PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

ENERGY DIVISION

AGENDA ID #23063
RESOLUTION E-5350
December 19, 2024

R E S O L U T I O N

Resolution E-5350. Approval of the Database for Energy-Efficient Resources updates for Program Year 2026-2027 and revised version for Program Years 2025 and 2024.

PROPOSED OUTCOME:

- DEER2026 Update (effective January 1, 2026)
- Revise DEER2025 Update (effective January 1, 2025)
- Revise DEER2024 Update (retroactive to January 1, 2024)

SAFETY CONSIDERATIONS:

- There are no safety considerations associated with this resolution.

ESTIMATED COST:

- There are no costs associated with this resolution.

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) 2026 and a revised version of DEER for PY2025 and PY2024, in compliance with D.15-10-028, D.21-05-031,[1] and Resolutions E-4818, E-4952,

[1] https://docs.cpuc.ca.gov/SearchRes.aspx?docformat=ALL&docid=385864616

E-5009, E-5082, E-5152, and E-5221. This update also directs forward-looking research and addresses significant transitions for the DEER and measure package system maintenance and operation.

All updated DEER assumptions, methods, values and supporting documentation are available on the DEER Module on the California Energy Data and Reporting System (CEDARS).[2]

BACKGROUND

The Database for Energy Efficient Resources (DEER) contains information on energy-efficient technologies and measures. DEER provides estimates of the typical energy-savings potential for these technologies in residential and nonresidential applications. DEER is used by California Energy Efficiency (EE) Program Administrators (PAs), private sector implementers, and the EE industry across the country to develop and design energy efficiency programs.

The DEER database has a 30-year history, starting in the 1990s under the California Energy Commission (CEC) where responsibility for developing energy efficiency measure parameters was delegated to a broad stakeholder coalition. With the 2006-08 energy-efficiency (EE) portfolio cycle, the CPUC staff assumed responsibility for the DEER and began hosting it on the "DEEResources" suite of websites.

Relevant Regulatory Background

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 DEER update.[3] D.21-05-031 retains previous direction regarding CPUC staff latitude in updating

[2] https://cedars.cpuc.ca.gov/deer-resources/

[3] D.15-10-28, 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.'"

DEER.[4] D.21-05-031 also adopts and Resolution E-5152 enacted a biennial update schedule for DEER, eliminates the DEER and non-DEER distinction for EE measures, and redefines the scope of the DEER resolution to:

a) lock down the version of ex ante (savings estimates before installation) EE values used for planning and claims; b) direct research to inform future DEER updates; and c) manage deemed ex ante processes.

Resolution E-5082 initiated the transition of existing DEER and measure package systems to a software platform jointly co-funded by the IOUs, called the Electronic Technical Resource Manual (eTRM),[5] and conferred conditional designation "data source of record" to the eTRM.[6] Resolution E-5082 also outlined a schedule and benchmarks for the phased transition from DEER to the eTRM as the new "data source of record" for the typical deemed energy savings values for energy efficiency measures.

In addition, Resolution E--4952[7] (DEER2020), adopted on October 11, 2018, clarified and specified issues in Resolution E-4818,[8] adopted on March 2, 2017. Among other things, these resolutions ordered many significant changes, including guidance on the peak demand period, building prototypes, and measure analysis software control (MASControl3) updates.

Timing and Applicability of DEER Updates

DEER updates flow into the EE portfolio development process by providing new deemed energy savings estimates and other EE measure parameter updates for program design. New energy savings estimates, and underlying assumptions, methods, and values, inform the direction of energy efficiency programs. These allow program administrators to shift program eligibility requirements and incentive support mechanisms to deliver the most reliable, cost-effective energy savings. DEER updates may also reflect new market conditions. The PAs are required to ensure new assumptions and values are incorporated into the next cycle of EE programs by considering a) when the next update is planned, b) the fundamental assumptions for the update, and c) whether shifts to their programs to capture cost-effective savings are needed. Updates to DEER methods apply to EE technical measure package

[4] D.15-10-28, 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.'"

[5] https://www.caetrm.com

[6] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M346/K161/346161639.PDF

[7] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M232/K459/232459122.PDF

[8] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M179/K264/179264220.PDF

development and custom project energy savings estimates as well as program delivery decisions.

The terminology "DEERxxxx" is used to designate the version of updated parameters and is independent of the conversion to using eTRM. The year shown reflects the program year that a given update takes effect. Beginning January 1, 2022, DEER no longer refers to the ExAnte and Preliminary Ex Ante Review (PEAR) databases, since these data now are accessed via the eTRM.

Scoping Document and Updates for DEER2026 and Revised DEER2024

On August 1, 2024, the CPUC Energy Division released for public comment a Scoping Document outlining the proposed issues and updates to be addressed in this DEER resolution. The Scoping Document described the various issues that may be considered in this resolution and the rationale for why these issues need to be addressed. Twelve stakeholders, including all four investor-owned utilities (IOUs), submitted comments on the Scoping Document.[9] Below are the issues raised most frequently in the comments:

- Measure package update timeline
- In support of load shape updates
- Refrigerant leakage impacts
- Running the Cost Effectiveness Tool (CET) from within eTRM
- eTRM table structure changes
- Mid-cycle adjustments to locked ex ante values
- FuelID table replacing FuelSubID table

In consideration of the comments to the Scoping Document, the topic areas addressed in this DEER update are summarized in Table 1. The guidance for these updates is described in the Discussion section that follows. A more detailed technical description of the changes and additions is provided in 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 the DEER Module on CEDARS.[10]

[9] The Scoping Document for DEER2026 Update was posted on August 1, 2024, and is located at: https://pda.energydataweb.com/#!/documents/4015/view.

[10] Supporting material is at https://cedars.cpuc.ca.gov/deer-resources/tools/supporting-files/resource/2/history/

Table 1. DEER2026 Update

Priority	Effort	DEER Version	Update Topic Area	Sector		Measure/Tech Group					Forecasted Value				
				Residential	Non-Res	Lighting	HVAC*	DHW*	Envelope	Plug/Process	UES*	NTG*	EUL*	Measure Cost	Other
			Management of DEER Processes												
!!!!	$$$	2026	A. Updates to eTRM and Measure Packages	X	X	X	X	X	X	X	X	X	X	X	X
!!!!	$$$	2026	B. DEER System and Measure Package Updates	X	X	X	X	X	X	X	X	X	X	X	X
!!!!	$$$	2026	C. DEER 2028 Update and Measure Package Submission/Review Timeline	X	X	X	X	X	X	X					
!!!!	$$$	2026	D. Mid-Cycle Adjustments to the Locked Ex-Ante Values	X	X	X	X	X	X	X	X				X
!!!	$$	2026	E. Structural Changes to DEER Tables	X	X	X	X	X	X	X					X
!!!	$$	2026	F. Updates to DEER Support Table Values	X	X	X	X	X	X	X		X	X		X
			Research Needs for PY2028-29												
!!	$$	2028	G. Research to Improve HVAC Refrigerant Charge Values	X	X		X								X
!!	$$	2028	H. VRF Heat Pump and AC Performance Curves		X		X				X				
!!	$$	2028	I. Improvements for Commercial Water Heater and Hot Water Measures		X			X			X				
			Measure Adoption												
!!!	$	2026	J. Guidance from 2021 Custom Industrial, Agricultural, and Commercial Impact Evaluation		X	X							X		
!!	$	2026	K. Guidance from EUL Studies	X	X		X	X	X				X		
!!	$	2026	L. Guidance Based on Other Studies	X	X	X	X	X	X	X	X	X			
!!	$	2026	M. Guidance from Review of 2023 EM&V Reports	X	X	X	X	X	X	X	X	X			

*HVAC=Heating, Ventilation, Air Conditioning; DWH=Domestic Water Heating; NTG=Net-to-Gross; UES=Unit Energy Savings; EUL=Effective Useful Life

DISCUSSION

Pursuant to D.15-10-028, the Energy Division published a DEER Update Scoping Document on the proposed list of updates for DEER2026 and revised DEER2025 and DEER2024 items on August 1, 2024. The list of topic areas that this Resolution will incorporate are summarized below and described in detail in Attachment A, DEER2026 Update Summary.

Management of DEER Processes

A. Updates to eTRM

Effective Program Year: 2024-2026. California's statewide electronic Technical Reference Manual (eTRM) is the *Official Source of California Energy Efficiency Measure Data*,[11] and the sole source for energy efficiency measure package development, submittal, review, and publishing. Measure developers shall follow the rules and procedures as laid out in the documents provided by CalTF as they move measures through the development phase prior to submittal.

A.1 eTRM Funding

Effective Program Year: 2024. Per D.23-02-002, IOUs may fund the CalTF and eTRM from their program budgets and/or evaluation budgets. Consistent with E-5082 direction, the IOU funding shall not exceed EE portfolio budget caps as ordered in D. 18-05-041 to fund the eTRM development.[12] IOUs shall identify the funding sources for eTRM and CalTF in their Mid Cycle Advice Letter (MCAL) filings.

A.2 eTRM Source Code Documentation

Effective Program Year: 2026. The eTRM has been providing monthly files to the CPUC of the source code, but the industry standard is for code to be documented and version-controlled using a Git[13] platform (e.g., GitHub). This is expected to improve transparency and traceability and allow stakeholders to have a better understanding of the changes that occur. SDG&E is currently the Program Administrator (PA) lead that oversees and manages eTRM and the responsible party for initiating and managing this task. There may be portions of the code that will need to be password-protected and hidden from public view for security purposes. A risk assessment shall be performed that balances the competing needs for transparency and security.

A.3 Measure Lifecycle Management (MLM) in DEER

Effective Program Year: 2025. In Resolution E-5221, staff proposed to establish a DEER database table to track existing and planned updates to current and future measure packages. This Measure Lifecycle Management (MLM) table will help manage measure package updates in a more strategic manner, including the identification of new research to inform planned updates and manage measure package review timelines to

[11] https://www.caetrm.com/

[12] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M346/K161/346161639.PDF, p. 11.

[13] Git is a distributed version control system that tracks changes in any set of computer files, usually used for computer programming.

avoid highly compressed review and comment periods. The MLM is currently in draft form and will be shared for CPUC review and approval before the next round of measure package updates for PY2028 that will be planned for in 2025. CPUC Staff and stakeholders will target MLM completion to review alongside the DEER2028 Measure Package Update Schedule to aid in the scoping of DEER2028 measure package updates.

A.4 Assess Enabling Filtering on CPUC Support Tables

Effective Program Year: 2026. For CPUC Support Tables, CalTF shall identify and assess options to mimic the "Add a filter" functionality that is currently provided for the "Advanced Full Screen View" of all Shared Values Tables. The most needed feature—involving the ability to show records based on their status—might be achieved by creating radio buttons (e.g., expired records, currently active, future, or a combination).

A.5 eTRM Table Structure Changes

The fields contained in the permutations table and the CPUC Support Tables within the eTRM shall be updated as needed to support evolving policies and measure development. Updates to fields may result from fields added to the DEER support tables in the DEER database or they may be required in the permutations (e.g. Restricted Permutation Flag). Measure developers may work with CalTF to identify those fields and communicate a process whereby the permutation tables will be changed to accommodate the new data. Where the new fields and associated data impact DEER, California Energy Data and Reporting System (CEDARS), or the Cost Effectiveness Tool (CET), CPUC staff will review and approve necessary changes to meet these needs.

Effective Program Year: 2024. The source status table in DEER is no longer maintained as the eTRM is the data source of record for active measure packages, using the Measure Detail ID. The eTRM may discontinue synchronizing with this table nightly and remove it from the CPUC Support Table page. The source status table will remain in DEER for a minimum of five years but will no longer be updated by Ex Ante Review.

Effective Program Year: 2026. Replace the FuelSubID field with the FuelID field to reflect the replacement of the FuelSub table with the Fuel table in DEER. More details are provided in Attachment A.

Effective Program Year: 2028. Refrigerant related fields will need to be added to the eTRM permutations to enable tracking the refrigerant effects of energy efficiency measures that contain refrigerants. The DEERMeasureID field in the permutations may go unused as the DEER Measure table is longer maintained by Ex Ante Review.

B. DEER System and Measure Package Updates

Effective Program Year: 2024-2028. This section describes updates to the DEER system encompassing any changes to policies that affect the eTRM and measure packages.

B.1 Refrigerant Leakage Impacts

Effective Program Year: 2024-2026. For mid-cycle new offerings added to existing measure packages or mid-cycle updates to existing measure packages (e.g. code or standard change), measure package developers shall use the CPUC's Refrigerant Avoided Cost Calculator (RACC) and Fuel Substitution Calculator (RACC-FSC_v3.0 and RACC-FSC_v3.1) that was released on April 22, 2024 and November 1, 2024, respectively.[14] Either version of the workbook shall also be used for 2026 measure package updates. Future updates to the RACC-FSC_v3.1 will occur in the DEER Update Resolution.[15]

B.2 Refrigerant Benefits/Costs for EULs Exceeding 20 Years

Effective Program Year: 2024-2026. The avoided refrigerant leakage emissions for accelerated replacement (AR) measure application types sometimes consider an end-of-life (EOL) refrigerant leakage event for the counterfactual standard practice equipment that occurs beyond the life of the measure, requiring avoided costs 40 years from the present date. The RefrigerantACC (RACC) table in the DEER database will be updated with new values each time a set of new set of avoided cost calculators (ACCs) are adopted and data will be extrapolated as necessary to yield 40 years of forecasts.

B.3 Water-Energy Nexus (WEN) Impacts

Effective Program Year: 2024. The embedded-water-energy savings are stored independently of the direct energy savings within the eTRM to facilitate reporting and cost-effectiveness calculations.

B.4 Lighting Baseline Updates

Effective Program Year: 2024-2026. The standard practice baseline in measure packages will conform to the updated values in the Modified Lighting Calculator (MLC). The

[14] https://cedars.cpuc.ca.gov/deer-resources/tools/supporting-files/file/3105/download. On November 1, 2024, RACC-FSC_v3.1 was released to formulaically distinguish between different DEER Versions of EUL values.

[15] "The staff proposal recommends, among other things, that consideration of the Refrigerant Avoided Cost Calculator be transferred from R.22-11-013 to the resolution process for biennial updates to the Database for Energy Efficiency Resources." (See https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M516/K988/516988077.PDF.)

new MLC update and corresponding standard practice efficacy will be effective upon approval. Any new mid-cycle measure package submissions should use the most up-to-date baseline values. Existing measure packages using the MLC methodology will be updated to reflect the latest MLC methodology in the DEER2026 version of the measure package. We recommend that the MLC is updated every two years in sync with the biennial DEER Update resolution.

B.5 Definition of Incentive and Rebate

Effective Program Year: 2024. Per D.08-07-006:

> *The SPM [standard practice manual] defines the incentive (INC) term very narrowly as the type of incentive that can be treated as a transfer payment in the SPM TRC [Total Resource Cost] formulation. The definition of the INC term, as set forth in the SPM, is restricted to "dollar benefits" such as rebates or rate incentives (monthly bill credits) paid by the sponsoring utility to the customers participating in the program. Moreover, the SPM is very clear that the term "participant" refers to the customer participating in the program, and that this transfer incentive (INC) is one that is paid directly to the participating customer.*

In the CET Input Guide, the values that are input to the INC term are referred to as rebates, i.e., "UnitEndUserRebate."[16]

All other program expenses such as payments to manufacturers, distributors, contractors, builders or energy service companies are referred to as costs or incentives and should not be confused with the narrow definition of a rebate described above.

This is not a change to policy, but a re-statement and clarification of existing policy.

B.6 Clarification of Deemed Measure Cost and Incentive Reporting to CEDARS

Effective Program Year: 2024. Measure level incentives reported to the Cost Effectiveness Tool (CET) for inclusion in the cost effectiveness tests must be only the portion of the incentive that reduces the customer cost of the measure. Incentives that do not reduce the customer measure cost must be reported as program level costs. Any program costs that cannot be assigned at a measure level should be entered into one, or distributed among several, of the Program Administration cost fields. These program costs will not reduce the participant measure costs in the CET calculation.

[16] https://edcentralserver.files.com/preview/f/f7b564868ffdc879/CET_Input_Guide_10132022.xlsx

B.7 Peak Load Definition

Effective Program Year: 2024. Resolution E-5152 DEER2023 Update made an error in the definition of a heat wave, originally defined in D.06-06-063.[17] This change to DEER was ordered in Resolution E-4952 OP 1.[18] The error was made in the Attachment on page A-12 Section A3-3 "Peak demand period definition update." It is corrected as follows with red text added:

The heat wave has the highest index value computed by adding and giving equal weight to each of these values:

- The peak temperature over the three-day period
- Average temperature over the three-day period
- The average temperature from ~~4 p.m.~~ noon to ~~9 p.m.~~ 6 p.m. over the three-day period

The criteria above are used to determine which days to use for determining the peak demand. The peak demand window is still from 4 p.m. to 9 p.m.

B.8 Vintage and Era Definitions

Effective Program Year: 2026. Starting in PY2026, the recent and old building eras are removed, and the existing era represents all existing buildings. Existing shall refer to any building built before 2026. New shall refer to any building built in 2026 and beyond. The guidance on vintage and era definitions through the Residential and Commercial EnergyPlus prototypes extends to include agricultural and industrial sectors.

B.9 EnergyPlus Prototypes

Effective Program Year: 2026. The DEER prototypes (residential and commercial) have transitioned from a DOE2 based system to EnergyPlus building simulation models.[19] The new prototypes use Modelkit[20] to facilitate the building of input files and running

[17] D.06-06-063 OP 1. The DEER version adopted in D.12-05-015 utilizes a 3-day "heat wave" that occurs on consecutive days in June through September such that the three consecutive days do not include weekends or holidays, and where the heat wave is ranked by giving equal weight to the peak temperature during the 72-hour period, the average temperature during the 72-hour period and the average temperature from noon – 6 pm over the three days.

[18] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M232/K459/232459122.PDF

[19] Commercial water heating measures, however, continue to use the DEER Water Heater Calculator to determine energy usage and savings.

[20] *Modelkit* is a free and open-source, cross-platform framework for parametric building energy modeling. https://bigladdersoftware.com/projects/modelkit/

batch simulation models. The entire system including post processing scripts are available on GitHub[21] for use in PY2026-27 measure updates. A new final version of California Energy Efficiency code, 2025 Title-24, was enacted in September 2024. This new code should be used as the baseline for all modeled measures effective PY2026. Because measure packages were submitted prior to September 2024, measures were based on draft versions of the 2025 Title-24. If the final 2025 Title-24 code results in changes from the draft version, CPUC will update the building prototype code files and measure package developers will update any affected measure packages.

B.10 Load Shapes Updates

Effective Program Year: 2028. The CPUC may provide the methodology and tools for measure package developers to use to generate the Generalized Load Shape Parameters (GLSPs), depending on available contracting resources. GLSPs are comprised of 900 parameters that characterize the hourly load shape (8760) for a given measure package offering. Once the measure package developer has produced the GLSPs for each measure package offering or set of offerings,[22] these will be uploaded to the eTRM by the measure package developer and reviewed by the CPUC as a part of each measure package.

The eTRM shall migrate the load shape tables that currently reside in the CPUC Support Tables (Load Shapes, Electric and Load Shapes, Gas) in the eTRM to a location with permissions that allow both the measure package developers and the CPUC to read, write, and edit GLSP records. (Currently, these tables can only be written to by the CPUC via the nightly synchronization of the DEER database.) By PY2028, these tables will be used to generate the avoided cost combinations that will be used by the Cost Effectiveness Tool (CET) to determine the ex-ante cost effectiveness of every measure package offering.

B.11 Data Requirements for Distributor/Contractor-Delivered Measures

Effective Program Year: 2024. The data collection requirements outlined in Resolution E-5221 should continue to be listed in measure packages moving forward. *SiteID* is not a replacement for end use or customer tracking data for evaluation purposes.

[21] https://github.com/sound-data/DEER-Prototypes-EnergyPlus

[22] One of the tools to be developed and provided by the CPUC will be used to assess which GLSPs can be reasonably coalesced and thereby avoid needlessly overloading the tables.

C. DEER 2028 Update and Measure Package Submission/Review Timeline

Effective Program Year: 2024. This resolution sets forth the schedule for DEER Update and for submission of measure packages for CPUC staff approval for PY2028-29. The timeline and schedule are provided in Table 2.

Table 2. Tentative PY2028-2029 DEER Update Cycle Timeline

Description	Responsible Party	Due Date	Approval Date	Effective Date
Draft DEER2028 Update Resolution	CPUC	2026-07-31	-	-
DEER2028 Update Resolution	CPUC	-	2026-10-30	2028-01-01*
Measure Package Update Schedule	PAs/ Stakeholders	2025-08-01**	-	-
Measure Package Submittals	PAs		2026-07-31+	2028-01-01*

* There may be exceptions when updates become effective mid-cycle.

** Draft for workflow scheduling; updates to the schedule may be made if needed. Future updates such as EnergyPlus prototypes, EM&V evaluations, and CPUC guidance will be incorporated into the review of the Measure Package Update Schedule to properly stagger measure package submissions and reviews.

+ Per Draft Resolution release, adoption in Final Resolution.

CPUC staff will work with PAs to set a prioritized schedule of updates for all PY2028-29 measure packages resulting from updates directed in Sections E and F. PAs may submit additional updates to measure packages beyond what is directed and may include additional measure packages for update during that time. Examples of such updates may include, but are not limited to costs, new study data, and Evaluation, Measurement, and Verification (EM&V) results. Only measure packages adopted in the DEER2028 will be included in the set of deemed measures for the PY2028-29 program cycle.

Staff will work with the PAs to develop a schedule of submissions so measure packages requiring more time to develop and review can be submitted well before the standard three-month timeframe for review and approval to avoid delays. It is the responsibility of the PAs to follow the agreed schedule for submissions or risk measure packages not being included in the DEER resolution and therefore not receiving approval.

D. Mid-Cycle Adjustments to the Locked Ex-Ante Values

Effective Program Year: 2024. D. 21-05-031 (p. 39) locks ex-ante values used in Potential & Goals as well as claims for the two-year DEER cycle. It further notes that there may be

mid-cycle adjustments that will account for reasonable corrections to the existing locked values and allow new measures to be added to the portfolio. Mid-cycle reasonable correction measure package updates will be reviewed on a case-by-case basis to determine measure package effectiveness as stipulated by D. 21-05-031. Mid-cycle corrections to existing locked values will be communicated to the lead IOU for stakeholder awareness. PAs may still submit new measures during the cycle, but ex ante values adopted in DEER2026 will remain locked. New measures or offerings are effective upon approval. Changes to existing measures are effective 90 days after approval.

D.1 Codes and Standards

Effective Program Year: 2024. As discussed in Resolution E-5221, anticipated changes to codes and standards that occur mid-cycle shall be planned for by Portfolio Administrators (PAs). ENERGY STAR® standards will be updated in 2025. In addition, EPA finalized the American Innovation and Manufacturing Act, AIM in October 2023 and as of January 2, 2025, all manufactured HVAC systems and products shall use refrigerants having a global warming potential (GWP) of no more than 700. This update to the code will result in reduced CO_{2e} emissions stemming from refrigerant leakage and the benefits of those avoided emissions. This will also mean that more fuel substitution measure package permutations are expected to pass Part 2 (to pass the fuel substitution requirement of not increasing CO_{2e} emissions) of the fuel substitution test.

D.2 Policy Updates

Effective Program Year 2024. In addition to codes and standards updates that trigger mid-cycle measure package updates, PAs shall plan for mid-cycle updates that are triggered by a Decision that either sunsets or modifies a parameter used by a measure package.

E. Structural Changes to DEER Tables

Effective Program Year: 2024-2026. The changes listed in the subsections to follow will be made to the structures of some new and existing DEER database tables.

E.1 Retiring Table for Fuel Substitution Measures

Effective Program Year: 2024. CPUC staff is retiring the recently added "FuelSub" table that was added to DEER's "costeff" schema. In its place, the "FuelID" table described in Section E.2 was added.

E.2 Adding FuelID Table

Effective Program Year: 2025-2026. In response to D.23-04-035, the need for a more detailed set of descriptors became necessary as a means to distinguish between exempt and non-exempt measure package offerings.

E.3 Locking Measure and Energy Impact Tables

Effective Program Year: 2026. New records will no longer be added to either the "Measure" table or the "EnergyImpact" table. The eTRM will be the only repository for deemed measure package offering permutations and their respective unit energy savings values and their unit energy consumption values (both end-use, only, and whole building). CEDARS Reporting no longer test the Measure IDs in the DEER database and rely solely on the eTRM's Measure Detail ID to validate claims.

E.4 Field Changes to the TechType Table

Effective Program Year: 2024. Several fields were added to the TechType table to support D.23-04-035 and enable enhanced analysis (IsExempt, HasElectric Alt, HasRefrig, HasRefrigAlt, UsesElec, and UsesGas). Two fields are also proposed for removal from the TechType table to increase measure package flexibility (NormUnit and defEULCode).

E.5 Building Weights Table Created

Effective Program Year: 2024. For transparency and ease of access, the "BldgWts" table was added to the "applic" schema of the DEER database that contains building weights and HVAC weights to be used for post-processing of energy impacts. These are also available for use by the eTRM to calculate the percent change in savings between a new measure package version and its prior version.

F. Updates to DEER Support Table Values

Effective Program Year: 2023-2028. The following changes to the DEER support table values are planned.

F.1 Updates to Net-to-Gross Table

Effective Program Year: 2024. Four NTG IDs are expired and no longer available for use as of October 16, 2024 (All-Ltg-LED-WRR, NonRes-Out-Ltg-LEDFixt, Res-InCmn-Ltg-LEDFixt, and Res-OutCmn-Ltg-LEDFixt). These were established when, per Resolution E-4952, NTG ratios were going to have above-code and below-code components. Until new EM&V results become available, the default NTG IDs shall be used. In addition, CPUC staff has the authority to change the Custom project NTG values based on current studies or evaluation results.

F.2 Updates to Delivery Types

Effective Program Year: 2026. As indicated in Resolution E-5221, the selection of delivery types are updated to:

- Disaggregate the upstream channel (currently UpDeemed) into ones where the party receiving the incentives is either a manufacturer, a distributor, or a retailer (Up-Manuf, Mid-Distr, and Mid-Retail).
- Aggregate the deemed and custom options for both downstream and direct install option (currently DnDeemed, DnCust, DnDeemDI, and DnCustDI) since the Measure Impact Type already indicates whether a measure was deemed or custom (Down and DI).

In 2026, the Upstream Flag used by CEDARS is no longer expected to be needed. Until that time, the Upstream Flag will be set to "true" for the upstream delivery type and "null" for either of the midstream delivery types.

F.3 Updates to Measure Impact Types

Effective Program Year: 2026. Since there is no longer a distinction between DEER and non-DEER measures and the *FuelID* will be added to eTRM permutations for program year 2025, the list of available Measure Impact Types are consolidated.

F.4 Updates to EULs

F.4.1 EUL for Residential Behavioral NMEC Programs

Effective Program Year: 2026. Since data were submitted by Pacific Gas & Electric that showed evidence of a population-level Normalized Metered Energy Consumption (NMEC) Residential Behavioral Program delivering measurable savings for two years, a request was received to extend the EUL from one to two years. A new EUL ID has been created (Res-Behavioral-NMEC) where each year's energy savings will be empirically derived in accordance with NMEC rules.

F.4.2 Residential Weatherization Measures

Effective Program Year: 2024. Documentation was submitted to Ex Ante Review to support the addition of three building weatherization EUL_IDs and EULs.

F.4.3 Other Mid-cycle EUL Additions

Effective Program Year: 2023-2024. Documentation was submitted to Ex Ante Review to support the addition of 11 EUL_IDs and EULs for water-energy nexus measures, commercial gas patio heaters, and residential fan controllers for HVAC systems.

F.5 Updates to Building Weights Using 2022 Commercial End Use Study (CEUS)

Effective Program Year: 2028. Using the data provided by the 2022 Commercial End Use Study (CEUS), updated building weights for the "Com" sector-level commercial building type have been added to the table.

F.6 New GasImpactProfileIDs

Effective Program Year: 2024. Three new gas impact profile IDs were added for use with fuel substitution measures that substitute gas appliances with electric ones. These were needed so that new avoided cost combinations could be generated that included the methane leakage adders included in the 2022 avoided cost updates.

F.7 New TechTypes

Effective Program Year: 2026. Many of the food service technologies and some pool/spa technologies are either gas-burning or all electric. In these instances, existing TechTypes were split into two distinct TechTypes (e.g., the "Fryer" TechType is replaced with "Fryer-Elec" and "Fryer-Gas" TechTypes).

Research Needs for PY2028-29

Effective Program Year: 2028. The focus of future research plans needs to center around forecasting important updates that will have significant impact on deemed measure savings. Future codes and standards and emerging technologies are two broad categories that influence how measure baseline definitions evolve resulting from new codes and standards. Additional research may be needed to bridge case studies to a reliable sample or pilot evaluation that can be used to create a new measure. Beyond baseline research and in support of new measures, further research could support new policies and use assumptions that could be updated with research. These items may not be measure specific and could affect default parameters such as NTG or EUL.

G. Research to Improve HVAC Refrigerant Charge Values

Effective Program Year: 2028. Since the emissions due to refrigerant leakage have a direct effect on both the cost effectiveness of a given measure offering and—for fuel substitution measures—whether a given measure offering permutation does not increase net CO_{2e} emissions per part two of the fuel substitution test, it is important to have a better understanding of the refrigerant charge (lb./NormUnit) for HVAC systems and products.

H. Variable Refrigerant Flow (VRF) Heat Pump and AC Performance Curves

Effective Program Year: 2028. SDG&E has funded additional research in high efficiency equipment using inverter-driven compressors with variable refrigerant flow to further

address data gaps in the study that SDG&E performed in 2023. This is phase 2 of research that began with the scope presented in Section M. We support this research and recommend relying on published independent lab-test data rather than manufacturer data to inform performance curves.

I. Improvements for Commercial Water Heater and Hot Water Measures

Effective Program Year: 2028. Although a literature and internet research effort to identify recent hot water load profiles for commercial buildings found no better available data, the Ex Ante Review Team will revisit this effort now that the last of the data gathered during the 2019 Commercial End Use Study (CEUS) has been published. Additional activity-level load shapes (e.g., gyms, laundromats) will also be pursued for development. CPUC staff and staff consultants will also explore pathways to migrating commercial measures currently modeled using the DEER Water Heater Calculator to EnergyPlus.

Measure Adoption

Effective Program Year: 2024-2025 and 2026-2027. Per D.21-05-031, this resolution adopts and locks approved ex ante values contained in the measure packages for PY2026-2027 and mid-cycle change from PY2024-25. The list of measure packages adopted and locked for PY2024-25 is listed in Appendix A1 and the list of measure packages adopted and locked for PY2026-27 is in Appendix A2. All measures that will be active in that program year will be adopted and locked, not just those with updates. New measures can be added mid-cycle and will be tracked with start and end dates of those measures in the eTRM.

The dispositions and guidance documents used to inform the measure updates for PY2026-27 are provided for reference in Appendices A3 and A4 respectively. New guidance that has not been previously issued is provided in the sections that follow.

J. Guidance from 2021 Custom Industrial, Agricultural, and Commercial (CIAC) Impact Evaluation

Effective Program Year: 2026. The 2020-2021 CIAC study[23] evaluated electric and gas energy reductions by the CIAC programs, which includes Savings by Design (SBD) and custom programs. While there are no changes to current DEER values resulting from this study, CPUC staff agrees with the relevant recommendations. First, lighting applications should use area-specific hours of use (HOU) categories when the DEER building-specific hours of use are found to be inappropriate for a given site. Further—

[23] https://pda.energydataweb.com/api/downloads/2816/CIAC 2020-2021 Evaluation Final Report - Revised.pdf

per D.12.05.015—PAs may conduct a study to develop HOUs if DEER values are neither available nor applicable. Second, it is recommended that deemed portions of custom projects are filed as separate deemed claims and clearly identified in the custom application.

K. Guidance from Effective Useful Life (EUL) Studies

Effective Program Year: 2024-2026. This section summarizes CPUC guidance for measure packages related to three recent effective useful life (EUL) studies.

K.1 2023 Residential Insulation EUL Study updates

Effective Program Year: 2024. The CPUC Group A 2023 Residential Insulation EUL Study FINAL Report[24] published in December 2023 presents the report findings of a 30-year EUL for ceiling and wall insulation measures. The findings of this study updated the insulation measures for program years 2024-25 with the new EULs per O.P. 5 in D.23-04-035.

K.2 2023 Residential HVAC and Water Heating EUL Study updates

Effective Program Year: 2026. The 2023 Residential HVAC and Water Heating EUL Study set updated the EULs for fuel substitution HVAC and water heating measures. The study focused on both measure case and baseline equipment EULs and the results led to an increase to the residential EULs for heat pumps and air conditioners (except room/window units), gas furnaces, heat pump water heaters, gas storage water heaters, and gas tankless water heaters. We direct that the EULs established in this study shall be used for the DEER2026 cycle but also allow program administrators to utilize the updated values for their 2025 programs. This allows the programs to utilize the most current EUL to best capture the true values of these technologies and not miss opportunities to increase installations during the 2025 program year. [25] Although residential central air conditioning was not part of this EUL study, the EUL (ID: HV-ResAC) was increased from 15 years to 23 years so that it was equal to the EUL of heat pumps. This is consistent with the commercial EUL, in that the air conditioner EUL was consistent with heat pump EUL.

[24] https://pda.energydataweb.com/api/downloads/3903/CPUC Group A 2023 Residential Insulation EUL Study Final Report.pdf

[25] https://pda.energydataweb.com/api/downloads/3952/CPUC Group A 2023 Res HVAC and DHW EUL Study Final Report.pdf

K.3 2023 Commercial Measure EUL Study updates

Effective Program Year: 2026. The 2023 Commercial Measure EUL Study set out to update the EULs for fuel substitution HVAC and water heating measures. The study focused on both measure case and baseline equipment EULs and the results led to an increase to the commercial EULS for heat pumps and air conditioners (except room/window units), heat pump water heaters and gas tankless water heaters. The EUL for gas storage water heaters was decreased from 15 to 13 years. The EULs established in this study should be formally adopted into the DEER2026 cycle, but for these EULs we allow the values to be used in 2025 for reasons stated earlier.[26]

L. Guidance Based on Other Studies

Effective Program Year: 2026. This section summarizes CPUC guidance for measure packages related to three other recent studies.

L.1 Hard-to-Reach (HTR) Net-to-Gross Ratios for Direct Install Delivery Type

Effective Program Year: 2026. Resolution E-5221 required research to determine whether there was evidence for having different default net-to-gross ratios (NTGRs) for HTR and non-HTR customers participating in direct install and downstream programs. The results of the "Group A Forward-Looking Research: Cross-Program Net-to-Gross Ratios for Hard-to-Reach Customers"[27] found no statistically significant evidence to support having different NTGRs for participants in either residential or commercial direct install programs. We direct that the default NTGRs for direct install programs are modified to 0.90 for residential programs and 0.70 for commercial ones. These changes do not, however, modify the expectation that programs will continue to serve HTR customers and track which are categorized as HTR and by which criteria.

L.2 High-SEER Heat Pump and AC Performance Curves

Effective Program Year: 2026. The study "Adding SEER2 VCHP Offerings to DEER," funded by SDG&E tried to obtain manufacturer performance data from a wide range of systems but only succeeded at getting sufficient information from two manufacturers, one product line from each. Although we do not recommend updating the performance curves at this time, we do agree with the study's other recommendations and therefore order that variable compressor systems are modeled using the MULTISPEED function in EnergyPlus, setting the number of compressor speeds to four, and using no cycling losses for speeds two through four. The study also recommends, and we order, that

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[26] https://pda.energydataweb.com/api/view/3980/CPUC%20Group%20A%202023%20Commercial%20HVAC%20and%20Water%20Heating%20EUL%20Study%20Final%20Report.pdf

[27] https://pda.energydataweb.com/#!/documents/4023/view

measure packages include program requirements intended to ensure that the new offerings function correctly.

- IOUs shall require the use of controls and thermostats recommended by the original equipment manufacturer.
- IOUs shall require that outdoor units must be capable of "variable capacity" performance (reference the definition we provided in the "Introduction to VCHP Technology" section of this report, based on AHRI 210/240 definitions).
- If high efficiency air handling unit offerings are pursued, consider performance requirements such as an electronically commutated motor (ECM) or a minimum of three fan speed settings.

L.3 Boiler Compliance with Condensation of Exhaust Gases and energy efficiency

Effective Program Year: 2026. CPUC staff has approved measures for condensing boilers, but it is necessary to verify that they operate in a mode where the return water temperatures are low enough to allow for condensing of water vapor in the exhaust gases. Based on the study's key findings we order that measure package developers revise impacts estimates for condensing boilers so that in retrofit applications the boilers are expected to operate in condensing mode less than 50% of the time and the expectation for condensing operation in new construction applications should be greater than 90%. Furthermore, we order programs claiming these measures ensure the following conditions are met:

- The hot water return temperature must be below 130 °F and the supply hot-water temperatures should not exceed 140 °F.
- For retrofit projects (replacing boilers only), ensure the existing end use equipment (e.g., heating coils, radiators, etc.) and recommissioning is designed for these lower supply temperatures.

M. Guidance from Review of PY2021 and PY2022 EM&V Reports for Deemed Measure Claims

Effective Program Year: 2026. EM&V market sector evaluation results and/or special studies will continue to be some of the primary sources for DEER measure and measure package updates. Evaluation results with sufficient rigor and precision will be used to update DEER and measure package 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. This review is focused on evaluations of PY2021 and PY2022 claims. These final evaluation study results informed updates to deemed measures that are hereby adopted as follows:

1. The low gross realization rates for the residential smart thermostat measures found in the Residential Direct Install Program EM&V report for PY2021[28] indicate further reductions of the electric and gas unit energy savings values are needed. We direct the measure package developer to investigate the means by which the smart thermostat realize savings and adjust the UES methodology and estimates.
2. Findings from the Residential Direct Install Program EM&V report for PY2021[29] on the residential smart fan controller measures indicate a need for a revised savings methodology estimate. The low realization rate for this measure in multiple evaluation cycles and the high uncertainty in the deemed savings methodology indicate the need for an updated laboratory or field study of fan controllers. We direct the measure package developer to generate an updated methodology as it is applied to contemporary HVAC systems for relating the part-load ratio to savings impacts for smart fan controllers which use the same methodology as this measure (that will be retired.)
3. Findings from the Residential Direct Install Program EM&V report for PY2021[30] on the residential brushless fan motor replacement measures recommend revising two key inputs since they are affected by system capacity: existing fan power draw and HVAC system run-hours. We direct the measure package developer to update the measures assumed existing power draw based on newer fan motor power draw data and to correct the modeled equipment sizing with AC capacity using data collected through the Quality Residential HVAC Services Program.

[28] "CPUC Group A Residential Direct Install Program Impact Evaluation - Program Year 2021," DNV, April 26, 2023. (www.calmac.org/publications/CPUC_Group_A_PY2021_Residential_Install_Program_Impact_Evaluation_-_Final_Report_CALMAC.pdf)
[29] Ibid.
[30] Ibid.

4. Findings from the Residential Direct Install Program EM&V report for PY2021[31] regarding the residential faucet aerator measures indicate a need to update assumptions used by the Unit Energy Savings (UES) calculation methodology. The evaluation found very low gross realization rates for these measures and recommended reducing uncertainty in assumptions of hot water consumption and changes to fixture flow rates. We direct the measure package developer to update the UES savings methodology with updated hot water usage rates, electric water heater saturation, and changes to fixture flow rate values based on new research or the best available data.
5. We direct that the NTG ratio for the residential smart fan controller for air conditioners is decreased from 0.88 to 0.80 based on the Residential Direct Install Program EM&V report for PY2021.[32]
6. We direct that the NTG ratio for the residential smart thermostat (direct install) is decreased from 0.95 to 0.85 based on the Residential Direct Install Program EM&V report for PY2021.[33]
7. We direct that the NTG ratio for the residential faucet aerator (all residential building types except multi-family) is increased from 0.59 to 0.85 based on the Residential Direct Install Program EM&V report for PY2021.[34]
8. We direct that the NTG ratio for the residential low-flow showerhead is increased from 0.70 to 0.85 based on the Residential Direct Install Program EM&V report for PY2021.[35]
9. We direct that a new NTG ID is generated for the commercial and multifamily gas dryer modulating valve (commercial sector and downstream delivery type only) with a ratio of 0.85 based on the Local Third-party Program EM&V report for PY2021.[36]

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[31] Ibid.
[32] "CPUC Group A Residential Direct Install Program Impact Evaluation - Program Year 2021," DNV, April 26, 2023. (www.calmac.org/publications/CPUC_Group_A_PY2021_Residential_Install_Program_Impact_Evaluation_-_Final_Report_CALMAC.pdf)
[33] Ibid.
[34] Ibid.
[35] Ibid.
[36] "EM&V Group A – Final Impact Evaluation Report Local Third-Party Programs – Program Year 2021," DNV, April 24, 2023. (www.calmac.org/publications/Group_A_PY2021_Local_Third-Party_Impact_Evaluation_-_Final_Report_CALMAC.pdf)

10. We direct that the NTG ratio for the nonresidential and multifamily hot water pipe insulation (multi-family and downstream delivery type only) is increased from 0.55 to 0.65 based on the Local Third-party Program EM&V report for PY2021.[37]
11. We direct that a new NTG ID is generated for residential water heater pipe wrap (downstream only) with a ratio of 0.90 based on the Local Third-party Program EM&V report for PY2021.[38]

FINDINGS

1. We find it reasonable for the eTRM to continue to be administered by the PAs.
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. It is appropriate to update the DEER values as result of a) updates to underlying methodology, b) updates for corrections and clarifications, c) updates based on evaluation study results, d) new code updates, e) review of market and research studies, and f) addition of new measures.
5. Decision D.05-01-055 establishes the CPUC Energy Division authority to review and approve measures, including authority to designate a set of values as the deemed data source of record.

THEREFORE, IT IS ORDERED THAT:

1. The DEER2026 and Revised DEER2024 and DEER2025 Updates, listed in Table 1, as described in Attachment A, and per supporting documentation available on the DEER Module at the CEDARS website, are approved with effective dates as listed. The Appendices and the Attachment to this resolution may be updated by staff as needed.
2. Pacific Gas and Electric Company (PG&E), Southern California Electric Company (SCE), Southern California Gas Company (SCG), and San Diego Gas & Electric

[37] Ibid.
[38] Ibid.

(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 Program Years 2024 and 2025 planning and savings claims, and Program Years 2026-27 planning, implementation and reporting.

3. Pacific Gas and Electric Company (PG&E), Southern California Electric Company (SCE), Southern California Gas Company (SCG), 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 follow the updated process adopted in this resolution for deemed ex ante activities as directed in this resolution.
4. Pacific Gas and Electric Company (PG&E), Southern California Electric Company (SCE), Southern California Gas Company (SCG), 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 comply with the updated schedule for activities adopted in this resolution unless expressly authorized by CPUC staff.

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 December 19, 2024; the following Commissioners voting favorably thereon:

RACHEL PETERSON
Executive Director

APPENDIX A

A1. PY2024-25 Mid-Cycle Measure Package Updates

Expected mid-cycle updates for PY2024-25 in Table Table A1.1 are current as of the adoption of the final resolution. These measure packages are measures that have planned code or standard updates that go into effect in 2025, before the DEER2026 measure package version update. The only measures shown for which the savings and impacts are unknown are measure packages SWAP003-05 – Clothes Dryer, Residential and SWAP014-04 – Heat Pump Clothes Dryer, Residential, Fuel Substitution. The eTRM version numbers may differ from this table based on other mid-cycle versions and approvals. *The list provided in Table A1.1 is preliminary and will be updated for the final resolution.*

Table A1.1. PY2024-25 Mid-Cycle Measure Package Updates

Measure Package ID	Measure Name	Mid-Cycle Update Reason	Program Year	Lead IOU
SWAP003-05	Clothes Dryer, Residential	ENERGY STAR Standard	2025**	SCG
SWAP014-04	Heat Pump Clothes Dryer, Residential, Fuel Substitution	ENERGY STAR Standard	2025**	SCE
SWCR014-06*	Medium or Low Temperature Display Case	CARB Refrigerant Standard	2025	SCE
SWFS016-05*	Refrigerated Chef Base	CARB Refrigerant Standard	2025	SCE
SWFS030-01	Pressure Fryer, Commercial	New measure package	2024, effective upon approval	SCG
SWHC005-04	Water-Cooled Chiller	CARB Refrigerant Standard	2025	SDGE
SWHC013-05*	Unitary Air-Cooled Air Conditioner, Over 65 kBtu/hr, Commercial	CARB Refrigerant Standard	2025	SDGE
SWHC014-05*	Unitary Air-Cooled Air Conditioner or Heat Pump, Under 65 kBtu/hr, Commercial	EPA AIM Act and CARB Refrigerant Standards	2025	SDGE
SWHC020-04	Air-Cooled Screw Chiller, Path A	CARB Refrigerant Standard	2025	SDGE
SWHC027-05*	Package Terminal Air Conditioner or Heat Pump, Under 24 kBtu/hr	CARB Refrigerant Standard	2025	SDGE
SWHC039-08	Smart Thermostat, Residential	New measure offerings	2024, effective upon approval	SCE

Measure Package ID	Measure Name	Mid-Cycle Update Reason	Program Year	Lead IOU
SWHC043-04	Multiple Capacity Unitary Air-Cooled Commercial Air Conditioners Between 65 and 240 kBtu/hr	New measure offerings	2024, effective upon approval	SDGE
SWHC043-05*	Multiple Capacity Unitary Air-Cooled Commercial Air Conditioners Between 65 and 240 kBtu/hr	CARB Refrigerant Standard	2025	SDGE
SWHC044-06*	Ductless HVAC, Residential, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWHC045-05*	Heat Pump HVAC, Residential, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWHC046-05*	Packaged Heat Pump Air Conditioner Commercial, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWHC049-05*	Ducted AC and HP HVAC Equipment, Residential	CARB Refrigerant Standard	2025	SDGE
SWHC050-05*	Ductless Heat Pump, Residential	CARB Refrigerant Standard	2025	SDGE
SWHC062-01	Occupancy Fan Controller, Commercial	New measure package	2024, effective upon approval	PG&E
SWLG019-01	LED, Indoor Horticulture	New measure package	2024, effective upon approval	SCE
SWMI003-01	High-Efficiency Toilets, Residential and Commercial	New measure package	2024, effective upon approval	SDGE
SWRE005-05*	Heat Pump Pool Heater, Residential, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWSV014-03*	Lifecycle Refrigerant Management, Residential	CARB Refrigerant Standard	2025	PG&E
SWWB008-03*	All-Electric Homes, Residential, New Construction	CARB Refrigerant Standard	2025	PG&E
SWWH001-04	Faucet Aerator, Residential	New measure offerings	2024, effective upon approval	SCG
SWWH002-04	Low-Flow Showerhead, Residential	New measure offerings	2024, effective upon approval	SCG

Measure Package ID	Measure Name	Mid-Cycle Update Reason	Program Year	Lead IOU
SWWH003-03	TSV with and without an Integrated Low-Flow Showerhead, Residential	New measure offerings	2024, effective upon approval	SCG
SWWH014-07*	Heat Pump Water Heater, Residential	CARB Refrigerant Standard	2025	SCE
SWWH017-05	Hot Water Pipe Insulation, Nonresidential and Multifamily	New measure offerings	2024, effective upon approval	SCG
SWWH019-05	Faucet Aerator, Commercial	New measure offerings	2024, effective upon approval	SCG
SWWH020-05	Low-Flow Showerhead, Commercial	New measure offerings	2024, effective upon approval	SCG
SWWH025-09*	Heat Pump Water Heater, Residential, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWWH026-03	Water Heater Pipe Wrap, Residential	New measure offerings	2024, effective upon approval	SCG
SWWH027-06*	Heat Pump Water Heater, Commercial, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWWH028-04	Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution	Error correction	2024	SCE
SWWH028-06*	Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWWH031-05*	Heat Pump Water Heater, Commercial	CARB Refrigerant Standard	2025	SCE

*PY2025 measure package versions that are not yet approved.
**ENERGY STAR standard update TBD.

A2. PY2026-27 Measures

The list provided in Table A2.1 is current as of the adoption of the final resolution. *The list provided in Table A2.1 is preliminary and will be updated for the final resolution.*

Table A2.1. DEER2026-27 Measure Packages to be Updated

Measure Package ID	Measure Name	Program Year	Lead IOU
SWAP003-05*	Clothes Dryer, Residential	2026	SCG
SWAP004-04	Clothes Washer, Residential & Multifamily	2026	SCG
SWAP005-04	Ozone Laundry, Commercial	2026	SCG
SWAP006-05	Dishwasher, Residential	2026	SCG
SWAP007-04	Room Air Conditioner, Residential	2026	SDGE
SWAP008-04	Room Air Cleaner, Residential	2026	SDGE
SWAP011-05	Vending and Beverage Merchandise Controller	2026	SCE
SWAP012-03	Gas Dryer Modulating Valve, Commercial and Multifamily	2026	SCG
SWAP013-04	Cooking Appliances, Residential, Fuel Substitution	2026	SCE
SWAP014-05*	Heat Pump Clothes Dryer, Residential, Fuel Substitution	2026	SCE
SWAP015-04	Efficient Electric Cooking Appliances, Residential	2026	SDGE
SWAP017-04	Oven, Gas, Residential	2026	SCG
SWBE001-05	Greenhouse Heat Curtain	2026	SCG
SWBE002-05	Greenhouse Infrared Film	2026	SCG
SWBE006-04	Ceiling Insulation, Residential	2026	SCG
SWBE007-04	Wall Insulation, Residential	2026	SCG
SWBE010-02+	Deeply Buried Ducts, Residential	2026	MCE
SWCA001-05	Air Compressor VFD Retrofit	2026	SCE
SWCR001-05	Anti-Sweat Heat Controls	2026	SCE
SWCR002-05	Low-Temperature Display Case Doors with No Anti-Sweat Heaters	2026	SCE
SWCR003-04+	High Efficiency Motor Retrofit for Refrigerated Display Case	2026	SCE
SWCR007-05+	Floating Head Pressure Controls, Multiplex	2026	PG&E
SWCR008-05+	Floating Suction Controls, Multiplex	2026	SCE
SWCR010-05	Bare Suction Line Insulation	2026	SCE
SWCR014-05	Medium or Low-Temperature Display Case	2026	SCE
SWCR015-04	Medium-Temperature Case Doors	2026	PG&E
SWCR017-05	Ultra-Low Temperature Freezer	2026	PG&E
SWCR018-05	Reach-In Refrigerator or Freezer, Commercial	2026	PG&E
SWCR019-04	Low-Temperature Coffin to Reach-In Display Case Conversion	2026	PG&E
SWCR020-04	Medium-Temperature Open Display Case Retrofit	2026	PG&E
SWCR021-04+	Medium or Low-Temperature Display Case with Doors	2026	PG&E
SWFS001-04	Convection Oven, Commercial	2026	SCG
SWFS002-05	Door Type Dishwasher, Commercial	2026	SCG

Measure Package ID	Measure Name	Program Year	Lead IOU
SWFS003-05	Combination Oven, Commercial	2026	SCG
SWFS004-03	Griddle, Commercial	2026	SCG
SWFS005-05	Steamer, Commercial	2026	SCG
SWFS006-04	Ice Machine, Commercial	2026	PG&E
SWFS007-05	Insulated Hot Food Holding Cabinet	2026	SCE
SWFS008-03	Conveyor Oven, Gas, Commercial	2026	SCG
SWFS009-04	Commercial Deck Oven, Electric	2026	SCE
SWFS010-04	Commercial Hand Wrap Machine, Electric	2026	SCE
SWFS011-07	Fryer, Commercial	2026	SCG
SWFS012-04	Exhaust Hood Demand Controlled Ventilation, Commercial	2026	SCE
SWFS013-04	Low-Flow Pre-Rinse Spray Valve	2026	SCG
SWFS014-04	Rack Oven, Gas, Commercial	2026	SCG
SWFS016-04	Refrigerated Chef Base	2026	SCE
SWFS017-04	Automated Conveyor Broiler, Commercial	2026	SCG
SWFS018-06	Undercounter Dishwasher, Commercial	2026	SCG
SWFS019-04	Underfired Broiler, Commercial	2026	SCG
SWFS021-05	Commercial Fryer, Fuel Substitution	2026	SCE
SWFS022-04	Commercial Convection Oven, Fuel Substitution	2026	SCE
SWFS023-04	Contact Conveyor Toaster, Commercial	2026	SCE
SWFS024-03	Hot Food Holding Cabinet	2026	SCG
SWFS025-03	Radiant Conveyor Toaster, Commercial	2026	SCG
SWFS026-03	Cooktop, Commercial	2026	SCG
SWFS027-02	Soup Well, Electric, Commercial	2026	SCG
SWFS028-02	Steam Table, Electric, Commercial	2026	SCG
SWFS029-02	Rotisserie, Gas, Commercial	2026	SCG
SWFS030-02	Pressure Fryer, Commercial	2026	SCG
SWHC001-05	Wall Furnace, Residential	2026	SCG
SWHC002-04	Intermittent Pilot Light, Residential	2026	SCG
SWHC004-07^{+}	Space Heating Boiler, Commercial and Multifamily	2026	SCG
SWHC005-05^{+}	Water-Cooled Chiller	2026	SDGE
SWHC006-04^{+}	Demand Control Ventilation for Single Zone HVAC	2026	PG&E
SWHC008-03^{+}	VSD For Central Plant System	2026	SCE
SWHC009-05^{+}	Supply Fan Controls, Commercial	2026	SDGE
SWHC012-04^{+}	Classroom HVAC Occupancy Sensor	2026	SCE
SWHC013-06^{+}	Unitary Air-Cooled AC and HP, over 65 kBtu/hr, Commercial	2026	SDGE
SWHC014-06^{+}	Unitary Air-Cooled AC and HP, below 65 kBtu/hr, Commercial	2026	SDGE

Measure Package ID	Measure Name	Program Year	Lead IOU
SWHC018-05+	VSD for HVAC Fan Controls, Commercial	2026	PG&E
SWHC020-05+	Air Cooled Screw Chiller, Path A	2026	SDGE
SWHC023-05+	Enhanced Ventilation for Packaged HVAC	2026	PG&E
SWHC024-05+	Drive Belt for HVAC Fan, Commercial	2026	SCE
SWHC027-06+	Package Terminal Air Conditioner or Heat Pump, Under 24 kBtu/hr	2026	SDGE
SWHC031-04	Furnace, Residential	2026	SCG
SWHC038-05	Brushless Fan Motor Replacement, Residential	2026	SCE
SWHC039-09	Smart Thermostat, Residential	2026	SCE
SWHC041-06+	Software-Controlled Switch Reluctance Motor	2026	SCE
SWHC043-06+	Multiple Capacity Unitary Air-Cooled Commercial Air Conditioners Between 65 and 240 kBtu/hr	2026	SDGE
SWHC044-05+	Ductless HVAC, Residential, Fuel Substitution	2026	SCE
SWHC045-04+	Heat Pump HVAC, Residential, Fuel Substitution	2026	SCE
SWHC046-04+	Packaged Heat Pump Air Conditioner, Commercial, Fuel Substitution	2026	SCE
SWHC047-05	Gas Fireplace, Residential	2026	SCG
SWHC049-06+	SEER Rated AC and HP HVAC Equipment, Residential	2026	SDGE
SWHC050-06+	Ductless Heat Pump, Residential	2026	SDGE
SWHC054-02	Heat Recovery Ventilation, Residential	2026	SCG
SWHC057-02	Space Heating Gas Absorption Heat Pump, Multifamily	2026	SCG
SWHC058-02	Patio Heater, Gas, Commercial and Residential	2026	SCG
SWHC059-03	Smart Fan Controller, Residential	2026	SDGE
SWLG020-03	UL Type B LED Mogul Base Lamp HID Retrofits for Outdoor Area/Pole and Decorative Fixtures	2026	SCE
SWMI002-03	No Savings	2026	SDGE
SWMI003-02	High-Efficiency Toilets, Residential and Commercial	2026	SDGE
SWPR001-03	Ventilation Fan, Agricultural	2026	PG&E
SWPR002-03	VFD for Glycol Pump Motor	2026	PG&E
SWPR003-03	Steam Trap, Commercial	2026	SCG
SWPR004-05	Circulating Block Heater	2026	SCE
SWPR005-03	VFD for Dust Collection Fan	2026	PG&E
SWPR006-03	VSD For Ventilation Fan, Agricultural	2026	PG&E
SWPR007-02	Steam Boiler Economizer, Industrial	2026	SCG
SWPR008-02	VFD on Rod Beam Pump	2026	PG&E
SWRE001-04	Pool Cover, Commercial	2026	SCG
SWRE003-04	Heater for Pool or Spa, Commercial and Mulitfamily	2026	SCG
SWRE004-04	Pool Heater, Residential	2026	SCG

Measure Package ID	Measure Name	Program Year	Lead IOU
SWRE005-04	Heat Pump Pool Heater, Residential, Fuel Substitution	2026	SCE
SWSV001-07	Duct Seal, Residential	2026	SDGE
SWSV005-04+	Economizer Repair, Commercial	2026	SDGE
SWSV010-04+	Economizer Controls, Commercial	2026	SDGE
SWSV013-05	Duct Optimization, Residential	2026	SDGE
SWSV014-04+	Lifecycle Refrigerant Management, Residential	2026	PG&E
SWWB002-02	Universal Audit Tool	2026	PG&E
SWWB004-03	Home Energy Reports	2026	PG&E
SWWB007-02+	Business Energy Reports	2026	SCE
SWWB008-03+	All-Electric Homes, Residential, New Construction	2026	PG&E
SWWH001-05	Faucet Aerator, Residential	2026	SCG
SWWH002-05	Low-Flow Showerhead, Residential	2026	SCG
SWWH003-04	TSV with and without an Integrated Low-Flow Showerhead, Residential	2026	SCG
SWWH004-04	Laminar Flow Restrictor, Commercial	2026	SCG
SWWH005-07	Boiler, Commercial	2026	SCG
SWWH006-08	Tankless Water Heater, Commercial	2026	SCG
SWWH007-06	Storage Water Heater, Commercial	2026	SCG
SWWH008-02	Boiler, Process	2026	PG&E
SWWH010-03	Boiler, Multifamily	2026	SCG
SWWH011-03	Central Storage Water Heater, Multifamily	2026	SCG
SWWH012-04+	Storage Water Heater, Residential	2026	SCG
SWWH013-04+	Tankless Water Heater, Residential	2026	SCG
SWWH014-06+	Heat Pump Water Heater, Residential	2026	SCE
SWWH015-04+	Demand Control for Centralized Water Heater Recirculation Pump, Multifamily & Commercial	2026	SCG
SWWH016-04+	Domestic Hot Water Loop Temperature Controller, Multifamily & Commercial	2026	SCG
SWWH017-06	Hot Water Pipe Insulation, Nonresidential and Multifamily	2026	SCG
SWWH018-05	Hot Water Tank Insulation, Nonresidential and Multifamily	2026	SCG
SWWH019-06	Faucet Aerator, Commercial	2026	SCG
SWWH020-06	Low-Flow Showerhead, Commercial	2026	SCG
SWWH021-02	Recirculation Pump Timer, Commercial	2026	SCG
SWWH023-03	Diverting Tub Spout with TSV, Residential	2026	SCG
SWWH025-08+	Heat Pump Water Heater, Residential, Fuel Substitution	2026	SCE
SWWH026-04	Water Heater Pipe Wrap, Residential	2026	SCG

Measure Package ID	Measure Name	Program Year	Lead IOU
SWWH027-05	Heat Pump Water Heater, Commercial, Fuel Substitution	2026	SCE
SWWH028-05	Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution	2026	SCE
SWWH031-04	Heat Pump Water Heater, Commercial	2026	SCE
SWWH032-02	Solar Thermal Water Heating System, Residential	2026	SCG
SWWH033-03	Gas Heat Pump Water Heater, Multifamily	2026	SCG
SWWH034-03	Solar Thermal Water Heating System, Commercial and Multifamily	2026	SCG
SWWP004-04+	Water Pump Upgrade	2026	SCE
SWWP005-04	Enhanced VFD on Irrigation Pump	2026	PG&E

*Measure package may change mid-cycle due to potential changes in ENERGY STAR specification.
+ PY2026 measure package under review and not yet approved.

A3. Dispositions

The list of 2023-2024 dispositions that will impact PY 2026-27 measure packages is listed in Table A3.1. These documents can be downloaded from the DEER Module on CEDARS.[39] In this context, a disposition refers to a document that summarizes why a measure was approved or rejected. This is typically used for when measure packages are high-profile measure packages and/or measure packages that constitute significant savings potential or changes as the result of measure package updates.

Table A3.1. Measure Package Dispositions Directing Updates for PY2026-2027

Measure ID	Title	Date	Summary of Direction
SWWH028-04	Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution	2024-06-10	Disposition approves the statewide measure package Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution: SWWH028-04 to be effective retroactively on January 1, 2024, and expire on December 31, 2025. This disposition summarizes the error correction that necessitated a correction in multifamily savings values retroactive to PY24.

[39] https://cedars.cpuc.ca.gov/deer-resources/deemed-measure-packages/dispositions/

Measure ID	Title	Date	Summary of Direction
SWHC045-02	Heat Pump HVAC, Residential, Fuel Substitution	2023-08-16	Disposition approves the statewide measure package Heat Pump HVAC, Residential, Fuel Substitution: SWHC045-02 to be effective on November 13, 2023, and expire on December 31, 2023. The program administrators are directed to revise the measure package for PY 2024-2025 based on NTG eligibility changes from the PY2020 HVAC Fuel Substitution Impact Evaluation report. These updates will persist into the PY26-27 version of the measure package.
SWHC044-03	Ductless HVAC, Residential, Fuel Substitution	2023-08-16	Disposition approves the statewide measure package Ductless HVAC, Residential, Fuel Substitution: SWHC044-03 to be effective on November 13, 2023, and expire on December 31, 2023. The program administrators are directed to revise the measure package for PY 2024-2025 based on NTG eligibility changes from the PY2020 HVAC Fuel Substitution Impact Evaluation report. These updates will persist into the PY26-27 version of the measure package.
SWHC050-03	Ductless Heat Pump, Residential	2023-08-06	Disposition approves the statewide measure package Ductless Heat Pump, Residential: SWHC050-03 to be effective on November 8, 2023. The key updates for this measure package included integrating the EnergyPlus modeling update, which will continue to be utilized for PY26-27.
SWHC049-03	SEER Rated AC and HP HVAC Equipment, Residential	2023-04-01	Disposition approves the statewide measure package SEER Rated AC and HP HVAC Equipment: SWHC049-03 to be effective retroactively on January 1, 2023. The key updates for this measure package included integrating the EnergyPlus modeling update, which will continue to be utilized for PY26-27.

A4. Measure Package Guidance

Table A4.1 lists the guidance released since the last DEER Resolution that informs PY2026-27 Measure Updates. These documents can be downloaded from CEDARS at https://cedars.cpuc.ca.gov/deer-resources/deemed-measure-packages/guidance/.

Table A4.1. Measure Package Guidance for PY2026-2027

Date	Title (linked to full document)	Summary
2024-06-28	New Construction Measure Application Type Definition and Best Practices (Rev1)	This guidance document amendment provides additional clarification on nuanced applications of measure application types (MATs) across the deemed portfolio in the eTRM.
2024-06-06	Direct Install Delivery Type Description	This guidance document clarifies the definition of the direct install (DI) delivery type. The definition has implications on how incentive costs are reported for making energy savings claims, which can also impact the Total Resource Cost (TRC).
2024-05-16	Rebate Greater than IMC – Revised CPUC Guidance	This guidance document clarifies the instances, reasons, and documentation required when the rebate to the customer exceeds the Incremental Measure Cost (IMC).
2024-05-15	Documentation Requirements for SB1414, Title 24 and Permitting Compliance	This guidance clarifies the intent of measure package language that specifies the following of local and state laws. In addition, the guidance document lays out how reporting should differ depending on program delivery type.
2024-04-19	New Construction Measure Application Type Definition and Best Practices	This guidance clarifies the definition of the new construction measure application type and avoid ambiguity with the normal replacement measure application type.
2023-12-14	Documentation Requirements for Existing Conditions	This guidance document summarizes specific measure package guidance when existing conditions are required to be known to select a measure package offering. In some midstream or upstream scenarios this information cannot be collected, so the guidance provides assumptions to follow.

Date	Title (linked to full document)	Summary
2023-10-26	Preponderance of Evidence Requirements for Accelerated Replacement of Deemed Measures	This guidance document summarizes the deemed measure package preponderance of evidence (POE) data collection requirements and is effective on January 1, 2024.
2023-10-20	Ex/Any Building Vintage Update Requirements for DEER2024	This guidance document is to follow up on prior direction confirming the use of 'Any' building vintage is not applicable. The guidance document also confirms how this impacts the permutations and claims.
2023-08-21	Acceptance of Deviation from Resolution E-5152, Section C.11	This guidance document addresses the addition of two new fields in the eTRM permutations and CEDARS to provide first and second baseline definitions to avoid errors in the claim data when savings are populated into the incorrect base case column.
2023-06-14	CPUC Guidance on Definition of "Gas Measure" in Decision D.23-04-035	This guidance document clarifies the definition of a gas measure for the purposes of compliance with Ordering Paragraph 3 in Decision D.23-04-035.
2023-04-18	Definition of "In the Marketplace"	Guidance to provide a more concrete definition for "in the marketplace" to add clarity to the eligibility of the "All-Default<=2yrs" NTG ID.
2022-10-18	Measure Package Plan Template	Measure package plan template for PA use to receive early feedback from CPUC Staff on a measure package prior to its submission.
2022-09-27	Guidance RE: NTG ID for Non-Residential Unitary/Split AC/HP Systems for DEER2023/2024 Measure Packages	This guidance clarifies NTG ID revisions for the SWHC013, SWHC014, and SWHC043 measure packages.
2022-08-16	CPUC Guidance Clarifying Requirements for Residential Duct Seal and Duct Optimization	This guidance memo clarifies the duct sealing test method, required leakage reduction, and savings by building era approaches to develop measure package savings values in the Duct Seal and Duct Optimization measure packages.

Date	Title (linked to full document)	Summary
2022-07-01	CPUC Guidance on Unitary HVAC Equipment Data Collection Requirements and Eligibility Requirements	This guidance document outlines requested changes to the measure package language that are no longer applicable.
2022-06-09	Measure Package Adoption by PAs	This guidance sets for the process for PAs and third-party implementers to upload and adopt PA implementation codes in eTRM.
2022-06-02	Addendum to Measure Package Documenting Incentive Greater than Incremental Measure Cost	This guidance sets for the process and documentation required for PAs to submit an addendum to measure packages informing the CPUC as to the need to provide an incentive which is greater than the incremental measure cost.