main database used for many PA applications, there is no longer a frozen database, and many of the measures are primarily defined by workpapers which are validated with a single table in the PEARdb. One of the PAs reported that when they use the DEER Support Tables they take the values from both databases, merge them then eliminate duplicates which illustrates the issue.

  Energy Division Staff would first determine if there is a need to maintain both databases, and if not then determine what changes and new processes are needed. For the near-term, both

[5] PG&E Resource Savings Rulebook: https://www.pge.com/pge_global/common/pdfs/for-our-business-partners/energy-efficiency-solicitations/PGE-Platform-Rulebook-Final.pdf

[6] "2004-2005 Database for Energy Efficiency Resources (DEER) Update Study, Final Report", December 2005. http://deeresources.com/files/deer2005/downloads/DEER2005UpdateFinalReport_ItronVersion.pdf

databases would be maintained for backward compatibility, but this task would clarify the use of each database and devise a plan for phasing out the dual database approach if that makes sense. This effort would also need to include modifying or replacing the READI tool, which is the default program used for viewing, analyzing, and exporting data from both the EA and PEAR databases.

- Fix READI hosting/porting issues or develop a web interface. Some users seem to have issues downloading, installing, and setting up the DEER READI tool, perhaps due to the use of "*.exe" files. The most common issue though is that the database/READI connection requires a specific "port" (port 5432). Most corporate IT networks routinely block ports to external servers, so users have to ask their company IT to open a port to access the DEER databases. Some entities cannot do this at all. For the near term, READI will likely need to continue as the primary tool for accessing the ex ante and PEAR databases, but it could potentially be replaced by a web application linked directly to the databases. Some PAs and their subcontractors may already be considering or using this option. A web application could eliminate entirely the recurring issues with READI, but would also need to be designed specifically to meet DEER user needs and applications, which could be an extensive effort.

- Consider opening DEER up to use of other building simulation tools. This is another issue that has been raised in many venues, especially with the increased use of the EnergyPlus™ building simulation tool for other state-sponsored work (e.g. California Energy Commission Title 24 compliance tools) and custom projects. The applications, issues, and caveats surrounding this proposal are complex and multi-faceted, so will need to be clearly laid out and considered. The California Technical Forum (Cal TF) recently kicked off one effort to address this issue and is organizing a building simulation "charette".[7] Energy Division Staff would like to get stakeholder insight and input on DEER accepting other building simulation tools. We are also seeking input on why we would need to change from the current building simulation environment and how we will get to that desired outcome. Regarding cost containment, how do stakeholders propose effective use of ratepayer money for this effort? Conversion or re-creation of building prototypes in a new building simulation tool format will be labor intensive and expensive, and the DEER building prototypes - which are DOE-2/eQUEST based - were just significantly updated and revised for the DEER2020 update cycle. Being able to add new measures and features relatively quickly and robustly is also a critical requirement for any modeling tool used for DEER savings estimation. Any assessment of these issues would need to clearly lay out the questions, issues, needs, and concerns and establish a systematic plan for deciding whether new tools and prototypes should be developed, and establish a timeline for the development and execution. This effort will be a multi-year effort and likely require multiple stakeholder and/or Technical

[7] Discussion of building simulation modeling issues at monthly California Technical Forum meeting: "Cal TF Modeling Charette: Overview of Plan for Comment", http://www.caltf.org/s/Cal-TF-Modeling-Charrette-V5-FINAL.pdf

Advisory Group (TAG) meetings. Energy Division Staff is seeking stakeholder insight and input on this important issue.

Commission staff will take further action on these items based on stakeholder comments and feedback about these issues and their prioritization.

3 Glossary of terms[8]

A glossary of the terms used in Attachment A is provided for reference.

deemed measure	Also referred to as a prescriptive energy efficiency measure and are generally used for mass-market technologies. Measure values are predefined and/or stipulated for a group (market, segment, customer, etc.) rather than using site-specific parameters. Values that are stipulated and/or pre-defined include baseline assumptions and eligibility, savings values and/or calculation approach used for savings, operating hours, measure costs, installation rates, delivery approach, and other key measure attributes like NTG and EUL.
DEER measure	An energy-efficiency measure for which savings are stored in and available from the database for energy efficiency resources (DEER).
Non-DEER measure	An energy-efficiency measure for which savings are not developed by or documented in DEER; the savings are only documented in a workpaper.
Workpaper	The narrative and data files that are used to provide a complete deemed measure definition including the basic measure description, energy and demand savings, implementation approach, and costs.
Workpaper disposition	The final result of the workpaper review process that labels the workpaper as approved, rejected, or conditionally approved.
EnergyPlus	EnergyPlus™ is a building simulation program from the Department of Energy (DOE) that can be used to model building energy use, and is intended primarily to simulate weather-sensitive loads such as space heating, space cooling, ventilation, and associated auxiliary equipment (e.g. pumps, cooling towers) loads. It also be used to simulate a number of other end uses.
DEER Data Tables	Four tables in the DEER that contain the measure definition information, the energy impact and savings data, the measure cost data, and the implementation approach (measure application type, delivery channel, etc.) data.

[8] Some definitions are original but were derived from the "Energy Efficiency Policy Manual" and "PG&E Resource Savings Rulebook" whenever possible.

4 Ex Ante Tables	Similar in format to the DEER Data Tables, these are actually 4 tabs in an Excel workbook that are used to provide all of the data used to claim a measure. The information is the same as for the four DEER Data tables and includes the measure definition information, the energy impact and savings data, the measure cost data, and the implementation approach (measure application type, delivery channel, etc.) data.
DEER Support Tables	Twenty-one tables in DEER that provide the allowed values for supporting parameters such as climate zone, building vintage, building type, effective useful life, net-to-gross ratio, delivery type, and measure application type.
Measure application type (MAT)	"A categorization of energy efficiency measures based on measure attributes – each measure application type has its own baseline treatment, cost basis, eligibility, and documentation requirements. There are six approved measure application types, which include: Accelerated Replacement, Add-On Equipment, Behavioral, Retrocommissioning and Operational, New Construction/New Capacity, Normal Replacement, and Weatherization. Each of these measure application types is further defined below." A major change to MAT types was made in Resolution E-4818 then restated and clarified in the DEER Update E-4952 resolution.
Effective useful life (EUL)	An estimate of the median number of years that efficiency measures installed under a program are still in place and operable.
Incremental measure cost (IMC)	The difference between the cost of existing or baseline equipment or service and the cost of alternative energy efficient equipment or service.
Net-to-gross ratio (NTGR)	A ratio or percentage of net program impacts divided by gross or total impacts. Net-to-gross ratios are used to estimate and describe the free-ridership that may be occurring among energy efficiency program participants.
Unit energy savings (UES)	The energy *or demand* savings (kWh, kW, or therm) associated with a single unit of a given energy-efficiency measure.

Attachment A
DEER2021 Update Summary

Contents

1 Introduction and background

Decision D.15-10-028, Ordering Paragraph 17 established the general approach to be used for the annual DEER update: "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." Context for the approach and issues relevant to this latest update cycle are provided in this introduction section.

1.1 DEER and update mandate (Rolling Portfolio)

The DEER update process provides a systematic, annual review and update of DEER measures, parameters, assumptions, and methodology for the database and workpapers used for PA prescriptive, deemed programs. Per Commission direction for this effort, ideally the DEER update activities were to target five parameters or "interventions" which are: unit energy savings (UES), operating hours (OpHrs), incremental measure costs (IMC), effective useful life (EUL), and net-to-gross-ratio (NTGR). These are the core parameters that most affect energy and demand savings. A number of DEER issues, however, involve correcting, troubleshooting, clarifying, and improving usability of the DEER database and other components rather than updating parameters. In addition, because there are limited resources available for each update cycle, we also need to prioritize the updates by considering the impact on and value to the portfolio, the size of the inaccuracy of the value being updated, the level of effort needed, and the availability of resources for a robust update.

Another increasingly important consideration for the DEER update cycle is the dynamic California energy environment. For example, proceeding R.19-01-011 which is focused on Building Decarbonization and fuel substitution issues could easily in the near future require savings and load shape impacts for HVAC and water heating decarbonization "measures." These basic technologies and assumptions are already in DEER, but the fuel substitution aspects would require modifications and update to DEER systems and structures. The potential of and methodology used for decarbonization needs to be thought through, and the DEER tools and Energy Division Staff are in a good position to assist with these issues. Evolving regulatory goals and initiatives, as well as the conventional update topic areas, will be considered for DEER updates.

1.2 Updates and corrections since DEER update resolution E-4952

Although the DEER update cycle is the formal mechanism for making updates, Energy Division Staff have been actively engaged in making updates to the DEER database and other elements of the DEER ecosystem even before the release of the Resolution for a variety of reasons. Major changes were made to the DEER system and some key parameters for the DEER2020 Update but without a chance to completely vet those updates due to a change in team contractors. There is also a huge push to move towards statewide workpapers for 2020, and to have these completed by the end of 2019 so in 2020 there are no PA-specific workpapers. There is also the quick pace of the Rolling Portfolio timeline and today's dynamic energy environment. All of these issues contributed to a continuous, transitional update process this year rather than the normally scheduled DEER Update process that is integrated into

the Rolling Portfolio. The updates completed to-date include error corrections and clarifications to the Resolution, which are documented on the deeresources.com website.[9] We anticipate that additional error corrections and clarifications of Resolution E-4952 will need to be addressed as the PAs focus on their 2020 offerings.

1.3 Energy efficiency Contract Group A activities supporting DEER updates

This DEER update builds on deliverables generated under the CPUC Energy Efficiency Contract Group A. The contract group includes the annual DEER database and website update, deemed measure ex ante workpaper review and dispositions, the Energy Savings Performance Incentive (ESPI), and the evaluation measurement and verification (EM&V) of deemed measures for the rolling portfolio. The recently completed EM&V studies (CPUC PDA, www.energydataweb.com/cpuc, March 2019) for Small and Medium Commercial, Residential, HVAC, and Lighting sectors and measure groups and ongoing non-DEER workpaper review and disposition will feed the ESPI process and be used to inform this DEER update in an ongoing cycle. The feedback received on the EM&V reports and this DEER scoping memo will inform both activities (ESPI and EM&V) going forward to focus on current and forward-looking needs.

Additional activities under Contract Group A that support the DEER update include analysis and studies to update effective useful life (EUL), and measure impact profiles and load shapes. Both activities will be collecting new data to provide input for future DEER update cycles but will not likely be completed in time for the DEER2021 update. The EUL study includes review of other information sources to determine if existing EULs can be updated, and where to target field studies that can be used to update EULs in 2022 for key measures with uncertain measure life. The load shape study will develop profiles as suggested in Resolution E-4952.[10] The activity will develop profiles across every hour of the year for the current DEER including the most recent weather data to feed into the cost effectiveness tool (CET). The format used for DEER and CET will guide submissions of new measure impact shapes in workpapers, ideally for the next DEER update (DEER2022). Beyond developing the load shapes suggested in E-4952, future work will include load shapes based on whole building advanced metering infrastructure (AMI) data analysis and use for calibrating building simulations, and leveraging end use metering activities.

2 DEER methodology updates

DEER methodology updates affect the methods and approaches used to generate measures savings and support table values. Examples include changes that would alter the database structure, building prototype models, use of DEER database measures in workpapers, or the effort to move away from utility-specific to statewide measures.

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

[10] Resolution E-4952, Section 7.4, Page A-60

2.1 Comprehensive review and assessment of lighting measures

Effective Program Year: 2020, 2021. The lighting market has been changing rapidly as have the DEER lighting measures and related workpapers, especially baseline definitions and costs. The shift away from PA-specific measures to statewide measures and the move towards a 100% LED baseline for many lighting technologies offers the opportunity to regroup, assess and add consistency where needed for the DEER and Non-DEER lighting measures, as well as phase out those offerings that are no longer viable. Energy Division Staff are actively working with the Program Administrators (PAs), the California Technical Forum (Cal TF), and Subject Matter Experts (SMEs) to conduct a comprehensive assessment and characterization of the state of all current and future lighting measures for the 2020 program year and future offerings, or discontinuation of measures. This is one of the highest priority issues for the DEER2021 update cycle. It is also complicated by a potential delay in implementation of a Federal Standard for general service lighting lamps, as described in Section 5.1.

2.2 Complete measure definitions to reduce workpaper maintenance

Effective Program Year: 2021. A complete measure definition consists of a narrative (i.e., workpaper) that describes all aspects of the measure needed to offer it, and the data used for claims which includes measure definition, energy savings, implementation-delivery method, and measure costs. The sequencing and volume of workpaper submissions is overwhelming this year (2019) for a variety of reasons, but one of them is because DEER only provides the savings estimates and a workpaper is needed to provide the other information needed for a complete measure definition. While moving to Statewide workpapers will drastically reduce the amount of effort to maintain DEER measures and workpapers by all parties, Energy Division Staff will review the current process for using DEER measures, especially in workpapers, and look for additional ways to improve the process.

One approach to consider is using DEER measures directly rather than submitting workpapers. Ideally, program offerings for measures that are similar to an existing DEER measure should only use a workpaper when there are significant deviations in savings, costs, and/or measure definition from the DEER measure, or the DEER measure is significantly in error or not completely defined. Unfortunately for a number of DEER measures, only the measure savings have been maintained in DEER while the critical measure delivery approach and measure costs are maintained in a workpaper. Migrating and maintaining these additional parameters in the DEER database may help reduce measures maintenance, though maintaining the delivery approaches in DEER could create a potential bottleneck for PAs.

Another issue to consider for DEER measures is that documentation for some DEER measures may be lacking, so it may be better to use the existing workpaper to more completely document the DEER measure assumptions. Another concept that could help reduce churn is the use of a measure "sunset date" which would specify the "shelf life" for the measure and when it should be updated, versus the current approach of leaving the Expiry Date blank and update open-ended. Energy Division Staff proposes to start this review and assessment process with these measure categories:

- **HVAC DEER Measures.** Like the lighting measures, there are many HVAC measures that are currently covered by workpapers rather than using DEER measures directly. The transition to

statewide workpapers offers the opportunity to consolidate and update the DEER measures so they can be used directly. The 2017 EM&V impact evaluations primarily targeted workpapers (Controls, Fan VFD, DCV) but some DEER measures were also examined (high-volume commercial rooftop units and residential furnaces). This latest evaluation work, any completed market or baseline studies, and lessons learned from consolidation into Statewide workpapers will be used to update and/or create a comprehensive set of DEER HVAC measures.

- **Miscellaneous Non-DEER Measures.** The Small/Medium Commercial sector 2017 EM&V evaluation examined refrigeration, food service, water heating, and process measures. Workpapers and Non-DEER values are used for many of these measures instead of DEER measures. In addition, the PAs reported significant issues with the water heating equipment calculators and the DOE 2.2R refrigeration models in the DEER measure analysis software control (MASControl) tool, and the Small/Medium Commercial EM&V report noted other issues for food service, refrigeration, and process measures. We will identify the measures with the highest impact on utility portfolios that will continue to be offered beyond 2020, extract the best and most robust information from EM&V and other studies that can be used for parameter updates, and, wherever possible, provide complete measure definitions in DEER so that the DEER measures can be used directly. We will retain workpapers for documentation of the approaches used.

Energy Division Staff will work with the PAs and Cal TF to examine the issues and process in detail and develop an improved process and procedures that are compatible with the Statewide workpaper process.

2.3 Consolidate PA-specific DEER energy impacts within the same climate zone

Effective Program Year: 2020. As part of the move to Statewide measures, a measure in a climate zone should only have a single savings value in DEER, not one for each PA that serves that climate zone. For example, currently the DEER2020 Measure “Furnace-Pkg-AFUE92” in CZ05 has three energy impact values, one for each utility: Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE) and Southern California Gas (SoCalGas). The savings values are essentially identical but very slightly due to minor differences in underlying weighting of building vintages, HVAC system types or other population characteristics. Instead of multiple values there should be only a *single* value in the database with PA = ”Any” that will be used by all utilities for that climate zone. However, many measures currently only have the three PA values. Energy Division Staff will explore immediate and longer-term options to fix this issue, and consider the approach used in the Statewide workpaper consolidation process by Cal TF. The short-term remedy for use in workpapers will be to pick one PA value and use that as the statewide value, rather than create PA=”Any” records in DEER. The longer-term remedy will be to eliminate the PA-specific building simulation runs which will require modifications to the MAS Control system and post-processing of the MAS Control results.

2.4 Revisit the DEER data tables specifications used for workpapers

Effective Program Year: 2021. Every prescriptive measure workpaper includes a narrative document and a multi-tabbed Excel workbook – sometimes referred to as "the 4 ex ante tables" - that contains the data needed for the savings claim. The need to revisit the data structure specification used for the Excel workbook, which is derived from the DEER database data tables, has been suggested in several venues. The DEER database, its contents, and application have evolved over numerous program cycles, so it may be time to review and evaluate the data structure. Cal TF is currently consolidating utility-specific workpapers into Statewide workpapers and has indicated that complying with the current data specification is difficult given the lack of a clear Data Dictionary, and that the value, intent and use of several fields in the current ex ante data specification is unclear. The procedures for which of the four ex ante tables need to be filled out and when are also not clearly documented, and appear to vary by PA, by the approach used in adopting a measure, and whether a workpaper is a DEER or non-DEER measure. Energy Division Staff will research, review, refine, and clearly document the DEER data specification as part of our primary effort to provide transparency and documentation for DEER processes.

3 DEER error corrections

DEER error corrections or clarifications are those that typically 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 there are several issues remaining, such as:

3.1 Suspend accelerated replacement below-code NTG adjustment factor

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 measures.[11] This concept was adapted from the "Energy Efficiency Potential and Goals Study for 2018 and Beyond"[12] as a way to adjust for savings already accounted for by Codes and Standards, and potential differences for below- and above-code free-ridership. The adjustment was assumed to be effective for 2019 programs, as part of the general change in Measure Application Type from Early Replacement (ER) to Accelerated Replacement (AR) that was also directed in the Resolution.

However, at this time Energy Division Staff is asking the Program Administrators to *not* make this change for 2019 claims or for future reporting and filing needs. We have had multiple meetings with utility staff and we appreciate their work, but it would be difficult to make the needed structural data system

[11] 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

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

changes at this time due to limited resource availability and to meet the future reporting schedule. Staff also decided that a manual, interim fix is not desirable given the complications around communicating it to third party implementers, resulting over/underestimated savings, and uncertainty around tracking and verifying the manual updates. Finally, the portfolio impact of net-to-gross for to-code savings is not clear at this time, as not all PAs appear to have a high presence of accelerated replacement measures in their portfolios. Notice of this change was previously communicated to the PAs via email[13] but is formally documented here and will also be included in the DEER2021 update resolution to be issued later this year. Comments on the future viability and application of this concept should be provided in response to this memo.

3.2 Facilitate use of new Measure Application Types (MATs)

Effective Program Year: 2019. Resolution E-4952 for DEER2020 restated and expanded on the significant changes that were made to measure application type (MAT) and two other key DEER Support Table parameters in Tables 12 through 14 of the Resolution.[14] These changes were first required by E-4818 but implementation was delayed until 2019 for a variety of reasons including significant data system structural changes. Energy Division Staff have been working closely with the PAs, Cal TF, and CEDARS staff to coordinate and clarify the required changes and timeline for implementing those changes. We will continue this coordination effort to ensure that the new Support Table parameters will be in the 2019 PA claims and workpapers. The new values have already been added to DEER.

3.3 Update and correct DEER water heater measures

Effective Program Year: 2020. The PAs have been actively working with Energy Division Staff to identify the corrections and improvements needed for DEER water heating measures that were discovered during the Phase 1 review of the 2019 Residential and Commercial Small Water Heaters. The PAs reported several issues and submitted a memo[15] to Energy Division Staff describing requested updates, improvements, and error corrections to the 2019 water heater calculator.[16] The issues include but are not limited to completing the update of measures from Energy Factor (EF) to Uniform Energy Factor (UEF) efficiency ratings for heat-pump water heaters, updating the UEF values using data from current data sources, determining savings for the "COM" building type at all climate zones for all water heater categories, and providing statewide savings for each climate zone (see Section 2.3). Consideration for improving diversity in operation for residential versus commercial water heaters and combining multiple measures that represent varying draw patterns (low, medium, high) into a single measure was also requested. Although there are insufficient resources to address these issues for the 2019 calculator, Energy Division Staff will continue to investigate these issues and work with the PAs for the 2020 calculator. Any corrected or previously-missing measures will be updated in DEER and a corrected water

[13] Email communication 4/16/2019 from Energy Division Staff in response to issues from the 2/26/2019 meeting of the Reporting Program Coordination Group.

[14] Page A-45, 46. The affected DEER Support Table parameters are Measure Application Type, Delivery Type, and Measure Savings Calculation Type.

[15] "Recommendations for Update to the DEER Water Heater Calculator for Program Year(s) 2019 and 2020," issued by SoCalGas, 2019-03-06.

[16] DEER-WaterHeater-Calculatorv3.3.xlsm

heating calculator will be added to deeresources.com. Subsequently, statewide workpapers will need to be updated and resubmitted.

3.4 Correction of the Effective Useful Life for duct sealing measures

Effective Program Year: 2020. Resolution E-4952 updated the classification of the duct sealing measure to a Behavioral, Retro commissioning, or Operational (BRO) measure and changed the EUL value to 3 years. Resolution E-4818 indicates that measures involving non-mechanical building components such as ductwork are eligible for building weatherization treatment; hence duct sealing should be categorized as a building weatherization measure. [17] Energy Division Staff will continue working with the PAs to determine the correct measure application type and EUL, and correct the previous resolution if needed.

3.5 Chiller efficiency and tier modifications for DEER2020 updates

Effective Program Year: 2021. The following issues were reported by SCE and will be reviewed, validated, and considered for implementation by Energy Division Staff. One reported anomaly is that the DEER2020 measure savings increased for certain building types and decreased for others. The revision to chillers was supposed to expand the approach so that savings for continuous increments above code +10% could be estimated. In addition, the DEER2020 chiller workbook savings calculations appear to be scaled simply by the full-load energy efficiency ratio (EER) rating rather than the integrated part-load value (IPLV). It is also not clear what data was used to develop the performance curves, and how well it represents the products available in the market. A more significant issue is that DEER measures appear to incorrectly establish efficiency levels for Path B[18] chillers. SCE reports these are incorrectly defined with fixed (linear) increments in both full-load and integrated part-load value efficiencies exceeding Title 24 requirements. SCE will provide market data for air-cooled chiller equipment from four manufacturers that illustrates the misalignment between available equipment and the DEER paired full-load/part-load tiers. SCE reported a drastic reduction in participation in their upstream program, so a review and correction of the Path B paired full-load/part-load chiller tier requirements is of utmost importance.

Two additional issues were also identified for the DEER2020 air-cooled chiller measure. The first is that DEER measure savings do not change for a given size and rated full-load efficiency when the part-load efficiency changes. For example, the DEER savings values are the same for a chiller that is greater-than-or-equal to 150 ton with 11.1 EER but *different* IPLV ratings of 15.4 IPLV and 15.1 IPLV. The second issue is that the DEER2020 data is missing the "Com" building type which SCE has been using for reporting Upstream savings per previous Energy Division Staff guidance. Either a new aggregated "Com" value should be added, or new guidance will need to be provided by Energy Division Staff. SCE also reported they are conducting a market study to address some of these identified issues and the results should be available in 2019. The reported issues and suggested changes submitted by PAs in their workpapers for

[17] Resolution E-4818, page 69, duct sealing is specifically mentioned as a building weatherization measure "…non-mechanical building efficiency improvements (e.g. windows, insulation, air sealing, duct sealing…"

[18] Two efficiency compliance paths are available for chillers. Path A is used for chillers designed primarily to run at full-load and Path B is used for chillers designed to operate primarily at part-load. For example for a <150 ton air-cooled chiller, Path A efficiency minimums are 10.1 EER/12.7 IPLV and Path B efficiency minimums are 9.7 EER/15.8 IPLV.

this measure will be reviewed, validated, and corrected as needed in the DEER database, calculators, or simulation models by Energy Division Staff.

3.6 Adjustment to heat pump water heater size ranges

Effective Program Year: 2020. SCE suggested that a review of ENERGY STAR Qualified Products List and data from major manufacturers of electric heat pump water heaters shows that currently only one heat pump water heater qualifies for the current DEER measure. Most qualifying water heaters have a rated storage capacity between 46 and 48 gallons. If the lower size range is changed from 50 gallons to 46 gallons, as shown in the table below, many of these water heaters would become eligible. SCE recommends this change be considered as a revision to DEER 2020, rather than inclusion in DEER 2021. The Energy Division Staff will investigate this issue and update the DEER measure if warranted.

Table A-1. 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

4 Review of energy efficiency Evaluation, Measurement and Verification (EM&V) studies

EM&V Sector evaluation results and/or special studies will continue to be some of the primary sources for DEER measure and workpaper updates. Evaluation results with rigor and precision will be used to update DEER and workpaper assumptions. Parameters in need of data to reduce uncertainty or increase accuracy will also be identified and fed back into the next EM&V cycle.

4.1 Use 2017-2019 EM&V plan study results to update parameters

Effective Program Year: 2021. The DEER team will examine the findings from recently completed impact evaluation and other studies to locate findings that indicate a substantial difference from current DEER values and are robust enough to be used to update key DEER parameters. We will focus on the primary DEER parameters – also referred to as "interventions" – which are NTG, unit energy savings (UES), EUL, operating hours (OpHrs) and incremental measure costs (IMCs). A complete list of the studies to consider is provided in Appendix E of the 2017-2019 EM&V Plan.[19] Due to the DEER Update schedule, we can only consider studies completed by Q1 2019 (36 studies). The available studies from Appendix E include:

- Twelve (12) impact evaluations with the majority (8) just completed for 2017 programs.

[19] "2017-2019 Energy Division & Program Administrator Energy Efficiency Evaluation, Measurement and Verification Plan Version 8," California Public Utilities Commission, 12/31/2018, https://pda.energydataweb.com/api/view/2119/2017-2019_EMV_Plan_Final.pdf.

- Nine (9) process evaluations completed by PAs or Regional Energy Networks (REN) completed 2017-Q1 2019
- Ten (10) market studies conducted by PAs or RENs completed 2017-Q1 2019
- Five (5) "Other" category studies conducted by PAs including special interest topics such as ZNE and residential lighting forecasting completed 2016-2017.

Energy Division Staff are aware of several other PA studies that are currently underway or in the planning stages. We will consider using the findings from near-term studies (Q2-Q3 2019) for this update if the findings are clear and results can be quickly and easily integrated into DEER. However, the application of results from these studies will most likely have to wait for the next DEER Update in 2020. Our review of the 2017 EM&V studies is currently underway. We will focus our effort on portfolio high-impact measures,[20] and then if time and budget permit we will update other measures that have significant differences and robust findings. A list of the targeted measures and parameters to be updated will be provided in the Draft Resolution. The scope of this effort will be limited by the time and budget available for the DEER2021 Update cycle.

4.2 Update of on-bill-financing net-to-gross ratio factor

Effective Program Year: 2021. There have been suggestions in the past that findings from Opinion Dynamics' PY2015 California Statewide On-Bill Finance Impact Evaluation Study (CALMAC Study ID CPU0181)[21] should be considered to adjust the net-to-gross (NTG) values for On-Bill Financing (OBF) projects. Energy Division Staff will review this report and relevant new research from other jurisdictions to determine if an update is warranted.

5 Review of Codes and Standards

Codes and Standards (C&S) changes are usually the highest priority updates because they can significantly impact baselines. In some cases, a mid-year change might even be considered. C&S updates consider both Federal and State requirements (Title 24, Title 20). For this update cycle there are minimal C&S changes and the DEER2020 update took care of the largest change, the Title 24 2019 update which goes into effect January 1, 2020.

5.1 General service lighting (GSL) codes and standards changes

Effective Program Year: 2020, 2021. The CEC released Title 20 final express terms to include reflectors, globe, and candelabra lamps as General Service Lamps for review in October 2018, to be effective on 1/1/2020. Guidance on suggested DEER changes was provided by the previous ex ante team, but not implemented in DEER. However, there are legal challenges to the code which may affect the implementation date. If the legal challenges delay the effective date, then both DEER 2020 and DEER 2021 may be impacted. The PAs and Energy Division Staff are actively working on a comprehensive

[20] A high impact measure (HIM) is defined as an energy efficiency measure that contributes 1% or more to the entire PA savings portfolio of electrical energy (kWh), electrical demand (kW), or natural gas (therm) consumption.
[21] "PY2015 California Statewide On-Bill Finance Impact Evaluation," Opinion Dynamics, 12/31/2017, Study ID CPU0181.01, www.calmac.org.

approach to lighting measures for 2020 and beyond for DEER and workpapers that includes these measures.

5.2 Residential gas-fired boilers

Effective Program Year: 2021. In 2021, the minimum efficiency of residential gas and oil-fired hot water boilers is scheduled to be increased. Gas-fired boilers will increase from 82% to 84% and oil-fired boilers will increase from 84% to 86%. We found no report that the effective date will be delayed, so assume that take effect as scheduled and updates to the baseline and any PA offerings will need to be made. There are no DEER residential boiler measures, but this may impact workpapers for smaller commercial units. PG&E and SoCalGas recently indicated to Energy Division Staff that they will be conducting an industry standard practice (ISP) study of boilers in 2019, but that data will not likely be available in time to be used for this update cycle.

6 Review of market and research studies

Market and research studies, including baseline studies,[22] are a rich source of update information but are only periodically conducted. These types of studies can be used for calibration of whole site and end use energy use, establishing industry standard and/or best practices, developing operating hours, and developing model prototype characteristics. A critical issue in the past with these studies is the time lag between study completion and integration of the results into DEER. Towards that goal, we are tracking current sector-scale efforts and will mention them in the following subsections even if the results cannot be used for the current cycle.

6.1 Lighting Market Studies

Effective Program Year: 2020, 2021. A number of lighting markets studies were recently completed and/or will be completed shortly. Energy Division Staff will use the findings to update 2020 assumptions if there is time to review, summarize and incorporate results for the 2020 program. However, we may not be able to incorporate results until the 2021 program cycle. The studies are:

- The California Statewide Exterior Standard Practice Baseline and Workpaper Update Study which is being conducted by TRC Energy Services and the lead PA is SCE.
- The California Statewide Non-Residential Interior Lighting Standard Practice Study which is also being conducted by TRC Energy Services and the lead PA is SCE.
- The California Statewide Non-Residential LED Quality and Market Characterization Study which is also being conducted by Navigant and the lead PA is PG&E.

Energy Division Staff will review these studies once they are available, incorporate any robust and valid findings into DEER, and identify any discrepancies as well as future research needs.

[22] For example, the Commercial End Use Study (CEUS), Residential Appliance Saturation Study (RASS), Commercial Saturation Study-Commercial Market Share Tracking (CSS-CMST) studies, and California Lighting and Appliance Saturation Study (CLASS).

7 New measure additions

Energy Division Staff will not be implementing any new DEER database measures for 2021. However, as a result of the statewide workpaper consolidation effort and the increased participation of third party (3P) implementers, we anticipate that a number of new measures will be proposed via workpapers and in response to this Scoping Memo. In addition, as part of the major DEER2020 update process some older DEER measures were expired by default because they were not included in the update. We anticipate that utilities will be submitting workpapers for these "new" measures so they can continue to be offered.

7.1 Measures expired by the DEER2020 Update that are still offered

Effective Program Year: 2020, 2021. As part of the major DEER2020 update process, some older DEER measures were expired by default because they were not included in the 2020 update. Only commercial refrigeration measures and some HVAC measures have been reported as missing by the PAs so far. Energy Division Staff are still investigating, but it appears that many of these were older measures in need of an update, such as new standard practice or baseline information, or because they are based on outdated weather fie results. Even if they were not officially retired, pre-2020 DEER database measures that were not updated 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 if they wish to continue them. 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 DEER2020 peak demand period. Energy Division Staff will not restore the DEER database measures for this cycle, but we will work with PAs to determine what updates are needed then review and vet any simulation run results and the workpapers.