STATE OF CALIFORNIA
PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

Gavin Newsom, Governor

Date: August 1, 2024

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

From: Energy Efficiency Branch, California Public Utilities Commission
CC: ALJ Julie Fitch; ALJ Valerie Kao; Simon Baker; Jeorge Tagnipes; Leanne Hoadley; Peter Biermayer

Subject: **Solicitation for Comments on Scope of Update for Database of Energy Efficiency Resources for program years 2024 through 2028 (DEER2026)**

The California Public Utilities Commission (CPUC) Staff invite comments on this proposed scope to update the Database of Energy Efficient Resources for program years (PY) 2026-27 (DEER2026) to be scheduled for adoption by a Resolution in Q4 2024.[1] Our scoping effort started with informal feedback from and discussions with the CPUC energy efficiency (EE) Program Administrators (PAs). We also considered current market conditions, conventional DEER update sources such as evaluation results and research studies, and analysis of energy efficiency regulatory oversight operational needs. This effort targets updates needed for PY 2026-27, but due to evolving regulatory requirements, some error corrections and clarifications are also needed for the previous 2025 and 2024 DEER updates.

As noted in DEER2023 Update Resolution E-5152, Decision D.21-05-031[2] makes several changes that affect the DEER Resolution update. It delegates CPUC staff to make future updates to the DEER and measure package submittal, review, and approval processes via the resolution, removes the DEER versus non-DEER distinction for deemed ex ante values, and revises the scope of the DEER Resolution. "The new scope of the resolution will encompass:

- Approval of deemed ex ante values
- Direction of research needs
- Management of deemed ex ante value process
- Adoption of a locked, two-year version of deemed values to be used in forecasting, portfolio planning, and savings claims"

The sections in the scoping document and in the resolution will be organized into sections corresponding to the bulleted list. D.21-05-031 further changes the DEER Resolution date from September 1 to November 1 and to be issued in even-numbered years rather than every year.

[1] See D15-10-028, OP 17, http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M155/K511/155511942.pdf.
[2] https://docs.cpuc.ca.gov/SearchRes.aspx?docformat=ALL&docid=385864616

This year's resolution will include the continued development of the electronic Technical Reference Manual (eTRM) and the measure lifecycle management tool(s).

Comments on this scoping document are due August 1, 2024. Table 1-1 presents the proposed timeline for this year's DEER update cycle.

Table 1-1. Proposed Timeline of 2026 DEER Update

Activity	Scheduled Date
DEER Scoping document release notice	2024-08-01
Scoping document comments due	2024-08-16
Draft Resolution and webinar notice release	2024-10-18
Public webinar	2024-10-23
Party comments due (20 days after draft Resolution release)	2024-11-07
Deadline for Resolution to be considered by Commission	2024-11-13
Commission voting meeting	2024-12-19

DEER2026 Scoping Document

Prepared by DNV Energy Insights USA, Inc.

1. Management of DEER Processes

The following sections provide detail on proposed policy changes and all proposed updates affecting the DEER database and measure packages—both structural and to ex ante values.

1.1. Updates to eTRM

Effective Program Year: 2026. As noted in DEER Resolution E-5221, California's statewide electronic Technical Reference Manual (eTRM) is the *Official Source of California Energy Efficiency Measure Data*[3] and the sole source for energy efficiency measure package development, submittal, review, and publishing.

1.1.1. eTRM Funding

Effective Program Year: 2026. The IOUs will continue to fund the California Technical Forum (CalTF) and eTRM and may do so from either their program or evaluation budgets.

1.1.2. 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[4] platform (e.g., GitHub). This is expected to improve transparency and allow stakeholders to have a better understanding of the changes that occur.

1.1.3. Measure Lifecycle Management (MLM) in DEER

Effective Program Year 2026. 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 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 in PY2028.

1.1.4. Enable Filtering on CPUC Support Tables in eTRM

Effective Program Year: 2026. CalTF shall enable the "Add a filter" functionality for all CPUC Support Tables equivalent to that provided for the "Advanced Full Screen View" of all Shared Values Tables.

[3] https://www.caetrm.com/shared-data/
[4] Git is a distributed version control system that tracks changes in any set of computer files, usually used for computer programming.

1.1.5. Running the Cost Effectiveness Tool (CET) from within the eTRM

Effective Program Year: 2026. The eTRM currently enables measure package developers to create input files for the Cost Effectiveness Tool (CET) on CEDARS. Then, another manual process is used to upload those files to the CET, get the CET outputs, and upload those results to eTRM. The avoided cost calculator (ACC) is updated through the R.22-11-013 proceeding. New draft avoided costs are expected to be released in 2024 to become effective PY2026 with final values expected in Q4 2024. All measure packages effective in PY2026 will require new CET runs once the updated avoided costs become available. Plans to automate CET runs from within the eTRM are under way to facilitate this process for measure package developers (though the CET, itself, will continue to be the engine that calculates cost effectiveness metrics and validates values).

1.1.6. eTRM Table Structure Changes

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.

Effective Program Year: 2026. The fields contained in the eTRM measure permutations table shall be updated as needed to support evolving policies and measure development. These fields may result from fields added to the DEER support tables or they may be in addition to DEER support table fields. 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. Examples of such revisions include but are not limited to:

- Adding new field(s): Net lifecycle refrigerant leakage emissions, in metric tonne CO2e; Refrigerant Type for measure, standard practice, and existing equipment cases (or always include in case descriptions where equipment uses refrigerant); end-use specific energy consumption fields for measure, standard practice, and existing equipment. (Presently, the consumption fields often contain whole-building consumption levels.)
- Retire existing field(s) that are no longer needed: DEERMeasureID. When a field is "retired," it must be retained for years prior to PY2026, but need not be populated by measure package developers from then on.
- Revising existing field(s): replace FuelSubID with FuelID to reflect the replacement of the FuelSub table with the Fuel table in DEER.

1.2. DEER System and Measure Package Updates

This section describes updates to the DEER system encompassing any changes to policies that affect the eTRM and measure packages.

1.2.1. 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, measure package developers shall use the CPUC's Refrigerant Avoided Cost Calculator and Fuel Substitution Calculator (RACC-FSC_v3.0) that was released on April 22, 2024.[5] The same workbook shall also be used for 2026 measure package updates. The Avoided Costs Calculator (ACC) versions to be used are as described in Table 1-1.

Table 1-1. Avoided Cost Calculator Update Version for use with RACC-FSC_v3.0

Measure Package Update Type	ACC Version
New offering(s) added to existing approved measure package for PY2024-2025	ACC2022 values shall be used in RACC-FSC for new offering permutations, only
Mid-cycle updates to existing approved measure packages for PY2025	ACC2022 values shall be used for all permutations
Measure package updates for PY2026	ACC2024* values shall be used for all permutations
New measure packages for PY2026	

*As of the issuance of this document, the 2024 ACCs have not been finalized.

The RACC-FSC_v3.0 shall be used to calculate refrigerant leakage emissions and avoided costs of net refrigerant leakage emissions for all measures that involve adding or replacing equipment that uses refrigerant and involves a change to the refrigerant type or to the refrigerant charge[6]—these include most fuel substitution and electric resistance to heat pump measures. The completed RACC-FSC_v3.0—containing the relevant parameters associated with a given measure package—shall be provided as an addendum to each affected measure package in the eTRM. Guidance for how to do so is described in the "RACC-FSC Technical Guidance Document" that was issued along with the RACC-FSC_v3.0 workbook.

Since the RACC-FSC_v3.0 contains both the RACC and the FSC, Table 1-2 lays out which components are to be completed for various types of deemed measure packages and custom applications.

[5] Supporting Files - CEDARS (sound-data.com)
[6] Refrigerant charge describes the weight of the refrigerant contained within equipment, typically in pounds.

Table 1-2. Worksheets to be Completed Within the RACC-FSC_v3.0

Measure type	2 RACC	3 FSC
Efficiency rating differs between the measure, standard practice, and/or existing equipment cases (i.e., refrigerant type and amount is the same between the cases)	-	-
Type of refrigerant differs between or changes for the measure, standard practice, and/or existing equipment cases	X	Only for fuel-substitution measures
Amount (charge) of refrigerant differs between or changes for measure, standard practice, and/or existing equipment cases	X	
Claiming avoided emissions when refrigerant in existing equipment is recovered and documentation provided*	X	
Fuel substitution measure without refrigerant (e.g., induction range)	X	X

* Documentation requirements for claiming avoided emissions due to existing equipment refrigerant recovery may be considered in the future.

New measure offerings added to approved measure packages shall use the version of the RACC-FSC that is current at the time that the new offerings are being added—even when the measure package otherwise uses a former version of the *Deemed Measure RACC v2.2* and or the *Fuel Substitution Calculator v1.1*. Mid-cycle updates to existing measure packages shall use the version of the RACC-FSC that is current at the time that the measure package is submitted for Ex Ante Review.

The version of the RACC-FSC used for the new offerings shall be noted in the measure characterization narrative along with the date that the copies of the DEER tables embedded within said RACC-FSC were last synchronized with DEER. The DEER tables that are used by the RACC-FSC include those listed in **Error! Reference source not found.**.

Table 1-3. DEER Database Tables Used by RACC-FSC_v3.0

Schema	Table	Description
applic	BldgWts	This table contains the weights used to produce the counterfactual standard practice baseline for residential heat pumps that replace a gas furnace without room/window or ducted AC.
costeff	CARB_EPA_GWP_Limits*	This table contains the GWP limits established by either the California Air Resources Board (CARB) or the Environmental Protection Agency (EPA), depending upon which prevails in a given year.

Schema	Table	Description
	CARB_RefrigLeaks*	This table contains the refrigerant leakage rates established by the California Air Resources Board for a variety of sectors, building types, and applications.
	EUL_basis	This table contains the DEER-approved EULs and RULs for deemed measures.
	OtherRatesACC*	This table contains natural gas heat rates, source energy rates, methane leakage rates and adders, and PA-specific capital rates established for each ACC update.
	Refrigerant*	This table contains a list of refrigerants and their associated GWPs for 20- and 100-year horizons.[7]
	RefrigerantACC*	This table contains the avoided costs of refrigerant leakage, electric generation emissions rates, and source energy factors for each ACC update.
spt	RACC_FSC_InputTracker	This table contains a list of the changes made to the rest of the tables that are used by the RACC-FSC. This is used to ensure that the connected copies of the DEER tables stored within the submitted measure package addendum or custom application are current. This table is automatically refreshed each time the workbook is opened.
tech	TechType	This table contains the DEER-approved TechTypes for all deemed measures.

* Table was added to the DEER database in the first and second quarters of 2024.

Going forward, updates to the Refrigerant Avoided Cost Calculator are expected to occur in the DEER Update Resolution.[8]

1.2.2. Refrigerant Benefits/Costs for EULs Exceeding 20 Years

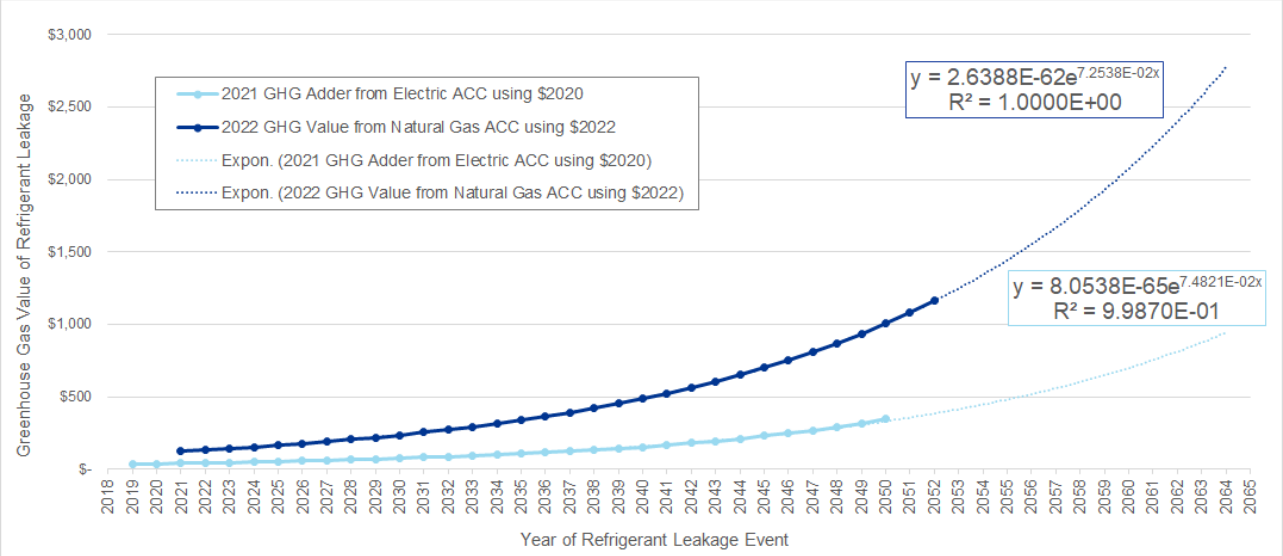
Effective Program Year: 2024-2026. The avoided refrigerant leakage emissions for accelerated replacement (AR) measure application types sometimes consider an end-of-life (EOL) refrigerant leakage event for the counterfactual standard practice equipment that occurs beyond the life of the measure. In these cases, it can be necessary to know the costs of those refrigerant emissions in years beyond the scope of the ACC updates. Since recent studies have found that some equipment

[7] Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report (AR4), 2007. (see https://www.ipcc.ch/assessment-report/ar4/.)
[8] "The staff proposal proposes, 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.)

categories have effective useful lives (EULs) that exceed 20 years, this can mean that an EOL refrigerant leakage event might occur more than 30 years beyond the date that the measure is installed. ACC updates, however, only forecast values for 30 years in the future. This presented a challenge for the RACC-FSC workbook to determine the monetary value of an EOL event more than 30 years in the future.

A plot of the annual costs of refrigerant emissions over the past two ACC updates shows that these costs increase at a fixed exponential rate over time as shown in Figure 1-1**Error! Reference source not found.**. Thus, it was decided that these values can reasonably be extrapolated beyond the bounds of the ACC update as needed. Since these greenhouse gas values of refrigerant leakage values will be added to the RefrigerantACC table in the DEER database following each ACC update, the extrapolated values for those years beyond the ACC will also be added to the table at the same time. (These extrapolated values for the 2022 ACCs have already been added to the RefrigerantACC table.)

Figure 1-1. Greenhouse Gas Value of Refrigerant Leakage



1.2.3. Water-Energy Nexus (WEN) Impacts

Effective Program Year: 2024. In December 2021, the CPUC released the new Water-Energy (W-E) Calculator 2.0.[9] On December 22, 2021, CPUC issued a guidance memo describing a short and long-term solution for how the embedded energy savings outputs of the W-E Calculator 2.0 are to be used. In 2023, the CET was updated to include a separate field for embedded water savings, the long-term solution, and allow for WEN measure packages to use the new CET functionality to accept the direct energy savings and embedded energy savings separately into the CET. The

[9] https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/energy-efficiency/water-energy-nexus-programs

embedded-water-energy savings are calculated following the same methodology described in the short-term solution, but the embedded energy savings are stored independently of the direct energy savings within the eTRM to facilitate reporting and cost-effectiveness calculations.

1.2.4. Lighting Baseline Updates

Effective Program Year: 2026. The integration of statewide lighting measure packages, which are based on the historic update of the Modified Lighting Calculator (MLC), has necessitated ongoing collaboration between custom and deemed CPUC staff. This coordination is being operationalized through the Lighting Working Group that has both custom and deemed representatives including representatives from all PAs including CalTF. The Lighting Working Group will perform a standard practice review to update the standard practice baseline. Additionally, one of the expected outcomes of the working group is to provide direction on the cadence and frequency of future baseline updates and how those updates will feed into the biennial cycle of the statewide lighting deemed measure package. Further guidance and communication will be shared with stakeholders as part of ongoing efforts of the working group.

1.2.5. Definition of Incentive and Rebate

Effective Program Year: 2024. Because the Standard Practice Manual (SPM) has made a distinction between rebates and incentives, and the policy results in a different mathematical treatment in the Cost Effectiveness Tool, it is important that we clearly define the terms and use them precisely.

D.08-07-006 discusses the rebates and incentives defined by the SPM and implemented in the cost effectiveness test calculations. Specifically, "the SPM defines the incentive (INC) term [used to calculate participant costs] very narrowly as the type of incentive that can be treated as a transfer payment in the SPM TRC 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 documentation, the values that are input to the INC term are referred to as rebates, i.e. "UnitEndUserRebate."

Decision D.08-07-006 goes on to state "In D.06-06-063, we reiterated the SPM definition of Program Administrator Cost (PAC) as any program expense except those program expenses that fit the narrow definition of a transfer payment incentive (INC) defined above. This means that the "non-transfer" incentive payments to midstream/upstream market actors and payments to contractors to deliver or install energy efficiency measures at customer premises are included in the PAC term. More specifically, under the utility "midstream/upstream programs," the utility pays incentives with program funds to manufacturers and distributors in order to buy down the retail price of energy efficiency measures or to stock efficient appliances. Under "direct-install programs," the utility arranges for measures to be either delivered to a participating customer for their

installation or to be installed at the customers' premises. As discussed in D.06-06-063, the definition of PAC includes all utility payments to these entities, i.e., to manufacturers, distributors, contractors, builders or energy service companies."

These types of payments should be referred to as costs or incentives and not be confused with the narrow definition of a rebate described above. CET Input Guide documentation refers to payments made to non-customers as incentives, i.e. "UnitIncentiveToOthers."

1.2.6. Clarification of Deemed Measure Cost Reporting to CEDARS

Effective Program Year: 2024. All measure costs should be reported to the Cost Effectiveness Tool (CET) for inclusion in the cost effectiveness tests. This includes customer copay for direct installed measures. CPUC Staff agrees with the following suggestions made in the "Cost Fact Sheet" by the CalTF:

- For Add-on Equipment (AOE), Building Weatherization (BW), Behavioral, Retrocommissioning, and Operational (BRO), and Accelerated Replacement (AR) (first baseline) Measure Application Types (MATs), Full Measure Cost (FMC) =

  Direct Install Labor + Direct Install Materials + Customer Co-pay. Direct Install Labor would be a fully loaded cost including installation contractor overhead costs.

- For Normal Replacement (NR), New Construction (NC), and AR (second baseline) MATs, Incremental Measure Cost (IMC) =

  (Direct Install Labor + Direct Install Materials + Customer Co-pay) – (Baseline labor + Baseline Materials).

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. From a CET perspective, it does not matter which administrative field the costs are entered into the ProgramCost.csv file. We recommend using DIInstallation and DIHardwareAndMaterials for direct installation programs where labor and materials cannot be assigned to a specific measure. Note, in these field names, DI stands for Direct Implementation which means there was direct contact with the customer, a broader context than Direct Installation, but still applicable to a direct install program.

1.2.7. Peak Load Definition

Effective Program Year: 2024. Resolution E-5152 DEER2023 Update made an inadvertent error in the definition of a heat wave, originally defined in D.06-06-063.[10] This change to DEER was ordered

[10] 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.

in Resolution E-4952 O.P.#1.[11] 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.

1.2.8. Vintage and Era definitions

Effective Program Year: 2026. Historically, many building vintages were modeled, each coinciding with a CA-Title 24 energy code release. As directed in the DEER2020 Update Resolution the outputs of these models were rolled up into eras using weights (from 2006 CEUS) representing the proportion of building stock for each vintage within the four eras: new, recent, existing, and old. An era is a collection of building vintages and is used to group buildings with similar energy use indexes[12] (EUIs). Producing a building model for each building vintage is costly in terms of energy model simulation time, quality control simulation review, and database storage space and two eras (recent and old) are rarely used.

With the switch to EnergyPlus building models, CPUC staff reduced the number of residential vintage models required by creating one model to represent all existing residential building stock. Details on our methods are noted in the Residential EnergyPlus Calibration Memo. That methodology is not available for commercial building models since the 2022 CEUS did not provide normalized energy consumption values (for calibration) as in the 2019 RASS study. Instead, we created representative existing commercial building prototypes using weighted building shell parameters (such as ceiling R-value) based on historical CA Title-24 values, and the afore mentioned building weights. Starting in PY2026 the recent and old building eras are removed, and the existing era represents all existing buildings. Table 1-4 shows the building eras that will be used going forward in PY2026.

Table 1-4. PY2026 residential and commercial building era and building vintage definitions

BldgVint	Year Built
Existing	<2026

[11] 232459122.PDF (ca.gov)
[12] A building EUI is the energy consumption per square foot of building area.

BldgVint	Year Built
New	≥2026

1.2.9. EnergyPlus Prototypes

Effective Program Year: 2026. The DEER prototypes (residential and commercial) have transitioned from a DOE2 based system to EnergyPlus building simulation models.[13] The new prototypes use Modelkit[14] to facilitate the building of input files and running batch simulation models. The entire system including post processing scripts are available on GitHub[15] for use in PY2026-27 measure updates. A User Guide posted on CEDARS[16] describes how to use the new prototype system. A new version of California Energy Efficiency code, 2025 Title-24, will be updated effective 1/1/2026. This new code should be used as the baseline for all modeled measures effective PY2026. Measure packages will use draft 2025 Title-24 values to update modeled measure baselines. If the draft 2025 Title-24 values do not get adopted or there are changes between the draft and final values, the impacted measure packages and their baselines will be updated prior to PY2026.

1.2.10. Load Shapes Updates

Effective Program Year 2028. The CPUC will develop and provide the methodology and tools for measure package developers to use to generate the Generalized Load Shape Parameters (GLSPs). GLSPs are comprised of 900 parameters that characterize the hourly load shape (8760) for a given measure package offering. The CPUC-developed tools and associated documentation to do so are expected to be made available at DEER Resources on CEDARS by 2025. Once the measure package developer has produced the GLSPs for each measure package offering or set of offerings,[17] these will be uploaded to the eTRM by the measure package developer and reviewed by the CPUC as a part of each measure package.

By June 2025, 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.

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[13] Commercial water heating measures, however, will continue to use the DEER Water Heater Calculator to determine energy usage and savings.
[14] *Modelkit* is a free and open-source, cross-platform framework for parametric building energy modeling. https://bigladdersoftware.com/projects/modelkit/
[15] https://github.com/sound-data/DEER-Prototypes-EnergyPlus
[16] https://cedars.sound-data.com/deer-resources/tools/energy-plus/file/3085/download
[17] 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.

1.2.11. 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. Please note that *SiteID* is not a replacement for end use or customer tracking data for evaluation purposes. As noted in Resolution E-5152, the site data in claims information will contain location and contact information for stores, contractors, or other service providers where the ultimate customer purchase occurs.[18]

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

This proposal sets forth the recommended 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 1-5 and Table 1-6**Error! Reference source not found.**.

Table 1-5. Tentative PY2026-2027 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	**Error! Reference source not found.**	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.
+ Per Draft Resolution release, adoption in Final Resolution.

Staff will work with PAs to set a prioritized schedule of updates for all PY2028-29 measure packages resulting from updates directed in Sections 1.5 and 2. 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 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 controversial measure packages can be submitted well before the standard three-month timeframe for review and approval

[18] Resolution E-5152, Attachment Section 5.1, pg. A-32

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.

Table 1-6 summarizes the measures presently planned for updates, when the PA-led research needs to be completed, and the deadline for measure package submittals.

Table 1-6. Timeline for DEER2028-2029 Measure Package Updates from PA-Led Research

End Use Category	Update Detail	Data Needed By	Measure Package Submittal By
HVAC (HC)	Performance curve research	2025-12-01	2026-03-31
	Refrigerant charge level research	2025-12-01	2026-03-31

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

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 adjustments include error corrections (i.e., PAs may still submit new measures during the cycle, but ex ante values adopted in DEER2026 will remain locked. Mid-cycle error corrections (i.e., correction of typographical, clerical errors, and other obvious, inadvertent errors and omissions) will be handled on a case-by-case basis with consideration for their impact to the portfolio. Per Resolution E-5152 these mid-cycle adjustments are further clarified as new measure package submittals, error corrections, or code and standard changes that occur and become effective during the mid-cycle period. New measures or offerings are effective upon approval. Changes to existing measures are effective 90 days after approval.

1.4.1. Codes and Standards

As discussed in Resolution E-5221, anticipated changes to codes and standards that occur mid-cycle shall be planned for by Portfolio Administrators (PAs). PAs will work with CPUC Staff and the ex-ante review team to document mid-cycle measure package revision timelines. ENERGY STAR® standards will be updated in 2025 and will affect the measures shown in Table 1-7.

Table 1-7. Measure packages affected by ENERGY STAR standards updates

Measure Package	Measure Package Title
SWAP003	Clothes Dryer, Residential
SWAP014	Heat Pump Clothes Dryer, Residential, Fuel Substitution

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. The measure packages that will be affected are listed in Table 1-8. The measure packages that are listed as only requiring updates to the Accelerated Replacement (AR) permutations are affected by standard updates that go into effect in 2028 or later. The measure packages that require updates to all of the permutations are affected by standard updates that go into effect as of 2026 or earlier.

Table 1-8. Measure packages affected by EPA refrigerant standards updates in 2025

Measure Package	Measure Package Title	Permutations
SWAP007-02	Room Air Conditioner, Residential	AR, if any
SWAP020-01	Portable Air Conditioner and Heat Pump, Residential	AR, if any
SWCR014-04	Medium or Low-Temperature Display Case	AR, if any
SWCR017-04	Ultra-Low Temperature Freezer	AR, if any
SWCR018-03	Reach-In Refrigerator or Freezer, Commercial	AR, if any
SWCR021-03	Medium or Low-Temperature Display Case with Doors	AR, if any
SWCR020-03	Medium-Temperature Open Display Case Retrofit	AR, if any
SWFS006-03	Ice Machine, Commercial	AR, if any
SWFS016-01	Refrigerated Chef Base	AR, if any
SWHC005-03	Water-Cooled Chiller	AR, if any
SWHC013-04	Unitary Air-Cooled Air Conditioner or Heat Pump, Under 65 kBtu/hr, Commercial	AR, if any
SWHC014-04	Unitary Air-Cooled Air Conditioner or Heat Pump, Under 65 kBtu/hr, Commercial	AR, if any
SWHC020-03	Air-Cooled Chiller	AR, if any
SWHC027-04	Package Terminal Air Conditioner or Heat Pump, Under 24 kBtu/hr	AR, if any
SWHC043-04	Multiple Capacity Unitary Air-Cooled Commercial Air Conditioners Between 65 and 240 kBtu/hr	AR, if any
SWHC044-04	Ductless HVAC, Residential, Fuel Substitution	All
SWHC045-03	Heat Pump HVAC, Residential, Fuel Substitution	All

Measure Package	Measure Package Title	Permutations
SWHC046-03	Packaged Heat Pump Air Conditioner Commercial, Fuel Substitution	All
SWHC052-02	Air-Cooled Chiller, Path B	AR, if any
SWHC049-04	SEER Rated AC and HP HVAC Equipment, Residential	AR, if any
SWRE003-03	Heat Pump Pool Heater, Residential, Fuel Substitution	AR, if any
SWSV014-01	Lifecycle Refrigerant Management, Residential	All

1.5. Structural Changes to DEER Tables

The changes listed in the subsections to follow will be made to the structures of some new and existing DEER database tables.

1.5.1. 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 1.5.2 was added.

1.5.2. 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 build a global exclusion table for the various types of *FuelID*s that have been established. Table 1-9 presents the *FuelID*s established to date.

Table 1-9. Options in *FuelID* Table for DEER2026

FuelID	Sector	Description
EE-Elec-Only	Any	Energy efficiency measure that uses only electricity
Exempt	Any	Add-on Equipment (AOE), Behavioral, Retrocommissioning, and Operational (BRO-Bhv, BRO-RCx, BRO-Op), or Building Weatherization (BW) measure that saves natural gas but does not burn natural gas (exempt measure)
Exempt-FuelSub-ToGas	Any	Fuel substitution measure that replaces electric-only equipment with natural gas-burning equipment and passes the fuel substitution test
None	Any	Codes & Standards or No Savings claims
Non-Exempt-EE-Gas-Existing	Any	Gas-burning, energy efficiency measure at existing building

FuelID	Sector	Description
Non-Exempt-EE-Gas-NC	Ag or Ind	Gas-burning, energy efficiency measure at new construction
Non-Exempt-EE-Gas-NC-NoViableElecAlt	Any	Gas-burning, energy efficiency measure that does not have a viable electric alternative
Non-Exempt-EE-Gas-Equity	Any	Gas-burning, energy efficiency measure offered through an equity program

Changes may still occur due to stakeholder feedback and pending policy updates.

1.5.3. Retiring Measure Table and Energy Impact Table

Effective Program Year: 2026. CPUC staff plans to retire these tables in the DEER database. 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 will no longer test the Measure IDs in the DEER database, but will rely solely on the eTRM's Measure Detail ID to validate claims.

1.5.4. Fields Added To and Removed From TechType Table

Effective Program Year: 2024. Several fields were added to the TechType table to support D.23-04-035 as shown in Table 1-10.

Table 1-10. Fields Added to TechType Table

Fieldname	Description
IsExempt	Boolean field to indicate if a given TechType is an exempt measure
HasElecAlt	Boolean field to indicate if a given TechType has an electric alternative
HasRefrigerant	Boolean field to indicate if a given TechType contains refrigerant
HasRefrigerantAlt	Boolean field to indicate if a given TechType has an electric alternative that contains refrigerant (e.g., electric-resistance clothes dryer)
IsWEN	Boolean field to indicate whether a given TechType saves water—and thus saves embedded energy—and is categorized as a Water Energy Nexus (WEN) measure
UsesElec	Boolean field to indicate whether a given TechType uses electricity
UsesGas	Boolean field to indicate whether a given TechType uses natural gas

A few fields were removed from the TechType table to lessen confusion as shown in Table 1-11.

Table 1-11. Fields Removed from TechType Table

Fieldname	Description	Reason for Removal
NormUnit	Field to define the normalizing unit (NormUnit) typically used by measures in a given TechType category	This field has caused confusion in the past.
defEULCode	Field to establish the default EUL_ID that is typically used for a measure in a given TechType category	This field has never been used and may be over-limiting.
State	Field to indicate whether a given TechType is "Standard" or "Proposed"	This field is duplicative of the "IsProposed" Boolean field.

1.5.5. 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.

2. Updates to DEER Support Table Values

The following changes to the DEER support table values are planned.

2.1. Updates to Net-to-Gross Table

Effective Program Year: 2024. The following NTG IDs are expired and no longer available for use. These NTG IDs will expire on October 15, 2024 according to the DEER database.

- All-Ltg-LED-WRR
- NonRes-Out-Ltg-LEDFixt
- Res-InCmn-Ltg-LEDFixt
- Res-OutCmn-Ltg-LEDFixt

2.2. Updates to Delivery Types

Effective Program Year: 2026. As indicated in Resolution E-5221, the Delivery Types shown in Table 2-1 shall be used.

Table 2-1. DEER2026 Delivery Types

Delivery Type	Change	Description of Delivery Type
Up-Manuf	Was UpDeemed[19]	Incentivizes an energy-efficient technology through a program administrator partnership with the manufacturer
Mid-Distr		Incentivizes an energy-efficient technology through a program administrator partnership with the distributor
Mid-Retail		Incentivizes an energy-efficient technology through a program administrator partnership with the retailer
Down	Was DnDeemed and DnCust	Incentivizes an energy-efficient technology or service to a participating customer for them to install or have installed
DI	Was DnDeemDI and DnCustDI	Incentivizes the installation of an energy-efficient technology or service at a customer property by a program implementer managed third-party contractor or installer
C&S	None	Codes and Standards (C&S advocacy and related programs)

[19] "Upstream (at the manufacturer level) and midstream (at the distributor or retailer level, but not the contractor or installer level) interventions are required to be delivered statewide. Some, but not all, downstream (at the customer level) approaches are also appropriate for statewide administration." D.16-08-019, O.P. 5, pp. 109-110

In 2026, the Upstream Flag used by CEDARS will no longer 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.

2.3. Updates to Measure Impact Types

Effective Program Year: 2026.[20] 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 Measure Impact Types will be consolidated as shown in Table 2-2.

Table 2-2. DEER2026 Measure Impact Types

Measure Impact Type	Description of Measure Impact Type
Cust-Gen	Custom Generic: generic, site-specific calculation or using approved tool or method and/or metered data (excluding NMEC, SEM, or RCT offerings)
Cust-NMEC-Pop	Population-level Normalized Metered Energy Consumption (NMEC) energy impacts are specified on a custom basis.
Cust-NMEC-Site	Site-level Normalized Metered Energy Consumption (NMEC) energy impacts are specified on a custom basis.
Cust-RCT	Custom RCT: uses a randomized-control trial (RCT) or experimental design method
Cust-SEM	Custom SEM: uses a strategic energy-management method
Deem	Deemed measure

2.4. Updates to EULs

2.4.1. EUL Update for Residential Population NMEC Behavioral Programs

Effective Program Year: 2026. Although not the direct result of an EM&V study, data was provided to Ex Ante Review by Pacific Gas & Electric that showed evidence of a population-level NMEC Residential Behavioral Program delivering measurable savings for two years. The first year of savings were evaluated for the 2019, 2020, and 2021 cohorts of participants and reported to have delivered 7.5%, 7.7%. and 6.7%, respectively, of electric savings and 6.1%, 3.4%, and 3.5% of gas savings.[21]

Since population NMEC behavioral projects may claim performance-based savings for the second year after installation based on a recurring 1-year behavioral EUL, changing the EUL in DEER is not needed.

[20] As indicated in **Error! Reference source not found.**, footnoted new MITs are needed for DEER2022 (retroactive to January 1, 2022).
[21] "CPUC Group A Impact Evaluation Report, Population-Based NMEC – Program Years 2019-2021," Dec. 22, 2023, CALMAC ID: CPU0365.01, pp. 4-5. (See: https://pda.energydataweb.com/#!/documents/3904/view.)

2.4.2. Residential Weatherization Measures

Effective Program Year: 2024. Documentation was submitted to Ex Ante Review to support the addition of the EUL_IDs and EULs as shown in Table 2-3.

Table 2-3. Residential Weatherization EULs

Measure	DEER2024 EUL_ID, year(s)
Residential solid-core wood door	BS-Door: 20.0
Residential door seals	BS-DoorSeals: 15.0
Residential door sweep	BS-DoorSweep: 5.0

2.4.3. Other Mid-cycle EUL Additions

Effective Program Year: 2023-2024. Documentation was submitted to Ex Ante Review to support the addition of the EUL_IDs and EULs as shown in Table 2-4. Some of these measures have not been approved yet.

Table 2-4. Mid-cycle EULs added to DEER

Measure	DEER2023 EUL_ID, year(s)
Residential fan controller for HVAC	HV-FanControl: 9.7
Commercial Patio Heater	Com-GasPatioHeater: 7.5
Commercial weather-based Irrigation Controller	Wtr-Irrig-Ctrl-Weather-Com: 3.0
Residential Toilet	Wtr-WaterFixt-Toilet-Res: 10.0
Commercial Toilet	Wtr-WaterFixt-Toilet-Com: 20.0
Commercial Urinal	Wtr-WaterFixt-Urinal: 20.0
Large Rotary Nozzle	Wtr-Irrig-Nozzle-LrgRot: 10.0
Soil Moisture Station	Wtr-Irrig-Ctrl-SoilMoist: 3.0
Residential Weather-based Irrigation Controller	Wtr-Irrig-Ctrl-Weather-Res: 3.0
Rotary Multi-Stream Nozzle	Wtr-Irrig-Nozzle-MultiStrm: 5.0
Turf Removal	Wtr-Irrig-TurfRemoval: 10.0

3. Research Needs for PY2028-29

The focus of future research 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 from case studies to a reliable sample or pilot evaluation that can be used to create a new measure. Beyond the baseline research and to support new measures, further research could support newer 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.

3.1. EnergyPlus Prototypes

The transition to EnergyPlus prototypes for residential and commercial measures has occurred as of April 2024. Upcoming prototype model improvements in order of priority include:

1. **Addressing Persistent Bugs in Prototype Models**: A few prototype models currently suffer from persistent bugs for specific measures and in specific climate zones. Our focus will be on identifying and fixing these issues. The purpose of doing so will be to improve model reliability and reduce the number of unmet hours[22] in affected models.
2. **Implementing Airflow Network Objects in Residential Models**: Our existing approach to modeling ducts and airflow in residential buildings involves an energy management system workaround. We plan to replace the workaround with airflow network objects within the residential models. This change is expected to enhance model accuracy, but it's essential to note that simulation time may increase significantly due to the added complexity. We will build in a control so the airflow network can be enabled only for measures requiring accurate duct simulations such as duct sealing measures.
3. **Enhancing Residential Model Parametrization:**[23] Our current residential models exhibit some discrepancies in terms of parametrization when compared to the parametrized commercial prototypes. To address this, we will enhance the parametrization of residential models. This adjustment aims to streamline model management and ensure coherence with the commercial prototypes. Currently, we have over 20 models representing just 3 prototype residential buildings, while we have a similar number of models for 26 commercial prototype buildings. By aligning the parametrization, we'll simplify maintenance and facilitate updates across all models.
4. **Developing a Robust Process for Model Testing**: As more users contribute through pull requests, evaluating and verifying model updates becomes crucial. We'll establish a consistent process for testing model changes. While this process doesn't need to be final, it should

[22] Unmet hours are a statistic reported by the E+ model for the number of hours that the HVAC system was not able to meet the building load. The number of unmet hours should be small.

[23] Parameterization is a process that allows a batch processer like Modelkit to change the value(s) of one or more parameters as it cycles through simulations. A parameter is any input to the model and a simple parameter is a single input such as ceiling insulation level. Using templates in Modelkit it is possible to parameterize complex model components such as HVAC type that has multiple input values.

allow us to systematically assess the impact of any modifications. Considering the various combinations of climates, vintages, building types, and measures, a robust testing process is essential.

5. **General Cleaning and Maintenance**: Although not of the utmost importance, we'll perform general cleaning and maintenance tasks. For instance, we'll identify and remove any unused parameters that clutter the models. While this won't directly impact simulation results, it contributes to overall model hygiene.

3.2. Research to Improve HVAC Refrigerant Charge Values

Since the avoided 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 passes 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. A study should answer the following research questions using product information from no fewer than three leading manufacturers of products sold in California:

1. Does the amount of refrigerant charge increase proportionally to the Cap-Tons for air conditioning equipment for all sizes? Should these be binned?
2. Does the amount of refrigerant charge increase proportionally to the Cap-kBtuh for HVAC heat pump equipment? Should these be binned?
3. Does the amount of refrigerant charge vary by efficiency tier?
4. Does the amount of refrigerant charge vary by refrigerant?

3.3. VRF Heat Pump and AC Performance Curves

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. We support this research and strongly recommend relying on independent lab-test data rather than manufacturer data to inform performance curves.

3.4. Improvements for Commercial Water Heater and Hot Water Measures

In the past year, DNV conducted literature and internet research to identify whether more recent hot water load profiles could be identified for commercial buildings. This effort did not identify any sources that would be better than those presently in use in the DEER Water Heater Calculator v5.1. The Ex Ante Review Team will revisit this effort once 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 be pursued for development. Pathways to migrating these commercial

measures into EnergyPlus that are currently modeled using the DEER Water Heater Calculator will be explored. New measures will also be developed using EnergyPlus templates in phases as follows:

1. Large central water heating measures
2. Small split-system heat pump water heating measures
3. Small unitary "one-to-one" water heating measures

4. Measure Adoption

This resolution will adopt and lock approved ex ante values contained in the measure packages for PY2026-2027 and mid-cycle change from PY2024-25. The list of measure packages with mid-cycle changes adopted and locked for PY2024-25 is listed in Appendix A1 and the list of measure packages adopted and locked for PY2026-27 is listed 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 this will be tracked with start and expiry dates of those measures in the eTRM.

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

4.1. Guidance from EUL studies

4.1.1. 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 following insulation measures for program years 2024-25 with the new EULs per O.P. 5 in D.23-04-035 and as shown in Table 4-1.

Table 4-1. EUL Results from 2023 Residential Insulation EUL Study

Measure	Existing EUL_ID, years	DEER2024 EUL_ID, years
Ceiling Insulation (SWBE006)	BS-CeilIns: 20.0	BS-CeilIns: 30.0
Wall Insulation, both blown-in and non-blown-in insulation (SWBE007)	BS-BlowInIns: 20.0 BS-WallIns: 20.0	BS-BlowInIns: 30.0 BS-WallIns: 30.0

4.1.2. 2023 Residential HVAC and Water Heating EUL Study updates

Effective Program Year: 2026. The 2023 Residential HVAC and Water Heating EUL Study seeks to update the EUL for fuel substitution HVAC and water heating measures. The study focuses on both measure case and baseline equipment EULs as shown in Table 4-2. The EULs established in this study should be formally adopted into the DEER2026 cycle if the final report recommends updating the EUL values[25].

[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

Table 4-2. EUL Results from 2023 Residential HVAC and Water Heating EUL Study

Measure	Existing EUL_ID, years	DEER2026 EUL_ID, years
Residential Heat Pump HVAC (Ductless and Central)	HV-ResHP: 15.0	HV-ResHP: 23.0
Residential Gas Furnace (Central and Wall)	HV-EffFurn: 20.0	HV-EffFurn: 30.0
Residential Heat Pump Water Heater	WtrHt-HtPmp: 10.0	WtrHt-HtPmp-Res: 20.0
Residential Gas Storage Water Heater	WtrHt-Res-Gas: 11.0	WtrHt-Res-Gas: 25.0
Residential Gas Tankless Water Heater	WtrHt-Instant-Res: 20.0	WtrHt-Instant-Res: 20.0

4.1.3. 2023 Commercial Measure EUL Study updates

Effective Program Year: 2026. The 2023 Commercial Measure EUL Study seeks to update the EUL for fuel substitution HVAC and water heating measures. The study focuses on both measure case and baseline equipment EULs as shown in Table 4-3. The EULs established in this study should be formally adopted into the DEER2026 cycle if the final report recommends updating the EUL values.

Table 4-3. EUL Results from 2023 Commercial HVAC and Water Heating EUL Study

Measure	Existing EUL_ID, years	DEER2026 EUL_ID, years
Commercial Heat Pump HVAC (Ductless and Central)	HVAC-airHP: 15.0	HVAC-airHP-Com: 20.0
Commercial Air Conditioner (packaged and split with gas heating)	HVAC-airAC: 15.0	HVAC-airAC: 20.0
Commercial Heat Pump Water Heater	WtrHt-HtPmp: 10.0	WtrHt-HtPmp-Com: 13.0
Commercial Gas Storage Water Heater	WtrHt-Com: 15.0	WtrHt-Com-Gas: 13.0
Commercial Gas Tankless Water Heater	WtrHt-Instant-Com: 20.0	WtrHt-Instant-Com: 20.0

4.2. Guidance from Other studies

4.2.1. Hard-to-Reach (HTR) Net-to-Gross Ratios

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 this study[26] found minimal evidence to support having different NTGRs for participants in direct install programs. For residential participants—both HTR and non-HTR—the NTGR was 0.89 and 0.87, respectively; for commercial participants, these were 0.65 and 0.71, respectively. No statistically significant difference was found between these pairs of results. For commercial participants, the results were less conclusive and had relative precision results that were outside of the targeted ±10%. The resulting updates in DEER are shown in Table 4-4.

Table 4-4. Recommended updates to NTG_IDs and NTGRs

Sector	Existing/Related NTG_IDs	Recommended Change	DEER2026 NTG_ID
Res	Res-Default>2: 0.55	Shall no longer be used for direct install programs	Res-Default-di: 0.90
	All-Default<=2yrs: 0.70		
	Res-Default-HTR-di: 0.85	Expire	
Com	Com-Default>2yrs: 0.60	Shall no longer be used for direct install programs	Com-Default-di: 0.70
	All-Default<=2yrs: 0.70		
	Com-Default-HTR-di: 0.85	Expire	

4.2.2. High-SEER Heat Pump and AC Performance Curves

Resolution E-5221 requested research to inform revised EnergyPlus performance curves for high SEER inverter-driven heat pumps. The study, titled "Adding SEER2 VCHP Offerings to DEER" and funded by SDG&E, was completed in November 2023. Although the study tried to obtain manufacturer performance data from a wide range of systems, they were only successful at getting sufficient information from two manufacturers: one product line from each. The authors developed performance curves from this data, and ultimately recommended one curve to represent all high-SEER equipment. The curves are very similar to the previous multispeed DEER curves for air conditioner performance (see Figure 4-1) but differ for heat pump performance (see

Figure 4-2.)[27] In the new curves heating capacity degrades by only 10% at 32 °F compared to the 20% degradation using the earlier curves. Although it may be true that heat pump heating

[26] "Group A Forward Looking Research: Cross-Program Net-to-Gross Ratios for Hard-to-Reach Customers DRAFT", May 2024.
[27] In the figures OEM stands for Original Equipment Manufacturer, and refers to the new curves developed in the SDG&E-funded study

performance has improved with the introduction of cold climate heat pumps in the past ten years, it is difficult to justify a change to the curves based on data from such a small number of systems.

Figure 4-1. Cooling performance curves at 75 °F indoor wet bulb

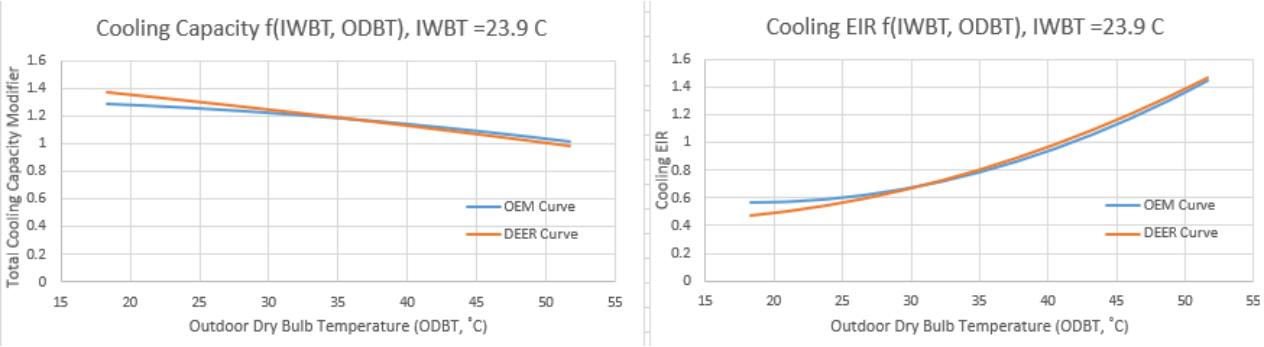
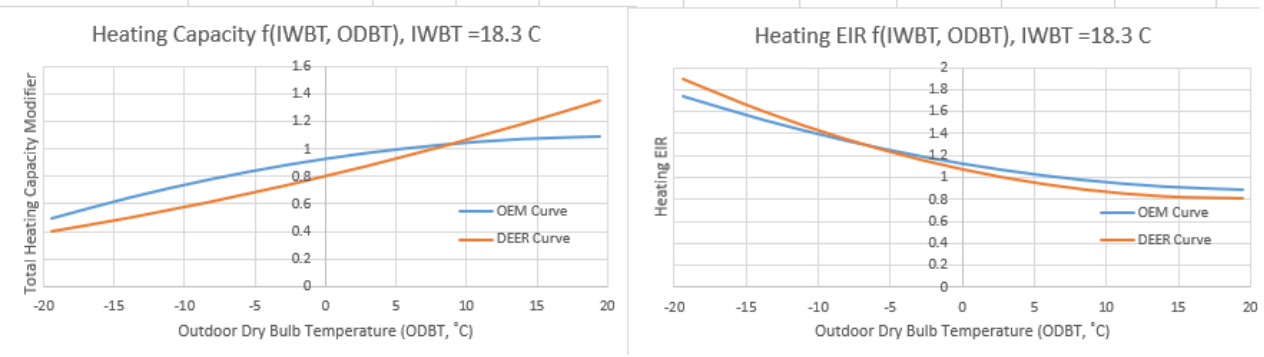


Figure 4-2. Heating performance curves at 65 °F indoor wet bulb



The previous DEER curves were based on a 2013 NREL report "Improved Modeling of Residential Air Conditioners and Heat Pumps for Energy Calculations." That report compared lab-test data to manufacturer-reported data and found the manufacturers extended performance table data to be unreliable. Therefore, the NREL report based its performance curves on AHRI 210/240 laboratory testing of 460 air conditioner and heat pump systems. Because this older study uses a much more robust dataset, we cannot justify a change to the performance curves based on potentially unreliable manufacturer-reported data from only eight systems.

Although we don't recommend updating the performance curves at this time, we do agree with the study's other recommendations. Variable compressor systems should be modeled using the MULTISPEED function in EnergyPlus, setting the number of compressor speeds to 4, and using no cycling losses for speeds 4, 3, and 2. This represents a 4:1 turn-down ratio which was determined for the eight system in this study based on AHRI 210/240 data from the Northeast Energy Efficiency Partnership's (NEEP's) cold climate air source heat pump (ccASHP) database.

The study also recommends, and we agree, that measure packages include program requirements intended to ensure that the new offerings function correctly.

1. Require the OEM-recommended controls and thermostats.
2. Outdoor units must be considered 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).
3. If high efficiency AHU offerings are pursued, consider performance requirements such as an ECM or ≥3 fan speed settings.

4.2.3. Boiler Compliance with Condensation of Exhaust Gases and the Associated Energy Efficiency Assumptions

Resolution E-5221 requested research to inform updates to measure packages consisting of condensing boilers. For a boiler to run in condensing mode, the return water temperature must be below 140 °F. 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. The study yielded the following key findings:

- The hot water return temperature must be below 130 °F for condensing boilers to start operating in condensing mode. To achieve the system's peak or advertised efficiency (e.g., 97% efficiency), a much lower return temperature will be needed.
- Supply hot-water temperatures for condensing boiler systems should not exceed 140 °F in order to achieve the low return-water temperature.
- For retrofit projects (replacing boilers only), it is likely that most of the existing end use equipment (e.g., heating coils, radiators, etc.) is not designed for low supply temperatures but is typically designed for a supply temperature of 180 °F. As such, it is very likely that end-user equipment will most likely need to be upgraded or go through extensive commissioning for the new condensing boilers to operate in condensing mode.
- Condensing boilers in retrofit systems are expected to operate in condensing mode less than 50% of the time. New construction systems can be expected to condense greater than 90% of the time given that they are designed for condensing operation.
- Boiler outside-air reset control is a standard feature with condensing boilers. 2022 CA Title 24 code requires new hydronic systems larger than 500,000 Btu/h to include reset temperature control. Typical boiler reset temperature has a delta-T range of 20 °F – 60 °F.

4.3. Guidance from 2023 EM&V Review

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. The current evaluation is focused on PY2021 and PY2022 claims. Final study results informed the rest of the values provided in the tables that follow.

Studies impacting the measure packages:

- PY2021 MCE Impact Evaluation Final Report
- Program Year 2021 Residential Energy Efficiency Impact Evaluation
- CPUC Group A Residential Direct Install Program Final Impact Evaluation - Program Year 2021

Studies not impacting the measure packages:

- Comfortably California HVAC Statewide Third-Party Program Evaluation, Program Year 2021
- Foodservice Instant Rebates Statewide Third-Party Program Evaluation, Program Year 2021
- CPUC Group A Local Third-Party Programs PY2021 - Final Impact Evaluation Report
- Local Third-Party Programs Impact Evaluation, Program Year 2022
- Regional Energy Network Evaluation, Program Year 2022
- Third-Party Commercial Programs Impact Evaluation Program Year 2022

CPUC staff has examined the 2022 EM&V draft and final impact evaluation reports and other studies to identify findings that may result in updates to deemed measure parameters and/or savings estimation approaches.

The list of studies reviewed is provided in Table 4-54-5 along with links to where they are stored on the Energy Project Status Reporting System. Also, a complete list of the studies to consider is provided in Appendix E of the CPUC's 2019-2021 EM&V Plan and the Energy Project Status Reporting System.[28]

[28] https://psr.energydataweb.com/#!/project-status

Table 4-5. Final and Draft EM&V Studies Reviewed

Study	Study Title (with link)	Evaluated PY2021 or PY2022 Measures
1	Comfortably California HVAC Statewide Third-Party Program Evaluation, Program Year 2021	SWHC001 – Wall Furnace, Residential SWHC004 – Space Heating Boiler, Commercial & Multifamily SWHC013 – Unitary Air-Cooled Air Conditioner Over 65 kBtu/hr, Commercial SWHC014 – Unitary Air-Cooled Air Conditioner or HP Under 65 kBtu/hr, Commercial SWHC031 – Furnace, Residential SWHC049 – SEER Rated AC and HP HVAC Equipment, Residential
2	Foodservice Instant Rebates Statewide Third-Party Program Evaluation, Program Year 2021	SWCR017 – Ultra-Low Temperature Freezer, Commercial SWCR018 – Reach-In Refrigerator or Freezer, Commercial SWFS001 – Convection Oven, Commercial SWFS002 – Door-Type Dishwasher, Commercial SWFS003 – Combination Oven, Commercial SWFS004 – Griddle, Commercial SWFS005 – Steamer, Commercial SWFS006 – Ice Machine, Commercial SWFS007 – Insulated Hot Food Holding Cabinet, Commercial SWFS009 – Deck Oven, Electric, Commercial SWFS011 – Fryer, Commercial SWFS012 – Exhaust Hood Demand Controlled Ventilation, Commercial SWFS014 – Rack Oven, Gas, Commercial SWFS017 – Automatic Conveyor Broiler, Commercial SWFS018 – Undercounter Dishwasher, Commercial SWFS019 – Underfired Broiler, Commercial
3	MCE Impact Evaluation Final Report, Program Year 2021	SWLG009 – LED, Tube, Type A

Study	Study Title (with link)	Evaluated PY2021 or PY2022 Measures
4	Residential Energy Efficiency Impact Evaluation, Program Year 2021	SWAP003 – Clothes Dryer, Residential SWAP004 – Clothes Washer, Residential SWHC001 – Wall Furnace, Residential SWHC031 – Furnace, Residential SWHC039 – Smart Thermostat, Residential SWHC047 – Gas Fireplace, Residential SWRE004 – Pool Heater, Residential SWSV001 – Duct Seal, Residential SWWH002 – Low-Flow Showerhead, Residential SWWH010 – Boiler, Multifamily SWWH012 – Storage Water Heater, Residential SWWH013 – Tankless Water Heater, Residential
5	Residential Direct Install Program Impact Evaluation, Program Year 2021	SWHC029 – Fan Controller for Air Conditioner, Residential SWHC038 – Brushless Fan Motor Replacement, Residential SWHC039 – Smart Thermostat, Residential SWSV001 – Duct Seal, Residential SWSV006 – Refrigerant Charge Adjustment, Residential SWWH001 – Faucet Aerator, Residential

Study	Study Title (with link)	Evaluated PY2021 or PY2022 Measures
6	Local Third Party Programs Impact Evaluation, Program Year 2021	SWAP012 – Gas Dryer Modulating Valve, Commercial and Multifamily SWHC002 – Intermittent Pilot Light, Residential SWHC029 – Fan Controller for Air Conditioner, Residential SWHC031 – Furnace, Residential SWHC038 – Brushless Fan Motor Replacement, Residential SWHC039 – Smart Thermostat, Residential SWLG009 – LED, Tube, Type A SWPR003 – Steam Trap, Commercial SWSV001 – Duct Seal, Residential SWSV006 – Refrigerant Charge Adjustment SWSV007 – Condenser Coil Cleaning, Residential SWSV009 – Airflow Adjustment, Residential SWWH001 – Faucet Aerator, Residential SWWH002 – Low-Flow Showerhead, Residential SWWH003 – TSV with and without an Integrated Low-Flow Showerhead, Residential SWWH006 – Tankless Water Heater, Commercial SWWH013 – Tankless Water Heater, Residential SWWH015 – Demand Control for Centralized Water Heater Recirculation Pump, Multifamily & Commercial SWWH016 – Domestic Hot Water Loop Temperature Controller, Multifamily & Commercial SWWH017 – Hot Water Pipe Insulation, Nonresidential & Multifamily SWWH018 – Hot Water Tank Insulation, Nonresidential & Multifamily SWWH020 – Low-Flow Showerhead, Commercial SWWH023 – Diverting Tub Spout with TSV, Residential SWWH026 – Water Heater Pipe Wrap, Residential SWWH027 – Heat Pump Water Heater, Commercial, Fuel Substitution
7	Southern California Edison's Plug Load and Appliance Program, Program Year 2021	SWHC044 – Ductless HVAC, Residential, Fuel Substitution SWHC045 – Heat Pump HVAC, Residential, Fuel Substitution SWHC050 – Ductless Heat Pump, Residential SWWH025 – Heat Pump Water Heater, Residential, Fuel Substitution

Study	Study Title (with link)	Evaluated PY2021 or PY2022 Measures
8	Local Third Party Programs Impact Evaluation, Program Year 2022	SWAP012 – Gas Dryer Modulating Valve, Commercial and Multifamily SWCR018 – Reach-In Refrigerator or Freezer, Commercial SWFS003 – Combination Oven, Commercial SWFS006 – Ice Machine, Commercial SWHC029 – Fan Controller for Air Conditioner, Residential SWHC038 – Brushless Fan Motor Replacement, Residential SWHC039 – Smart Thermostat, Residential SWLG009 – LED, Tube, Type A SWLG018 – LED, Tube, Type B and C SWPR003 – Steam Trap, Commercial SWSV001 – Duct Seal, Residential SWWH001 – Faucet Aerator, Residential SWWH002 – Low-Flow Showerhead, Residential SWWH003 – TSV with and without an Integrated Low-Flow Showerhead, Residential SWWH006 – Tankless Water Heater, Commercial SWWH013 – Tankless Water Heater, Residential SWWH015 – Demand Control for Centralized Water Heater Recirculation Pump, Multifamily & Commercial SWWH016 – Domestic Hot Water Loop Temperature Controller, Multifamily & Commercial SWWH017 – Hot Water Pipe Insulation, Nonresidential & Multifamily SWWH018 – Hot Water Tank Insulation, Nonresidential & Multifamily SWWH023 – Diverting Tub Spout with TSV, Residential SWWH025 – Heat Pump Water Heater, Residential, Fuel Substitution SWWH026 – Water Heater Pipe Wrap, Residential SWWH027 – Heat Pump Water Heater, Commercial, Fuel Substitution SWWH028 – Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution SWWH031 – Heat Pump Water Heater, Commercial

Study	Study Title (with link)	Evaluated PY2021 or PY2022 Measures
9	Regional Energy Networks Evaluation, Program Year 2022*	SWAP004 – Clothes Washer, Residential SWAP006 – Dishwasher, Residential SWAP010 – Smart Connected Power Strip SWAP013 – Cooking Appliances, Residential, Fuel Substitution SWAP014 – Heat Pump Clothes Dryer, Residential, Fuel Substitution SWBE006 – Ceiling Insulation, Residential SWBE007 – Wall Insulation, Residential SWHC005 – Water-Cooled Chiller SWHC031 – Furnace, Residential SWHC039 – Smart Thermostat, Residential SWHC044 – Ductless HVAC, Residential, Fuel Substitution SWHC045 – Heat Pump HVAC, Residential, Fuel Substitution SWHC049 – SEER Rated AC and HP HVAC Equipment, Residential SWRE003 – Heater for Pool or Spa, Commercial and Multifamily SWSV001 – Duct Seal, Residential SWWH001 – Faucet Aerator, Residential SWWH002 – Low-Flow Showerhead, Residential SWWH012 – Storage Water Heater, Residential SWWH013 – Tankless Water Heater, Residential SWWH014 – Heat Pump Water Heater, Residential SWWH015 – Demand Control for Centralized Water Heater Recirculation Pump, Multifamily & Commercial SWWH017 – Hot Water Pipe Insulation, Nonresidential & Multifamily SWWH025 – Heat Pump Water Heater, Residential, Fuel Substitution

Study	Study Title (with link)	Evaluated PY2021 or PY2022 Measures
10	Third-Party Commercial Program Evaluation, Program Year 2022	SWCR001 – Anti-Sweat Heater Controls SWCR004 – ECM Retrofit for a Walk-in Cooler or Freezer SWCR005 – Auto Closer for Refrigerated Storage Door SWCR015 – Medium-Temperature Case Doors SWHC027 – Package Terminal Air-Conditioner or Heat Pump, Under 24 kBtu/hr SWHC042 – Evaporative Pre-Cooler System and Controls for Packaged HVAC Unit SWLG009 – LED, Tube SWLG011 – LED, High or Low Bay SWLG018 – LED, Tube, Type B and Type C SWWH027 – Heat Pump Water Heater, Commercial, Fuel Substitution SWWH028 – Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution SWWH031 – Heat Pump Water Heater, Commercial

A summary of the recommended updates to gross unit energy savings (UES), and NTGRs resulting from PY2021 and PY2022 impact evaluations is provided in Table 4-6 and Table 4-7, respectively.

Table 4-6. Proposed UES Parameter Updates Based on EM&V Studies

Study	Measure	Previous UES	DEER2026 UES
5	SWHC039 - Smart Thermostat, Residential	Varies	Low GRR indicates further investigation
	SWHC029 – Fan Controller for Air Conditioner, Residential	Varies	Revise baseline
	SWHC038 – Brushless Fan Motor Replacement, Residential	Varies	Revise methodology
	SWWH001 – Faucet Aerator, Residential	Varies	Revise assumptions

Table 4-7. NTGR Parameter Updates Based on Final and Draft EM&V Studies

Study	Measure	DEER2024 NTGR	Evaluated NTGR	DEER2026 NTGR
5	SWHC029 – Fan Controller for Air Conditioner, Residential	0.88	0.76	0.75
	SWHC038 – Brushless Fan Motor Replacement, Residential	0.85	0.86	0.85
	SWHC039 – Smart Thermostat, Residential (Direct Install only)	0.95	0.83	0.85
	SWSV001 – Duct Seal, Residential	0.95	0.91	0.90
	SWWH001 – Faucet Aerator, Residential	0.59	0.81	0.80
	SWWH002 – Low-Flow Showerhead, Residential	0.70	0.81	0.80

4.3.1. MCE Impact Evaluation Final Report, Program Year 2021

The MCE Impact Evaluation reviewed various program delivery types including the Commercial Efficiency Market (CEM) program. CEM is a Normalized Metered Energy Consumption (NMEC) program that pays aggregators a variable rate based on the time during which participants save electricity. The evaluation was conducted during the early stages of implementation and early feedback shows program influence on project expansion. Projects should continue to document accelerated replacement (AR) conditions and follow both custom (Resolution E-5115) and deemed guidance.[29] Key findings include the update of hours of use (HOU) estimates to DEER and MLC values leading to changes to the UES values for LED Tube, Type A installations as shown in Table 4-8. The evaluation verified the nonresidential LED tube NTG of 0.70 that currently exists in DEER under the 'NonRes-sAll-mLtg-TLEDLamp-dn' NTG_ID.

Table 4-8. Evaluated Hours of Use Results

Measure	Existing DEER Annual Operating Hours	Evaluated Annual Operating Hours	Existing DEER Coincidence Factor	Evaluated Coincidence Factor
LED, Tube, Type A	2,688	2,099	0.350	0.277

[29] Preponderance of Evidence Requirements for Accelerated Replacement of Deemed Measures, https://cedars.sound-data.com/deer-resources/deemed-measure-packages/guidance/file/3060/download

4.3.2. Program Year 2021 Residential Energy Efficiency Impact Evaluation

This study evaluated the impacts of Southern California Gas Company's Residential Energy Efficiency Program administered in program year 2021, which provides incentives for customers adopting efficient gas appliances in single-family and multi-family existing buildings, as well as residential new constructions applications. The vast majority (82%) of savings claimed from this program came from tankless water heating measures, mostly in single-family and residential new construction applications. The evaluation found that the claimed tankless water measures were meeting expectations for gross energy impacts (net attribution was not studied) with a GRR ranging between 100 and 103%. A notable finding from the evaluation survey effort was a lower hot water setpoint temperature of 120/122 °F relative to the measure package value of 135 °F.

4.3.3. Residential Direct Install Program Impact Evaluation, Program Year 2021

This study determined measure-level gross realization rates, net-to-gross ratios, and evaluated program delivery performance for the residential direct install programs in PY2021. For these direct install programs, the NTG ratios are all higher than those claimed through the program, and we recommend making changes to the DEER2026 direct install NTGRs for these measures. The NTG ratio findings are summarized below in Table 4-9.

Table 4-9. Evaluated NTGR Findings

Measure	Claimed NTGR (electric/gas)	Evaluated NTGR (electric/gas)	DEER2026 NTGR
SWHC029 – Fan Controller for Air Conditioner, Residential 'Res-sAll-mHVAC-FanCtrl-di'	0.69	0.76	0.75
SWHC038 – Brushless Fan Motor Replacement, Residential 'Res-sAll-mHVAC-FanMotor'	0.64/0.70	0.85/0.86	0.85
SWHC039 – Smart Thermostat, Residential 'Res-sAll-mHVAC-SCT-di'	0.90	0.83	0.85
SWSV001 – Duct Seal, Residential 'Res-sAll-mHVAC-DuctSeal'	0.57/0.56	0.87/0.94	0.90
SWWH001 – Faucet Aerator, Residential 'Res-mDHWaerator'	0.66	0.81	0.80
SWWH002 – Low-Flow Showerhead, Residential 'Res-sAll-mDHWshwr'	0.66	0.81	0.80

The study found low gross realization rates for smart thermostats, fan motor replacements, and fan motor controls. Based on the study findings, we recommend that the underlying measure savings assumptions be re-evaluated for PY2026 revisions to these measure packages. The following assumptions should be re-assessed:

- SWHC029 – Fan Controller for Air Conditioner, Residential: the continued low gross realization for this measure suggests that the savings need further revision.
- SWHC038 – Brushless Fan Motor Replacement, Residential: the baseline fan motor efficiency is based on a 15-year-old study.
- SWHC029 – Fan Controller for Air Conditioner, Residential: review the savings methodology and underlying data since this measure has a low realization rate and is based on a 2012 SCE study.
- SWWH001 – Faucet Aerator, Residential: the assumptions of hot water consumption or change in flow rate should be investigated and corrected if necessary.

Appendices

DEER2026 Scoping Document

Contents

A1. 2024-2025 Mid-Cycle Measures

Expected mid-cycle updates are listed in Table A1.1. 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 below 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.

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	EnergyStar Standard	2025	SCG
SWAP014-04	Heat Pump Clothes Dryer, Residential, Fuel Substitution	EnergyStar Standard	2025	SCE
SWHC014-05	Unitary Air-Cooled Air Conditioner or Heat Pump, Under 65 kBtu/hr, Commercial	Federal Standard	2025	SDG&E
SWHC044-05	Ductless HVAC, Residential, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWHC045-04	Heat Pump HVAC, Residential, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWHC046-04	Packaged Heat Pump Air Conditioner, Commercial, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWRE005-04	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
SWWH014-06	Heat Pump Water Heater, Residential	CARB Refrigerant Standard	2025	SCE
SWWH025-08	Heat Pump Water Heater, Residential, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWWH027-05	Heat Pump Water Heater, Commercial, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWWH028-04	Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution	CARB Refrigerant Standard	2025	SCE
SWWH031-04	Heat Pump Water Heater, Commercial	CARB Refrigerant Standard	2025	SCE

A2. PY2026-27 Measures

The list provided in Table A2.1 is preliminary and will be updated in the future; it is current as of this document. The table will be updated with the draft Resolution.

Table A2.1. DEER2026-27 Measure Package Updates

Measure Package ID	Measure Name	Program Year	Lead IOU
SWAP001-07	Refrigerator or Freezer, Residential	2026	SDGE
SWAP003-06*	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	Residential Cooking Appliances, Fuel Substitution	2026	SCE
SWAP014-05*	Heat Pump Clothes Dryer, Residential, Fuel Substitution	2026	SCE
SWAP015-04	Induction Cooking Top with or without Electric Range, 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

Measure Package ID	Measure Name	Program Year	Lead IOU
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	Commercial Convection Oven – Electric & Gas	2026	SCG
SWFS002-05	Door Type Dishwasher, Commercial	2026	SCG
SWFS003-05	Combination Oven, Commercial	2026	SCG
SWFS004-04	Griddle, Commercial	2026	SCG
SWFS005-06	Steamer, Commercial	2026	SCG
SWFS006-05	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	SCG
SWFS013-04	Low-Flow Pre-Rinse Spray Valve	2026	SCG
SWFS014-04	Rack Oven	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
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
SWHC005-04	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

Measure Package ID	Measure Name	Program Year	Lead IOU
SWHC009-05	Supply Fan Controls, Commercial	2026	SDGE
SWHC012-04	Classroom HVAC Occupancy Sensor	2026	SCE
SWHC013-05	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
SWHC018-05	VSD for HVAC Fan Controls, Commercial	2026	PG&E
SWHC020-04	Air Cooled Chiller	2026	SDGE
SWHC023-05	Enhanced Ventilation for Packaged HVAC	2026	PG&E
SWHC024-05	Cogged V-Belt for HVAC Fan, Commercial	2026	SCE
SWHC027-05	Package Terminal Air Conditioner or Heat Pump, Under 24 kBtu/hr	2026	SDGE
SWHC030-05	Whole House Fan, Residential (will be sunset and resubmitted as a new measure)	2026	SCE
SWHC031-04	Furnace, Residential	2026	SCG
SWHC038-05	Brushless Fan Motor Replacement, Residential	2026	SCE
SWHC039-08	Smart Thermostat, Residential	2026	SCE
SWHC041-06	Software-Controlled Switch Reluctance Motor	2026	SCE
SWHC043-05	Multiple Capacity Unitary Air-Cooled Commercial Air Conditioners Between 65 and 240 kBtu/hr	2026	SDGE
SWHC044-06	Ductless HVAC, Residential, Fuel Substitution	2026	SCE
SWHC045-05	Heat Pump HVAC, Residential, Fuel Substitution	2026	SCE
SWHC046-05	Packaged Heat Pump Air Conditioner, Commercial, Fuel Substitution	2026	SCE
SWHC047-05	Gas Fireplace, Residential	2026	SCG
SWHC049-05	SEER Rated AC and HP HVAC Equipment, Residential	2026	SDGE
SWHC050-05	Ductless Heat Pump, Residential	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	Pool Heater, Commercial	2026	SCG
SWRE004-04	Pool or Spa Heater, Residential	2026	SCG
SWRE005-05	Heat Pump Pool Heater, Residential - Fuel Substitution	2026	SCE

Measure Package ID	Measure Name	Program Year	Lead IOU
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
SWWB008-04	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 Low Flow Showerhead	2026	SCG
SWWH004-04	Laminar Flow Restrictor	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
SWWH014-07	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	Tub Spout TSV	2026	SCG
SWWH025-09	Heat Pump Water Heater, Residential, Fuel Substitution	2026	SCE
SWWH026-04	Water Heater Pipe Wrap, Residential	2026	SCG
SWWH027-06	Heat Pump Water Heater, Commercial, Fuel Substitution	2026	SCE
SWWH028-05	Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution	2026	SCE

Measure Package ID	Measure Name	Program Year	Lead IOU
SWWH031-05	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	PG&E
SWWP005-04	Enhanced VFD on Irrigation Pump	2026	PG&E

*Measure package is expected to change mid-cycle due to update to ENERGY STAR requirements.

A3. Dispositions

The list of 2021 dispositions that will impact PY 2023 and PY 2024 measure packages is listed in Table A3.1. These documents can be downloaded from the DEER Module on CEDARS.[30]

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	2023-06-10	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. The disposition corrected savings values for the central multifamily offerings using EnergyPlus prototype models.
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.

[30] https://cedars.sound-data.com/deer-resources/deemed-measure-packages/dispositions/

Measure ID	Title	Date	Summary of Direction
SWWH028-04	Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution	2023-06-10	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. The disposition corrected savings values for the central multifamily offerings using EnergyPlus prototype models.
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.
SWWH028-02	Large Heat Pump Water Heater, Commercial & Multifamily, Fuel Substitution	2022-10-19	Disposition approves the statewide measure package Large Heat Pump Water Heater, Commercial & Multifamily, Fuel Substitution: SWWH028-02 to be effective on January 1, 2023. The program administrators are directed to submit the incremental measure cost (IMC) addendum when the cost of the rebate exceeds the IMC. The measure package will continue to update the Refrigerant Avoided Cost Calculator (RACC) and align with DEER Water Heater Calculator updates.

Measure ID	Title	Date	Summary of Direction
SWWH028-04	Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution	2023-06-10	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. The disposition corrected savings values for the central multifamily offerings using EnergyPlus prototype models.
SWWH027-03	Heat Pump Water Heater, Commercial, Fuel Substitution	2021-06-11	Disposition approves the statewide measure package Heat Pump Water Heater, Commercial, Fuel Substitution: SWWH027-03 to be effective on January 1, 2023. The program administrators are directed to submit the incremental measure cost (IMC) addendum when the cost of the rebate exceeds the IMC. The measure package will continue to update the Refrigerant Avoided Cost Calculator (RACC) and align with DEER Water Heater Calculator updates.
SWWH025-05	Heat Pump Water Heater, Residential, Fuel Substitution	2022-10-14	Disposition approves the statewide measure package Heat Pump Water Heater, Commercial, Fuel Substitution: SWWH025-05 to be effective on January 1, 2023. The program administrators are directed to submit the incremental measure cost (IMC) addendum when the cost of the rebate exceeds the IMC. The measure package will continue to update the Refrigerant Avoided Cost Calculator (RACC).
SWAP014-02	Heat Pump Clothes Dryer, Residential, Fuel Substitution	2022-10-12	Disposition approves the statewide measure package Heat Pump Clothes Dryer, Residential, Fuel Substitution: SWAP014-02 to be effective on January 1, 2023. The measure package will continue to update the Refrigerant Avoided Cost Calculator (RACC).

Measure ID	Title	Date	Summary of Direction
SWWH028-04	Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution	2023-06-10	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. The disposition corrected savings values for the central multifamily offerings using EnergyPlus prototype models.
SWHC046-02	Packaged Heat Pump Air Conditioner, Commercial, Fuel Substitution	2022-09-12	Disposition approves the statewide measure package Packaged Heat Pump Air Conditioner, Commercial, Fuel Substitution: SWHC046-02 to be effective on January 1, 2023. The measure package will continue to update the Refrigerant Avoided Cost Calculator (RACC).
SWRE005-02	Heat Pump Pool Heater, Residential, Fuel Substitution	2022-09-01	Disposition approves the statewide measure package Heat Pump Pool Heater, Residential, Fuel Substitution: SWRE005-02 to be effective on January 1, 2023. This measure package will continue to update the Refrigerant Avoided Cost Calculator (RACC).

A4. Measure Package Guidance

Table A4.1 lists the guidance released since the last DEER Resolution that informs PY2026-2027 Measure Updates. These documents can be downloaded from CEDARS at https://cedars.sound-data.com/deer-resources/deemed-measure-packages/guidance/.

Table A4.1. Measure Package Guidance for PY2026-27

Date	Title (linked to full document)	Summary
2024-06-28	New Construction MAT Definition	This guidance clarifies the definition of the New Construction (NC) Measure Application Type (MAT), specifically differentiating between NC and Normal Replacement (NR).
2024-06-06	Direct Install Delivery Type Description	This guidance 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 Total Resource Cost (TRC).
2024-05-16	Rebate Greater than IMC – Revised CPUC Guidance	This guidance 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
2024-06-28	New Construction MAT Definition	This guidance clarifies the definition of the New Construction (NC) Measure Application Type (MAT), specifically differentiating between NC and Normal Replacement (NR).
2024-06-06	Direct Install Delivery Type Description	This guidance 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 Total Resource Cost (TRC).
2024-05-16	Rebate Greater than IMC – Revised CPUC Guidance	This guidance clarifies the instances, reasons, and documentation required when the rebate to the customer exceeds the Incremental Measure Cost (IMC).
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.

Date	Title (linked to full document)	Summary
2024-06-28	New Construction MAT Definition	This guidance clarifies the definition of the New Construction (NC) Measure Application Type (MAT), specifically differentiating between NC and Normal Replacement (NR).
2024-06-06	Direct Install Delivery Type Description	This guidance 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 Total Resource Cost (TRC).
2024-05-16	Rebate Greater than IMC – Revised CPUC Guidance	This guidance clarifies the instances, reasons, and documentation required when the rebate to the customer exceeds the Incremental Measure Cost (IMC).
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.
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.

Date	Title (linked to full document)	Summary
2024-06-28	New Construction MAT Definition	This guidance clarifies the definition of the New Construction (NC) Measure Application Type (MAT), specifically differentiating between NC and Normal Replacement (NR).
2024-06-06	Direct Install Delivery Type Description	This guidance 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 Total Resource Cost (TRC).
2024-05-16	Rebate Greater than IMC – Revised CPUC Guidance	This guidance clarifies the instances, reasons, and documentation required when the rebate to the customer exceeds the Incremental Measure Cost (IMC).
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.
TBD	Direct Install Description Clarification	This guidance documents clarifies the definition of the direct install (DI) delivery type. The memo also details reporting and cost-effectiveness metrics that are unique to the DI delivery type.