Date of Issuance: November 4, 2022

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

ENERGY DIVISION **RESOLUTION E-5221**
November 3, 2022

R E S O L U T I O N

E-5221. Approval of the Database for Energy-Efficient Resources updates for Program Year 2024-2025 and revised version for Program Years 2023 and 2022.

PROPOSED OUTCOME:

- DEER2024 Update (effective January 1, 2024)
- Revise DEER2023 Update (effective January 1, 2023)
- Revise DEER2022 Update (retroactive to January 1, 2022)

SAFETY CONSIDERATIONS:

- There are no safety considerations associated with this resolution.

ESTIMATED COST:

There are no costs associated with this resolution.

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

SUMMARY

This Resolution approves updates to the Database for Energy-Efficient Resources (DEER) for program year (PY) 2024 and a revised version of DEER for PY2023 and PY2022, in compliance with D.15-10-028, D.21-05-031,[1] and Resolutions E-4818, E-4952, E-5009, E-5082, and E-5152. This update also directs forward looking research and addresses significant transitions for the DEER and measure package system maintenance and operation.

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

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

BACKGROUND

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

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

Relevant Regulatory Background

The California Public Utilities Commission (Commission or CPUC) Decision D.15-10-028, Ordering Paragraph 17 states: "Commission staff shall propose changes to the Database of Energy Efficient Resources once annually via Resolution, with the associated comment/protest period provided by General Order 96-B. However, Commission staff may make changes at any time without a Resolution to fix errors or to change documentation." D.15-10-028, retains the direction from D.12-05-015 that DEER values be updated for consistency with existing and updated state and federal codes and standards while incorporating these changes into the DEER update.[3] D.21-05-031 retains previous direction regarding CPUC staff latitude in updating DEER.[4] D.21-05-031 also adopts and Resolution E-5152 enacted a biennial update schedule for

[2] https://cedars.sound-data.com/deer-resources/

[3] D.15-10-28, at 80, states "D.12-05-015 allowed additional mid-cycle changes if there are new state and federal codes and standards that affect DEER values. Specifically, the decision stated in Conclusion of Law 84: "We generally agree with parties' request that ex ante values should be adopted and held constant throughout the portfolio cycle. However, mid-cycle updates of ex ante values are warranted if newly adopted codes or standards take effect during the cycle."

[4] D.15-10-28, at 80, quotes from D.12-05-015: "Conclusion of Law 80 states: 'Our Staff should have significant latitude in performing DEER and other policy oversight functions and, absent specific directives to the contrary, should not be required to consult with or otherwise utilize any other groups to perform this work."

DEER, eliminates the DEER and non-DEER distinction for EE measures and redefines the scope of the DEER resolution to:

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

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

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

Timing and Applicability of DEER Updates

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

The terminology "DEERxxxx" is used to designate the version of updated parameters and is independent of the conversion to using eTRM. The year shown reflects the program year that a given update takes effect. Beginning January 1, 2022, DEER no

[5] https://www.caetrm.com
[6] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M346/K161/346161639.PDF
[7] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M232/K459/232459122.PDF
[8] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M179/K264/179264220.PDF

longer referred to the ExAnte and Preliminary Ex Ante Review (PEAR) databases since these data now reside in the eTRM.

Scoping Document and Updates for DEER2024 and Revised DEER2023/DEER2022

On May 4, 2022 the CPUC Energy Division released for public comment a Scoping Document outlining the proposed issues and updates to be addressed in this DEER resolution. The Scoping Document described the various issues that may be considered in this resolution and the rationale for why these issues need to be addressed. Seven stakeholders, including all four investor-owned utilities (IOUs), submitted comments on the Scoping Document.[9] Below are the issues raised most frequently in the comments:

- Research regarding the high-SEER heat pump and air conditioning performance curves
- Structuring the EnergyImpact and Measure tables in the DEER database
- Updates to the Delivery Types
- Aggregated values in permutations
- Budget/staff implications to shift historic DEER measure modeling to PAs

In consideration of the comments to the Scoping Document, the topic areas addressed in this DEER update are summarized in Table 1. The policy guidance for these updates is described in the Discussion section that follows. A more detailed technical description of the changes and additions is provided in Attachment A to this Resolution. Complete documentation and supporting material on the updated assumptions and methods and updated DEER elements such as database tables, calculators, and web pages are available at the DEER Module on CEDARS.[10]

[9] The Scoping Document for DEER2024 Update was posted on May 4, 2022 and located at: https://pda.energydataweb.com/#!/documents/2623/view.

[10] Supporting material is at https://cedars.sound-data.com/deer-resources/tools/supporting-files/resource/2/history

Table 1. DEER2024 Update

Priority	Effort	DEER Version	Update Topic Area	Sector		Measure/Tech Group					Forecasted Value				
				Res	Non-Res	Lighting	HVAC	DHW	Envelope	Plug/Process	UES	NTG	EUL	Measure Cost	Other
			Management of DEER Processes												
!!!!	$$$$	2024	A. Transition to Electronic Technical Reference Manual (eTRM)	X	X	X	X	X	X	X	X	X	X	X	X
!!!!	$$$$	2024	B. Updates to eTRM and Measure Packages	X	X	X	X	X	X	X	X	X	X	X	X
!!!!	$$	2024	C DEEResources Website Content Migrated to CEDARS	X	X	X	X	X	X	X	X	X	X	X	X
!!!	$$$	2023	D. PAs Responsible for Modeling DEER and Historically Non-DEER Values	X	X	X	X	X	X	X	X	X	X	X	X
!!!!	$$$$	2026	E. DEER 2026 Update and Measure Package Submission/Review Timeline	X	X	X	X	X	X	X	X	X	X	X	X
!!!	$$$	2024	F. Measure Lifecycle Management in DEER	X	X	X	X	X	X	X	X	X	X	X	X
!!!!	$	2024	G. Mid-Cycle Adjustments to the Locked Ex-Ante Values	X	X	X	X	X	X	X	X	X	X	X	X
!!!!	$$$$	2024	H. EnergyPlus Prototypes, Residential	X		X	X	X	X	X	X				
!!!	$	2021	I. PY2021 Evaluator Guidance	X	X	X	X	X	X	X	X	X	X	X	X
!!	$	2024	J. Hard-to-Reach/Direct-Install Net-to-Gross Ratios	X	X	X	X	X	X	X		X			
!!	$$	2024	K. Fuel Substitution Calculator Updates	X	X		X	X	X	X					X
!!	$	2023-2024	L. Add-On-Equipment (AOE) Host Clarification	X	X	X	X	X	X	X					X
!!	$$	2024	M. Structural Changes to DEER Tables	X	X	X	X	X	X	X		X	X		X
!!!	$	varies	N. Updates to DEER Support Table Values	X	X	X	X	X	X	X		X	X		X
			Research Needs for PY2026-27												
!!!!	$$$$	2026	O. EnergyPlus Prototypes, Commercial		X	X	X	X	X	X	X				
!!!!	$$	2026	P. Research to Improve Water Heater Measures	X	X			X			X				
!!!	$$	2026	Q. Net-to-Gross Ratio for Hard-to-Reach Customers	X	X	X	X	X	X	X		X			
!!!!	$$$	2026	R. High-SEER Heat Pump and AC Performance Curves	X	X		X				X				
!!!!	$$	2026	S. Boiler Compliance with Condensation of Exhaust Gasses and Associated EE Assumptions	X	X		X	X			X				
			Measure Adoption												
!!!	$	2024-2026	T. Guidance Based on Industry Standard Practice Studies	X	X		X	X			X				
!!!	$	2024	U. Guidance from 2019 Custom Industrial, Agricultural, and Commercial Impact Evaluation Review		X	X	X	X	X	X		X			
!!!!	$$$	2024	V. Guidance from Evaluation, Measurement and Verification (EM&V) Review	X	X		X	X	X		X	X	X		

DISCUSSION

Pursuant to D.15-10-028, the Energy Division published a DEER Update Scoping Document on the proposed list of updates for DEER2024 and revised DEER2023 and DEER2022 items on May 4, 2022. The list of topic areas that this Resolution will incorporate are summarized below and described in detail in Attachment A, DEER2024 Update Summary.

Management of DEER Processes

A. Transition to Electronic Technical Reference Manual (eTRM)

A.1 IOU Budgets for 2023 eTRM and CalTF Support

In Resolution E-5152,[11] we directed the IOUs to include budgets for eTRM development and California Technical Forum (CalTF) support of new measure development needs in their 2022-23 Annual Budget Advice Letter filings, with a short description and table illustrating the proposed budgets in the narrative so that CPUC staff can understand and approve the budgets along with the other forecasted activities for 2022. Section A.4 of Resolution E-5152 also allowed the PAs to include funding for the eTRM in their Business Plan applications. This contracting and funding model has been demonstrated to be effective and should continue, and if the IOUs did not budget for eTRM in their Business Plan applications, they may update their 2024-2027 budget applications in the 2023 True-up Advice Letter.

A.2 Ownership and Financial Responsibility of eTRM 2023 and Beyond

The Energy Division has oversight of ex ante values and methodologies, including measure review and processes supported by the eTRM; however, the eTRM contracting process to date has provided a model for IOU funding of EE resources that enables them to fund the eTRM from their EM&V budgets and administer the eTRM as activities within their Business Plans.

Resolution E-5082[12] Ordering Paragraph 6 required the IOU Funders to administer and maintain the eTRM without changes to contract management structure until completion of both Phase 1 and Phase 2 activities. Since both phases are completed, the IOUs are authorized to alternate eTRM contract management responsibilities to another IOU, and to manage software maintenance and development contracts as needed.

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[11] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M398/K106/398106298.PDF
[12] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M346/K161/346161639.PDF

B. Updates to eTRM and Measure Packages

Effective Program Year: 2022. California's statewide electronic Technical Reference Manual (eTRM) is the *Official Source of California Energy Efficiency Measure Data*,[13] and with the release of Version 2.3 in March of 2022, is now the sole source for energy efficiency measure package development, submittal, review, and publishing. Measure developers shall follow the rules and procedures as laid out in the documents provided by CalTF as they move measures through the development phase prior to submittal.

B.1 eTRM Table Structure Changes

Additional fields shall be added to the eTRM measure permutations table as needed to support 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 shall 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 support tables, CEDARS, or CET, the CPUC staff will review and approve necessary changes to meet these needs. Examples of such fields include but are not limited to: E3 target sector, E3 climate zone,[14] Refrigerant Avoided Costs (RACC), ex ante annual water savings, in gallons (one for indoor water savings and a second for outdoor water savings), low-Global Warming Potential (GWP) refrigerants, and water-energy nexus (WEN) direct energy savings.

B.2 Refrigerant Impacts (RACC)

Per D.21-05-031 and Resolution E-5152, starting in PY2022 the reporting of refrigerant leakage avoided costs (RLAC) is required for all energy efficiency measure claims as calculated from the CPUC's Refrigerant Avoided Cost Calculator (RACC)[15] for measure packages where the retrofit involves adding (not replacing) equipment that uses refrigerant—these include fuel substitution and electric resistance to heat pump measures—or where low-GWP measure benefits will be claimed.

The RACC does not presently have a means to determine avoided refrigerants for dual baseline implementations. The CPUC considered and analyzed various work arounds to this issue and concluded that treating accelerated replacement (AR) measures as normal replacement (NR) measures was the best option at this time. We direct that in the RACC, accelerated replacement (AR) measures shall be treated the same as normal

[13] https://www.caetrm.com/
[14] E3 refers to Energy + Environmental Economics – these fields are needed to track the mapping to E3's sectors/climate zones.
[15] https://cedars.sound-data.com/deer-resources/tools/supporting-files/resource/2/history

replacement (NR) measures until the RACC is revised. PAs shall continue to work with CPUC staff to update the RACC to include the calculations for AR measures and align with the 2022 update to the avoided costs by June 1, 2023. Measure developers will need to submit the updated RACC for applicable measure packages thereafter. These updates will be outlined in the Measure Lifecycle Management table, see Section F. PAs are to use the most recent version of the calculator for all off-cycle new Measure Package submissions. Guidance on where to submit the addendums can be found on CEDARS at Guidance for Deemed Measures - CEDARS.[16]

CPUC Decision D.21-05-031 section 8.1 allows program administrators to collaborate with CPUC staff for developing normal replacement measures within energy efficiency programs to encourage low-GWP refrigerants. The Decision specifies "...we will set normal replacement baseline to be either the current regulation, or the refrigerant typically used for similar applications in program years 2020-2021, whichever has lower refrigerant emissions. Given the market uncertainty, we will revisit this baseline policy in 2025." The refrigerant baseline may be updated for program year 2026.

B.3 Aggregated Values in Permutations

A review of eTRM permutations found that aggregated values (e.g., "Any", "Res", "Com") were in use when more accurate deemed savings were available and should have been used. We clarify that aggregated values shall only be used in some fields of the permutations table under a limited set of conditions as described in Attachment A.

B.4 Water-Energy Nexus (WEN) Impacts

In December 2021 we released the new Water-Energy (W-E) Calculator 2.0.[17] The new calculator replaces W-E Calculator 1.0 and is to be used to calculate the embedded energy savings for Water-Energy Nexus (WEN) energy efficiency measures starting PY2023 for existing measures. To improve the traceability of embedded energy savings from measures that save water, W-E savings are no longer to be reported in a single rolled-up measure package (SWMI001); instead, the WEN calculated savings are to be included with each measure package involving water savings. PAs can now add the embedded energy savings to the direct energy savings from these WEN measures to claim incentives which will count towards PAs' energy efficiency goals.

On December 22, 2021, CPUC staff issued a guidance memo describing a short- and long-term solution for how the embedded energy savings outputs of the

[16] https://cedars.sound-data.com/deer-resources/deemed-measure-packages/guidance/resource/8/history
[17] https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/energy-efficiency/water-energy-nexus-programs

W-E Calculator 2.0 must be calculated and integrated into the measure package, eTRM, CEDARS, and CET, see Appendix A4. PAs are to use the most recent version of the calculator for all off-cycle new Measure Package submissions. Guidance on where to submit the addendums can be found on CEDARS at Guidance for Deemed Measures - CEDARS (sound-data.com).

The long-term solution to incorporate embedded energy savings outputs of the W-E Calculator are currently under integration between eTRM, CEDARS, and CET. Once the proper fields for the long-term solution are migrated into the CET, CPUC staff will inform PAs that a measure package plan (MPP) for each WEN measure will be required to update the methodology used to calculate embedded energy savings. An MPP does not require a full measure update. While the timeline is still fluid, we expect the measure package plans incorporating the long-term solution methodology will occur in early 2023.

B.5 Rebates Exceeding Incremental Measure Cost (IMC)

In 2020, CPUC staff released an *Addendum to Fuel Substitution Workpaper Documenting Incentive Greater that Incremental Measure Cost.*[18] The purpose of this addendum was to provide a pathway for PAs to inform the CPUC staff of the need to offer rebates to the customer that exceeds the net cost to the participant of installing more efficient equipment. We adopt this guidance memo.

On June 2, 2022, CPUC staff released an updated guidance document *Addendum to Measure Package Documenting Incentive Greater than Incremental Measure Cost*, see Appendix A4. We adopt this guidance memo. The guidance included the following:

- Update to include eligibility of all measures.
- Update to change the term workpaper to measure package.
- Update title of document "Addendum to Measure Package Documenting Incentive Greater than Incremental Measure Cost".
- Added directions for posting addendum to the measure log for referenced measure package.
- Added third party to Incentive Requirements narrative.
- Removed PA contact information

B.6 Measure Cost Updates

Currently measure costs are reviewed for necessary updates as measure packages are revised. As directed in Section F, measure costs shall be updated as measure packages

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

are revised in accordance with the Measure Lifecycle Management table, see Section F. In addition, to ensure that measure costs stay current they will be revised no less frequently than every four years using methods described in CalTF's whitepaper on cost updates for measure package updates.[19]

B.7 Data Requirements for Distributor/Contractor-delivered Measures

Multiple evaluation reports have recommended improvements in documentation quality for measures delivered via midstream and upstream channels to meet measure verification evaluation requirements per the California Evaluation Protocols.[20] Since these recommendations have not been sufficiently acted upon, we direct that data requirements must be added to measure packages updated for PY2023 and PY2024 for all offerings using the UpDeemed delivery type. At a minimum the data collected must be sufficient to allow an evaluator to better track the installed equipment that received a rebate. These include:

- Site Identifier – A unique identifier for the shipping destination (upstream) or installed location (midstream) of the incentivized equipment (e.g., site address)
- Equipment Identifier - A unique identifier for each unit of incentivized equipment[21] (e.g., serial number)
- Quantity per sales transaction, project, or site – Total units of incentivized equipment located at the site or project

Additional data requirements for specific measure packages may be required for inclusion and will be addressed as part of the measure package review process.

C. DEEResources Website Content Migrated to CEDARS

Effective Program Year: 2022. Due to security vulnerabilities identified by the CPUC, all content from the DEEResources.com and DEEResources.net websites was migrated to the DEER Module at CPUC's CEDARS website.[22] We clarify here that no new content will be uploaded to DEEResources.com; new content will only be added to

[19] https://static1.squarespace.com/static/53c96e16e4b003bdba4f4fee/t/5f99c8d60e9651515f53a3db/1603913944726/Cal+TF+White+Paper+Cost+Analysis+Methods+Affirmed+2020.09.24++v1.0.pdf

[20] The California Evaluation Protocols, p. 57 states that Basic Rigor Verification involves physical inspection of the installation to verify correct measure installation and installation quality.

[21] Exemptions to the equipment identifier requirement will be made for measure package offerings where leveraging a serial number or other practical unique identifier is infeasible.

[22] https://cedars.sound-data.com/deer-resources/

DEEResources.net in rare instances and until it can be uploaded to the CEDARS DEER Module.

D. PAs Responsible for Modeling DEER and Historically Non-DEER Values

Effective Program Year: 2026. Decision D.21-05-031 eliminated the DEER and non-DEER distinction and clarified that all deemed ex ante values approved by staff and housed in the existing DEER systems, and ultimately in the eTRM, are considered DEER values."[23] Because of this change, there is no longer a compelling reason for these historically DEER measures to be modeled by the CPUC. Shifting this work to the PAs will allow CPUC staff to devote more time to—and elevate the rigor of—the review of measure package submissions by:

- Ensuring that the UES values are based on valid assumptions
- Verifying that policy guidance from the CPUC is appropriately interpreted and applied
- Scrutinizing building model inputs to improve the accuracy of UES values

Starting with PY2026 measure packages, the entire responsibility for calculating the UES values for all deemed measures is shifted to the measure package developers. CPUC staff will continue to develop and maintain the DEER building simulation tools and the DEER water heater calculator. Tools and methods will be fully documented and supported. CPUC staff will also continue to be responsible for critically reviewing all UES values for deemed measures.

E. DEER 2026 Update and Measure Package Submission/Review Timeline

This resolution sets forth the schedule for DEER Update and for submission of measure packages for CPUC staff approval for PY2026-27. The timeline and schedule are provided in Table 2 and Table 3.

Table 2. PY2026-27 DEER Update Cycle Timeline

Description	Responsible Party	Due Date	Approval Date	Effective Date
Measure Package Update Schedule	PAs/ Stakeholders	2023-08-01**	-	-

[23] D.21-05-031, "Assessment of Energy Efficiency Potential and Goals and Modification of Portfolio Approval and Oversight Process," adopted 2021-05-20, p. 38.

Description	Responsible Party	Due Date	Approval Date	Effective Date
Measure Package Submittals	PAs	See Table 3	2024-08-01+	2026-01-01*
Draft DEER2026 Update Resolution	CPUC	2024-08-01	-	-
DEER2026 Update Resolution	CPUC	-	2024-11-01	2026-01-01*

* There may be exceptions when updates become effective off-cycle.
** Draft for workflow scheduling. Updates to the schedule may be made if needed.
+ Per Draft Resolution release, adoption in Final Resolution

CPUC staff will work with PAs to set a prioritized schedule of updates for all PY2026-27 measure packages resulting from updates directed in the Measure Lifecycle Management (further described in Section F) and Research Needs for PY2026-27. PAs may submit additional updates to measure packages beyond what is directed and may include additional measure packages for update during that time. Only measure packages adopted in the future resolution for DEER2026 will be included in the set of deemed measures for the PY2026-27 program cycle.

Controversial measure packages must be submitted well before the standard three-month timeframe for review and approval to avoid delays. It is the responsibility of the PAs to follow the agreed schedule for submissions or risk measure packages not being included in the DEER resolution and therefore not receiving approval.

Table 3 summarizes the measures presently planned for updates and the deadline for PA measure package submittals.

Table 3. Timeline for DEER2026-27 Measure Package Updates from CPUC-Led Research

End Use Category	Update Detail	Research Data Needed By	PA Measure Package Submittal By
Commercial Refrigeration (CR)	Commercial refrigeration EnergyPlus updates per Section N	2023-12-01	2024-03-31
HVAC (HC)	Commercial weather-dependent EnergyPlus updates per Section N	2023-12-01	2024-03-31
Water Heating and Water Pumping (WH)	Water Heater Measure Update per Section O	2023-12-01	2024-03-31

Table 4 summarizes the measures presently planned for updates, when the PA-led research is due, and the deadline for the PA measure package submittals.

Table 4. Timeline for DEER2026-27 Measure Package Updates from PA-Led Research

End Use Category	Update Detail	PA Research Data Needed By	PA Measure Package Submittal By
HVAC (HC)	High-SEER performance curves for HPs/ACs per Section R	2023-12-01	2024-03-31
Water Heating (WH)	Condensing boiler operating efficiencies per Section S	2023-12-01	2024-03-31

F. Measure Lifecycle Management (MLM)

Effective Program Year: 2024. PAs shall work with CalTF to link to and synchronize with a Measure Lifecycle Management (MLM) table in DEER to track existing and planned updates to current and future measure packages. This table is intended to help manage measure package updates in a more strategic manner and space them out over time to minimize highly compressed measure package update and review periods. The table will also be used to identify those measure packages that need new research to inform planned updates. In addition to the Statewide Measure ID, end use, and technology group, at a minimum the table will track characteristics of each measure package as identified in Table 5. For each characteristic listed—including the characteristic itself—the dates each was last updated and is next expected to be considered for update will be tracked. CPUC staff will retain responsibility for approving the MLM table.

Table 5. Measure Package Characteristics Tracked for Measure Lifecycle Management

Characteristic	Description
PAlead	Lead program administrator for measure package
FuelType	Predominant fuel type saved by technology (e.g., electric, natural gas)
WeatherFile	For weather-sensitive measures, the TMY weather file used (e.g., CZ2022)
CodeStd	Relevant building code or appliance, ENERGY STAR®, or CEE standard
ISPref	Report to determine industry standard practice used for most recent update
Refrigerant	Flag to indicate measures that contain refrigerant

Characteristic	Description
EULref	Report used for most recent EUL update
NTGref	Report used for most recent NTGR update
Costref	Report used for most recent cost update
EntryYear	First year measure became available for tracking when availability exceeds two years

G. DEER Off-Cycle Adjustments to the Locked Ex-Ante Values

D. 21-05-031 (p. 39) locks ex-ante (i.e. expected) energy savings values that will be used in the Energy Efficiency next Potential & Goals Study as well as claims for the two-year DEER cycle, beginning with years 2024-25. It further notes that there may be off-cycle adjustments that will account for reasonable corrections to the existing locked values and allow new measures to be added to the portfolio. PAs may still submit new measures during the cycle, but ex ante values adopted in DEER2024 will remain locked. Off-cycle error corrections (i.e., correction of typographical and clerical errors, and other obvious, inadvertent errors and omissions) will be handled on a case-by-case basis and consider their impact to the portfolio. Building upon Resolution E-5152, these off-cycle adjustments are further clarified below.

G.1 New Measures

New measure packages and measure packages that solely include the addition of new measures may be submitted for CPUC staff review at any time during the biennial cycle and must follow the submittal, review, and approval process outlined in Resolution E-5152 (p. 13). Newly approved ex ante values adopted into the portfolio are not subject to an effective date 90-day after approval. Instead, they will become effective upon approval and can be used for off-cycle claims. Notification of new measure packages or new measures added to existing measure packages will be communicated to stakeholders through CPUC staff measure package dispositions, eTRM published values, DEER support tables, and/or stakeholder meetings.

G.2 Error Corrections

Reasonable error corrections to DEER and measure packages (i.e., "correction of typographical and clerical errors, and other obvious, inadvertent errors and

omissions.")[24] can occur at any time during the biennial cycle, shall become effective immediately. As stated in E-5152, "such errors will be handled on a case-by-case basis and assessed based on their impact to the portfolio." Notification of reasonable error corrections shall be communicated to stakeholders through CPUC staff measure package dispositions, eTRM published values, guidance documents, DEER support tables, DEER change log, and/or stakeholder meetings.

Error corrections that are egregious and have a large impact to the savings portfolio or claims (i.e., NTG values, measure eligibility requirements, or other measure packages requirements that can retroactively impact potential savings claims) may be allowed only on a very limited basis and will be handled case-by-case. CPUC staff shall hold the authority to decide whether an off-cycle update is considered critical in these circumstances. This will be communicated to stakeholders through CPUC staff measure package dispositions, guidance documents, eTRM published values, DEER support tables, DEER change log, and/or stakeholder meetings.

G.3 Codes and Standards

Anticipated changes to codes and standards that occur off-cycle shall be planned for and proceed as outlined in the Measure Lifecycle Management table, see Section F. Uncertain or unanticipated changes to codes and standards that occur off-cycle will require a revised Measure Package baseline and become effective 90 days after the Measure Package is approved. Voluntary standards such as ENERGY STAR® may also require a revision to the baseline or measure values.

H. EnergyPlus Prototypes, Residential

Effective Program Year: 2024. CPUC staff has completed the transition to EnergyPlus prototypes for residential measures with the set of residential weather dependent measures listed in Table 6 that will be adopted as part of this DEER2024 update. The draft CPUC methodology documentation was publicly reviewed, changes were made to the prototypes and the models were recalibrated. The final documentation is posted on CEDARS.[25] The transition of commercial measures is upcoming, may also include a revision of the residential prototype models, and is described in Section O.

Table 6. Measures Transitioned to EnergyPlus Prototypes

Measure ID	Measure Name
SWHC027	Package Terminal Air Conditioner or Heat Pump, Under 24 kBtu/h

[24] Resolution A-4661, Orders Correcting Errors in Commission Decisions (March 9, 1977) is available on the Commission website at: https://docs.cpuc.ca.gov/PublishedDocs/PUBLISHED/Graphics/96168.PDF

[25] https://cedars.sound-data.com/deer-resources/tools/energy-plus/resource/10/history

Measure ID	Measure Name
SWHC029	Fan Controller for Air Conditioner, Residential
SWHC030	Whole House Fan, Residential
SWHC031	Furnace, Residential
SWHC044	Ductless HVAC, Residential, Fuel Substitution
SWHC049	SEER Rated AC and HP HVAC Equipment, Residential[26]
SWSV001	Duct Seal, Residential
SWSV013	Duct Optimization, Residential
SWBE006	Ceiling Insulation, Residential
SWBE007	Wall Insulation, Residential
SWHC038	Brushless Fan Motor Replacement, Residential
SWHC050	Ductless Heat Pump, Residential
SWWH028	Heat Pump Water Heater, Commercial and MF, Fuel Substitution
SWAP001	Residential Refrigerator and Freezer
SWWH010	Boiler, Multifamily

I. PY2021 Evaluator Guidance

Effective Program Year: PY2021. Due to the transition to eTRM as the data source of record in PY2022 and the resulting transition year in PY2021 we clarify the location of the official ex ante values during the transition period. Evaluators of PY2021 programs that delivered deemed measures are directed to use the Ex Ante Data (EAD) Tables that accompany each measure package as the data source of record for ex ante UES values rather than eTRM's permutations. These EAD tables may be found in the CEDARS Deemed Measure Archive.[27] There is one exception to this guidance for measures that were developed, submitted, and approved at the end of 2021 using only eTRM permutations (i.e., no EAD tables were produced or reviewed). Table 7 lists the measure package that falls under that exception:

Table 7. PY2021 EM&V Exceptions for Measure Savings Evaluation

Measure ID	PA Lead	Measure Name
SWWH011-01	PG&E	Central Storage Water Heater, Multifamily

[26] This measure will include SEER 19-21 equipment.
[27] https://cedars.sound-data.com/deer-resources/deemed-measure-packages/measure-package-archive/

Starting in PY2022, evaluators are directed to use the ex-ante UES values provided in permutation tables contained within measure packages published in eTRM.

J. Hard-to-Reach (HTR)/Direct-Install Net-to-Gross Ratios

Effective Program Year: 2022. Due to confusion regarding the applicability of the higher NTG ratio value for HTR customers we clarify here that the 0.85 NTG ratio for HTR customers in California only applies to HTR customers as defined in D.18-05-041, Section 2.5.2 and 2.5.3 and must use a direct install (DI) delivery channel. We adopt in Section N of this resolution three additional measure application types (MATs) that are eligible to use the HTR-DI NTGRs. We also clarify the definition of the direct-install delivery channel.

K. Fuel Substitution Calculator Updates

Effective Program Year: 2026. CPUC staff may be updating the Fuel Substitution Technical Guidance Document and Fuel Substitution Calculator as soon as the summer of 2023. If available, the updated calculator shall be used beginning in 2024 to update all fuel-substitution measure packages to become effective for PY2026-27. PAs are to use the most recent version of the calculator for all off-cycle new Measure Package submissions. Guidance on where to submit the addendums can be found on CEDARS at Guidance for Deemed Measures - CEDARS (sound-data.com).

L. Add-On-Equipment (AOE) Host Clarification

Effective Program Year: 2023-2024. An AOE measure is defined as improving the nominal efficiency of the host equipment (upon which it is installed) and the host equipment is defined as the equipment that uses less energy due to the add-on measure.[28] This resolution clarifies the definition of the host equipment by adding that some AOE measures reduce the load, or energy usage, on the host equipment. The measure life of an AOE and the introduction of a host proxy is discussed in more detail in Attachment A.

[28] Resolution E-4818, Section 1.3.6.2 Add-On Equipment, pp. 26-27.

In addition, ceiling, wall, or floor insulation as well as greenhouse heat curtains and infrared film shall no longer be considered AOE and are reclassified as the building weatherization (BW) measure application type.

M. Structural Changes to DEER Tables

To improve both the traceability of updates made to deemed savings and the reporting verification abilities of CEDARS, we direct the following changes to the structures of some new and existing DEER database tables.

- A new table, "FuelSub", will categorize the types of fuel substitution measures to accommodate the transition to the Total System Benefit calculations.
- A new table—serving as a companion to the NTG_2020 table—will clarify when a given NTG ID may be used. The eTRM and CEDARS shall synchronize with this new companion table nightly.
- A new table—serving as a companion to the EUL basis table—will clarify when a given EUL ID may be used. The eTRM and CEDARS shall synchronize with this new companion table nightly.
- CPUC staff will add two new fields to the Measure Table: WeatherSim and FuelSub_ID.
- CPUC staff will add six new fields in DEER's EnergyImpact table to accommodate updates to load shapes. The contents of four fields that are no longer in use will be deleted.

N. Updates to DEER Support Table Values

To accommodate policy clarifications and improve the evaluability of reported claims, we direct the following changes to the DEER support table values.

- Expand the allowed MATs for HTR-DI NTGRs from Normal Replacement (NR) or Accelerated Replacement (AR) to also include Add-on Equipment (AOE) and Building Weatherization (BW) MATs. Retro-commissioning measures (BRO-RCx) may also be categorized as being direct install if the vendor, as part of the program, performs the installation. Whether a given measure is categorized as direct install will need to be determined on a case-by-case basis by CPUC staff.
- Updates to Delivery Types to provide more detail for upstream delivery types, and to drop the distinction between deemed and custom measures since Measure Impact Types already account for whether measures are deemed or custom.
- New Measure Impact Types (MITs) are added for use starting in program year 2022 since Normalized Metered Energy Consumption and Strategic Energy Management program measures that involve fuel substitution require their own

MITs for claims in PY2022-2025. The MITs will be consolidated in 2026 since there will no longer be a distinction between DEER and non-DEER measures and a FuelSubID field will be added to the Measure table.

- All NTGRs resulting from CPUC staff's evaluation, measurement, and verification (EM&V) studies and approved via dispositions shall be rounded to the nearest 0.05 in DEER. NTGRs results from EM&V studies shall only be updated in DEER when the EM&V NTGR (before rounding) is at least 0.05 different from the current DEER value. If a new EM&V study determines that an existing and active measure-specific NTGR is—after rounding—equal to the relevant default NTGR, the measure-specific NTGR will be expired.

Research for PY2026-27

The CPUC's future research plans center around forecasting important updates that will have significant impact on deemed measure savings.

O. EnergyPlus Prototypes, Commercial

The transition to EnergyPlus prototypes for commercial measures is anticipated to be completed by December 2023. These new commercial building prototypes will be released as available so they can be used for new measures and for PY2026-27 measure updates. CPUC staff will update the grocery and refrigerated warehouse prototypes and the refrigeration system performance curves. Refrigeration equipment performance curves used by the current DEER prototype are out of date.

P. Research to Improve Water Heater Measures

CPUC released a new version of the water heater calculator, "DEER Water Heater Calculator v5.1.xlsm," on August 29, 2022.[29] We adopt this version of the calculator that encompassed the following updates:

- Residential hot water profiles using data that had been gathered and analyzed to inform the California Energy Commission (CEC) residential code compliance software (research version)[30] for the 2022 update to Title 24
- Heat pump water heater (HPWH) performance curves

[29] "DEER Water Heater Calculator v5.0.xlsm" was previously released on January 24, 2022 in which the normalizing unit (NormUnit) was "Cap-kBTUh"; "DEER Water Heater Calculator v5.1.xlsm" uses "CapOut-kBtuh" as the normalizing unit. No other updates were made to the calculator.

[30] The software package is titled *CBECC-Res 2022 (RV).*

- Water heater sizing methodology and TechIDs using recent American Heating and Refrigeration Institute (AHRI) product data
- Embedded macro enabling users to save 8,760 load shapes to a comma-separated value (csv) file format
- To improve alignment between HPWH ratings and those used for all other water heaters, the normalizing unit used by the calculator to determine measure savings was modified from a unit's rated input capacity to its rated output capacity.

CPUC staff will add features to the water heater tools. Future updates that are under consideration involve HPWHs and include:

- Account for HPWHs located in conditioned spaces; presently HPWHs are assumed to be in unconditioned spaces.
- Investigate the proportion of the time that the HPWH uses electric-resistance water heating and update sizing requirements to minimize use of electric resistance mode. The amount of water heating generated in electric resistance mode for measure offerings will be determined.
- Investigate how the efficiency of HPWH is influenced by hot water temperature setpoint.

Q. Net-to-Gross Ratio for Hard-to-Reach Customers

Resolution E-4952 called into question the use of a higher NTGR for HTR customers. At that time, CPUC staff did not examine data specific to HTR customers, but instead CPUC staff used customer size as a proxy and assumed that smaller businesses would more likely be HTR customers.

Further research is needed to characterize the appropriate NTGR for residential and commercial HTR customers—in addition to those served through direct installation of measures—but also those served through downstream delivery mechanisms. The focus of the work would be to see if there is evidence for:

- A higher NTGR for HTR customers served through DI compared to non-HTR customers served through DI
- A higher NTGR for HTR customers served through downstream compared to non-HTR customers served through downstream

Primary research designed to inform NTGR values to use for HTR customers is needed. We direct CPUC staff to conduct this research. This work could go further to investigate

HTR customer participation rates and depth of savings to assess whether HTR customers have equitable access to energy efficiency programs. The NTG research is to be completed by December 2023 and the results will be used to inform measure packages used for the PY2026-27 cycle.

R. High-SEER Heat Pump and AC Performance Curves, Non-residential and Residential

Although many high-SEER, inverter-driven heat pumps systems are being installed and claimed as fuel substitution measures under ratepayer-supported PA programs, CPUC staff identified gaps in the understanding of their field performance. We direct the PAs to conduct research to inform parameter updates to high efficiency equipment using inverter driven compressors with variable refrigerant flow (unitary, conventional split, and mini-split systems with and without heat recovery). The research shall involve equipment that has been redesigned to comply with the new Department of Energy unitary air conditioner and heat pump appliance standards effective January 1, 2023. This data is required to inform performance curves used in modeled unit energy savings and the development of load shapes.

The limitations of existing measure development tools to capture benefits of heat recovery capabilities of high efficiency variable flow heat pumps preclude the broad inclusion of these measures in the EE portfolio. Research to assess EnergyPlus performance curves to see if they adequately capture actual performance of variable flow heat pump systems is necessary to inform changes in modeled energy savings. Further research is also required to characterize performance curves of equipment utilizing low-GWP refrigerants that are starting to emerge in the market.

This work shall leverage data collected using the new DOE Variable Refrigerant Flow test procedures (based on AHRI 1230-2021) and involve collaboration with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard Project Committee 2059 to support the gathering of equipment performance data and additional data sources for informing the development of new performance curves.

The results of this research are needed by December 2023 to inform PY2026-27 updates to measure packages.

S. Boiler Compliance with Condensation of Exhaust Gasses and the Associated Energy Efficiency Assumptions

Although the CPUC staff has approved measure packages for condensing boilers, 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. For a boiler to

run in condensing mode, the return water temperature must be below 140°F. We direct the PA's to conduct this research to inform updates to measure packages by answering the following questions:

- Do the boiler measure requirements preclude condensing operation in some installation cases?
- Are boiler outside-air reset temperature controls inadvertently precluding condensing mode? In other words, does raising the setpoint during cold weather result in returning water to the boiler that is too warm to facilitate condensing?
- Is commissioning in the field verifying that return water temperatures are low enough for the boiler to operate in condensing mode?
- What boiler applications are most or least likely to achieve condensing efficiency levels?

Measure Adoption

Per D.21-05-031 this resolution adopts and locks approved ex ante values contained in the measure packages for PY2023 and PY2024-2025. The list of measure packages adopted and locked for PY2023 is listed in Appendix A1 and the list of measure packages adopted and locked for PY2024-25 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 off-cycle and will be tracked with start and end dates of those measures in the eTRM.

The dispositions and guidance documents used to inform the measure updates for PY2023 and PY2024-25 are provided for reference in Appendices A3 and A4 respectively. New guidance that has not been previously issued is provided in the sections below.

T. Guidance Based on Industry Standard Practice (ISP) Studies

This section summarizes CPUC guidance for measure packages related to recent industry standard practice studies. Five ISP studies were conducted by the IOUs as directed by Resolution E-4939. We find from the five completed ISP studies the following:

1. No updates are required for updating the DEER2024 baselines according to the results from the SDG&E *Industry Standard Practice Study of Unitary AC and HP Study*. The study concluded that high efficiency boilers are not yet industry standard practice. This ISP study shall be kept up-to-date with future minimum efficiency standards.

2. No update is required for DEER2024 based on the SCE *Market Impacts of Low-GWP Refrigerants for Refrigeration Equipment* as the study found that low global warming potential refrigerants were not ISP.
3. Updates are required based on the PG&E *Industrial Standard Practice Study of Commercial Domestic Hot Water Boilers for Commercial and Multifamily Sectors* . Measure Packages SWWH005-02 (Boiler, Commercial), SWWH007-03 (Storage Water Heater, Commercial), SWWH010-01 (Boiler, Commercial), and SWWH011-01 (Central Storage Water Heater, Multifamily) shall be updated to reflect all current state codes and the new federal minimum efficiency standard for hot water boilers, ≥300 kBtuh and ≤2,500 kBtuh set at 84% thermal efficiency which will become effective on January 10, 2023.
4. No update is required in DEER2024 resulting from the SCG study titled *Retrofit Modulating Gas Dryer Valve for Commercial Dryers*. The study determined that adding a modulating dryer valve to an existing dryer is not standard practice.
5. No update is required in DEER2024 resulting from the SCG study titled *Industry Standard Practice Study of Residential Low Flow Showerheads and Aerators* because low-flow showerheads and aerators comprise less than 50% of the market. However, the Water Sense specifications from this study shall be included as a measure offering requirement in low-flow showerhead and aerator measures to ensure customer satisfaction with the product.

U. Guidance from 2019 Custom Industrial, Agricultural, and Commercial (CIAC) Impact Evaluation Review

Effective Program Year: 2024. The 2019 CIAC study[31] found lower NTGRs than the defaults in the DEER database. Evaluated NTGRs were determined based on surveys with decision makers in the organizations that implemented custom projects. We direct the following:

1. The default NTG ratio for custom (ci) agricultural measures is decreased from 0.70 to 0.50.
2. The default NTG ratio for electric savings of commercial measures is decreased from 0.60 to 0.50.
3. The NTG ratio for custom, direct-install lighting measures is decreased from 0.60 to 0.45.

[31] "Group D 2019 Custom Industrial, Agricultural, and Commercial (CIAC) Impact Evaluation," by SBW Consulting for CPUC, February 1, 2022. (https://pda.energydataweb.com/#!/documents/2583/view)

V. Guidance from Review of 2022 EM&V Reports for PY2020 Deemed Measure Claims

Effective Program Year: 2024. Evaluation results with sufficient rigor and precision are used to update DEER and measure package assumptions. Resolution E-5152 instructed PAs to work with CPUC staff to determine EM&V results being released in the calendar year 2022 EM&V bus stop that affect DEER measures due to the compressed timeline during transition period and to ensure EM&V studies finalized in calendar year 2022 are considered for the DEER2024 adoption.

Final evaluation study results, focused primarily on PY2020 claims, informed updates to deemed measures that are hereby adopted as follows:

1. To ensure the gas savings expectations are met, we direct that residential ductless HVAC fuel substitution measure packages shall be revised so that only direct install and downstream delivery types are eligible and measure package eligibility requirements include decommissioning the existing gas system, per the findings and recommendations in the HVAC Fuel Substitution Impact Evaluation.[32]
2. We direct the PAs that claims shall be based on actual building type rather than using Com or Res for all downstream programs and—where possible—for midstream and upstream programs, particularly those that deliver Unitary Air-Cooled Air Conditioners or Heat Pumps, based primarily on the findings and recommendations in the Commercial HVAC Sector Impact Evaluation.[33]
3. We direct that the NTG ratio for the residential smart thermostat (rebate/downstream) is decreased from 0.60 to 0.50 based on the EM&V report for PY2020.[34] Evaluated NTG ratios for this measure over the past several years have fluctuated around 0.50 rather than showing a consistent trend.
4. We direct that the annual deemed electric and gas savings for residential smart controlling thermostats (SCT) is decreased to levels that are halfway between the previous deemed values and those that were determined using the PY2020 billing analysis results. This was done because the deemed values represent pre-COVID savings prior to thermostat optimization as a standard opt-in option

[32] "Group A Impact Evaluation PY2020 HVAC Fuel Substitution," by DNV for CPUC, May 20, 2022. (www.calmac.org/publications/CPUC Group A HVAC Fuel Substitution Impact Evaluation PY2020 Final.pdf)

[33] "Impact Evaluation Report Commercial HVAC Sector-Program Year 2020," by DNV for CPUC, April 29, 2022. (www.calmac.org/publications/Group A YR4 Com HVAC Impact Report Final CALMAC.pdf)

[34] "Impact Evaluation of Residential HVAC Measures Residential Sector – Program Year 2020," by DNV for CPUC, June 3, 2022. (www.calmac.org/publications/Group A Residential PY2020 RES HVAC Final Report CALMAC.pdf)

whereas the evaluated values represent during-COVID savings with the addition of thermostat optimization; the only way to account for the unknown effects of COVID combined with the expected savings increase from optimization is to combine these two conditions. This is because a full return to pre-COVID work patterns is not expected for the foreseeable future. Specific values by building type and climate zone are provided in Attachment A. If we had just used the energy savings based on the most recent EM&V report, the savings would have been lower.

5. We direct that the NTG ratio for residential fuel substitution heat pump measures is decreased from 1.00 to 0.55 for the midstream delivery type.[35]
6. We direct that the NTG ratio of 0.20 for commercial and multifamily space-heating boilers is expanded to apply to all delivery types (resulting in a decrease from 0.60 for upstream applications).
7. We direct that the NTG ratio for commercial water-heating boilers is decreased from 0.60 to 0.10 (excluding downstream delivery type).[36]
8. We direct that the NTG ratio for indoor LED tube lighting is increased from 0.65 to 0.70 for downstream and direct install delivery types.[37]
9. We direct that the NTG ratio for indoor LED fixtures (including high/low bay) is decreased from 0.65 to 0.60 for downstream and direct install delivery types.
10. We direct that the NTG ratio for variable frequency drives (VFD) on well pumps smaller than 300 hp is increased from 0.30 to 0.40.[38]
11. We direct that the NTG ratio for commercial fryers is decreased from 0.60 to 0.35 for the downstream delivery type.

COMMENTS

Public Utilities Code section 311(g)(1) provides that this resolution must be served on all parties and subject to at least 30 days public review. Please note that comments are

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[35] "Group A Impact Evaluation PY2020 HVAC Fuel Substitution," by DNV for CPUC, May 20, 2022. (www.calmac.org/publications/CPUC Group A HVAC Fuel Substitution Impact Evaluation PY2020 Final.pdf)

[36] "Impact Evaluation Report Commercial HVAC Sector-Program Year 2020," by DNV for CPUC, April 29, 2022. (www.calmac.org/publications/Group A YR4 ComHVAC Impact Report Final CALMAC.pdf)

[37] "Final Impact Evaluation Non-Residential Lighting Sector Program Year 2020," by Quantum Consulting for CPUC, April 28, 2022. (www.calmac.org/publications/__AllSections_Final_w_Apps.pdf)

[38] "Final Impact Evaluation Non-Residential Deemed Pump and Food Service Program Year 2020," by Quantum Consulting for CPUC, April 28, 2022. (www.calmac.org/publications/_PumpFoodService ALLSections Final W APPS.pdf)

due 20 days from the mailing date of this resolution. Section 311(g)(2) provides that this 30-day review period and 20-day comment period may be reduced or waived upon the stipulation of all parties in the proceeding. Interested stakeholders do not need to have party status in order to submit comments on the resolution.

The 30-day review and 20-day comment period for the draft of this resolution was neither waived nor reduced. Accordingly, this draft resolution was mailed for comments on August 18, 2022.

On September 7, 2022 comments on the draft resolution were submitted by Google, Nikhil V. Gandhi & Associates (NVGA), Pacific Gas and Electric Company, (PG&E), San Diego Gas & Electric Company (SDG&E), Southern California Edison Company (SCE), Southern California Gas Company (SCG), and the California Efficiency + Demand Management Council (the "Council"). A summary of the comments requesting changes and updates to this Resolution and the CPUC response to those comments is provided below. Comments and responses are presented using the same headings in the preceding Discussion section. Comments involving typos have been omitted and all typos have been corrected in this document. Some comments were deemed out of scope and not addressed.

A. Transition to Electronic Technical Reference Manual (eTRM)

A.1 IOU Budgets for 2023 eTRM and CalTF Support

SDG&E commented that they had interpreted Section A.4 of E-5152 differently and did not request eTRM funding for 2023 and 2024 in their business plan application. They requested a wording change to strike the sentence stating that E-5152 required them to include eTRM funding in their Business Plan applications and to specifically state that if budget was not requested, they should make the adjustment in the 2023 True-up Advice Letter.

We did not strike out the requested sentence in the resolution but did add the language about making the adjustment in the 2023 True-up Advice Letter.

A.2 Ownership and Financial Responsibility of eTRM 2023 and Beyond

The Council and SCE commented on stable funding for the eTRM.

The issue of eTRM management and funding is currently an open issue in R. 13-11-005 and may be addressed a Decision separate from this DEER Resolution.

B. Updates to eTRM and Measure Packages

B.1 eTRM Table Structure Changes

SCE requested that field names be aligned between eTRM and CEDARS, particularly those required for the CET such as E3 Target Sector and E3 Climate Zone.

We appreciate the comment and agrees that alignment is important. Energy Division staff also plan to address this issue in the Energy Efficiency Reporting Program Coordination Group (PCG), as we further the integrations between eTRM, CEDARS and the CET.

B.2 Refrigerant Impacts (RACC)

SCE requested that the CPUC make the RACC 2022 available in CEDARS once the new avoided costs are approved and state that they will re-evaluate the new version of the RACC 2022 for application to NR and AR measures.

We support updates to tools (including the RACC) as new information becomes available. The new RACC tool is available on the CPUC Integrated Distributed Energy Resources (IDER) Cost Effectiveness page.[39] CPUC staff may post it on CEDARS after it is reviewed.

B.3 Aggregated Values in Permutations

SCE requested changes to the eTRM permutation options to align the building type options for the commercial sector with those for the residential, agricultural, and the industrial sectors. Further, SCE requested the elimination of the "Com" building type.

We clarify here that it is currently not possible to eliminate the Com building type. It is how aggregated savings are stored in DEER such that it can be used for upstream delivery type where the specific building type at which the measure was delivered is unknown. The Com records, just as is the case with Res records, contain savings values that are weighted averages of the those across all DEER building types in the relevant sector. This change has not been made to either the DEER database or to this resolution.

SCE and PG&E requested the creation of a "ComOth" building type for the commercial sector just as there are "IndOth" and "AgOth" building types for the industrial and

[39] https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/energy-efficiency/idsm

agricultural sectors. SCE suggested that these are intended for use in cases where the savings do not vary by building type within a given sector.

We clarify that in the DEER database, these building types are defined as intended for "subsectors not covered by existing [ones]." There is no mention of whether it is appropriate to use "IndOth" and "AgOth" to represent "Any" within the industrial and agricultural sectors. This change has not been made to either the DEER database or to this resolution.

B.4 Water-Energy Nexus (WEN) Impacts

SCG requested that the Resolution include an initial schedule for the implementation of the long-term solution to add energy savings outputs of the W-E Calculator to existing measure packages.

Some guiding language has been added to the Resolution since a full schedule was not possible at this time. Before a timeline can be established, the CET needs to be updated to incorporate embedded water energy fields.

B.5 Rebates Exceeding Incremental Measure Cost (IMC)

There were no comments on this section.

B.6 Measure Cost Updates

There were no comments on this section.

B.7 Data Requirements for Distributor/Contractor-delivered Measures

SCE, PG&E, and SCG commented on data requirements. SCE and SCG cited concerns about being able to provide the installed location for measures in upstream programs and wondered what equipment identifier can be used for products such as light bulbs that don't have serial numbers to use as an equipment identifier. PG&E requested that this issue be discussed in the Data and Reporting Project Coordination Group (PCG) to finalize the requirements by March 2023 so their data tracking system can be updated for 2024.

We clarify that that, these requirements are minimums and are intended to improve the consistency and completeness of reasonable recordkeeping for accountability and evaluability. Distributor purchase orders or invoices can be used to track batches of items such as light bulbs that do not have individual serial numbers. The Reporting PCG seems a reasonable venue to finalize data reporting fields.

C. DEEResources Website Content Migrated to CEDARS

There were no comments on this topic.

D. PAs Responsible for Modeling DEER and Historically Non-DEER Values

NVGA commented that it is not clear whether the use of DEER methods, values, and assumptions would continue to apply as applicable to custom projects. NVGA recommended that the Commission clarify the scope of staff reviews and require all inputs and outputs of a measure package be subject to staff review and approval, not just the unit energy savings values. NVGA added that the resolution should provide guidance on transitioning from using DEER values, methods, and assumptions in custom projects to alternative parameters. Additionally, the Custom Project Review team should be involved in reviews of measure packages that might impact default values used in custom projects.

We clarify here that CPUC staff retains final authority in approving all measure package values including all deemed UES values. CPUC staff also review and approve all methodologies and input parameters. The term DEER is not being retired; Per D.21-05-031 all deemed ex ante values approved by staff and housed in the existing DEER systems, and ultimately in the eTRM, are considered DEER values. To be clear: all values contained in the eTRM's permutations tables will be considered DEER values and all methods described in measure packages are considered DEER methods. The custom project review team will continue to communicate with the deemed measure package review team as needed.

SCE requested that CPUC facilitate a clear process for testing, updating and calibrating DEER prototypes and batch processing tools to allow PAs a consistent process for the evaluation, modeling, and update of new and existing weather sensitive measures. They also asked for training and documentation to support the new tools. SCG requested clarification on how to request additional budget for this work.

We agree with the need for clear processes, training, and documentation and CPUC staff may provide such detail. Training and documentation of the Modelkit framework used for EnergyPlus batch file processing is forthcoming in 2022.

E. DEER2026 Update and Measure Package Submission/Review Timeline

Willdan requested that CPUC develop requirements, timeline, and process for third parties to submit measure packages consistent with D.18-01-004. SCE requested the addition of a Bus Stop publishing date after which studies would not be included in measure package updates.

Through the CalTF and the eTRM, third parties have the opportunity to author measure packages and provide feedback on those measure packages, each measure package authored by a third party has a PA sponsor who will submit the measure package to CPUC. This is because CPUC has regulatory oversight over the PAs, but not over third

party implementers. Regarding SCE's Bus Stop request, the target date for most studies (ISP, market research, etc.) is December 2023 to be included in measure package updates for PY2026-27. EM&V studies may have a slightly later timeline.

F. Measure Lifecycle Management (MLM)

SCE and SoCal Gas requested further clarification of how the MLM table is to be implemented by the IOUs. CPUC staff consultant will maintain the MLM. This has been clarified in the Resolution body.

G. DEER Off-Cycle Adjustments to the Locked Ex-Ante Values

There were no comments on this topic.

H. EnergyPlus Prototypes, Residential

SCE and Willdan requested that all Residential EnergyPlus prototype supporting documentation be made available including DEER prototypes, assumptions, and workbooks used in the measure characterization. Willdan's comment encompassed not just the residential measures transitioned to EnergyPlus, but all measures. SCE further requested information regarding what type of changes are expected to the residential EnergyPlus measures and how those would be incorporated into PY2024 measure packages. SCG requested that two measures (SWWH010 - Multifamily Central Boiler, and SWWH011, Storage Water Heater) be included in Table 6.

All savings calculation, assumptions, and proposed savings values for residential measures modeled using EnergyPlus are available on CEDARS. In addition, all approved measure packages for PY2024 are available in the eTRM. We agree that public review is important and will consider opportunities for increased public input in the future.

The commercial prototypes will not trigger updates to residential measures and no further revisions to the PY2024 residential measures are planned. There may be a revision to improve the residential prototypes, for instance using the airflow network to model duct leakage, but these improved models would be applicable to measures in PY2026 and beyond.

The two measures requested by SCG were not on the list of residential measures to be transitioned to EnergyPlus developed with PA input in January 2022.[40] One of the two measures requested by SCG (SWWH010) was modeled by the CPUC staff consultant team and added to Table 6; and the other (SWWH011) was not. Guidance was provided

[40] Memo dated January 12, 2022, titled "Request for Program Administrator Residential Measure Details – Updated"

to use the EnergyPlus tools developed for the Multifamily Central Water Heating Systems available on CEDARS to model the remaining measure.[41]

I. PY2021 Evaluator Guidance

SCG suggested that Section I is unnecessary, since PY2021 claims have already been finalized.

The PY2021 claims have not yet been evaluated and the purpose of this section is to inform evaluators where to find the official ex ante data for those claims. Because PY2021 is during a transition to eTRM, the official ex ante data can be found within the Ex Ante Data tables associated with each measure package.

J. Hard-to-Reach (HTR)/Direct-Install Net-to-Gross Ratios

Willdan and NVGA commented on this section. Willdan requested we add reference to an additional section of D.18-05-041, and clarification relating to the public sector HTR definition. They also suggested a change to the text in the Attachment where we suggest a higher NTG may not be needed to bolster PA's ability to serve HTR customers. NVGA requested we clarify that the data requirements and acceptable savings estimation methodologies for Direct Install (DI) programs remain unchanged.

We deleted the requested sentence and added the requested reference. We also added language in the Attachment stating that this Resolution does not change or address the definition of HTR in the public or private sector. We confirm that there is no change to the data requirements or acceptable savings methodologies for DI programs.

K. Fuel Substitution Calculator Updates

SCE suggested requiring updates to fuel substitution measure packages only if updates to the Fuel Substitution Calculator result in substantive changes to measure impacts, particularly emissions impacts.

We are not inclined to make this change. A new fuel substitution calculator version will require all fuel substitution measure packages to be updated.

L. Add-On-Equipment (AOE) Host Clarification

NVGA suggested that the proposed clarification of the AOE measure application type should be removed from the resolution until research-based data to support it becomes available.

[41] https://cedars.sound-data.com/deer-resources/tools/water-heaters/resource/8/history

We clarify here that there has been considerable confusion around which measures should or should not be classified as AOE measures and the appropriate EUL to use for them. Since research-based supporting data is not expected in the near future, the clarification remains in the resolution. Further, the EUL of AOE has generally capped at 1/3 the life of the host or host proxy only because it is expected to be removed at the same time as the host equipment or the host proxy--rather than due to other reasons. The EULs of all equipment types—including AOE—are determined by the median age at which 50 percent are no longer in service for a variety of reasons, including customer dissatisfaction. Hence, the host proxy will remain as a tool for determining the EUL of AOE equipment.

SCE asked for clarification regarding whether measures that shut off or de-energize host equipment are intended to be reclassified as AOE. We clarify that controls measures shall remain categorized as BRO-RCx and will not be treated as AOE when completely shutting off or de-energizing the energy-consuming equipment.

Willdan suggested revising the table by inserting a row that allows for AOE that is not typically replaced at the same time as the host equipment but has no host proxy.

We have implemented this change to the table, but used pool covers as an example of this scenario. We decline to use the suggested VFD for irrigation pump as the example in Table 1-3 of Attachment A because there is some debate about the frequency with which VFDs remain in place upon burnout of the motors they control.

Willdan also suggested utilizing the California Technical Forum (Cal TF) to facilitate the categorization of current AOE custom measures. This topic is not within the scope of this resolution.

M. Structural Changes to DEER Tables

PG&E requested that the new FuelSub table includes more categories for replacing a mixed-fuel equipment baseline case with an all-electric equipment measure case. Given that the CPUC has made clear that all-electric new construction measures are not to be confused with fuel substitution, the addition of the mixed-fuel baseline cannot be added to the fuel substitution table. Further, it is beyond the scope of this resolution to address how the cost effectiveness of such replacements shall be determined.

SCE suggested that changes to the EnergyImpact table are not warranted given that deemed measure savings will no longer be modeled by Staff beginning in 2026. We will continue with these revisions since the new fields are necessary for documenting the unit energy consumption values for DEER2024 residential measures that have been modeled using EnergyPlus building prototypes.

N. Updates to DEER Support Table Values

NVGA suggested that the removal of the custom distinction in the Delivery Type table needed further clarification. We clarify that the streamlining of delivery types is intended to delete instances of measure characteristic(s) being captured by two fields. The distinction between custom and deemed would be retained in the Measure Impact Type field. Delivery Type does not also need to contain this information. This is especially true for claims reporting where deemed measures and custom measures are submitted in two separate tables.

Per SCE's comment, we have added the "online retailers" option to the description of the Mid-Retail delivery type. We also implemented SCE's suggestion to insert the term "trade professional" into the definition of the direct install (DI) delivery type. SCE further suggested that an "Any" delivery type be added to the table. This is not possible since the hard-to-reach NTGR may only be used for hard-to-reach customers reached through the DI delivery type.

PG&E suggested the elimination of the fuel-substitution-specific Measure Impact Types (MITs) since the FuelSub table has been added to DEER. We agree and have incorporated this suggestion.

O. EnergyPlus Prototypes, Commercial

SCE commented that they would like an opportunity to provide additional quality assurance on the commercial prototypes as they are developed.

We welcome the collaboration and CPUC staff plans to provide ample opportunity for public review of the commercial prototype models in EnergyPlus.

P. Research to Improve Water Heater Measures

SCE suggested two enhancements to the DEER Water Heater Calculator: 1) include HPWHs with low-GWP refrigerants; and 2) include split-system HPWHs. These suggestions will be considered when developing the work plan for the next update.

SCG commented that the reference to the DEER Water Heater Calculator v5.0 be updated to v5.1. We agree and have done so.

Q. Net-to-Gross Ratio for Hard-to-Reach Customers

There were no comments on this topic.

R. High-SEER Heat Pump and AC Performance Curves, Non-residential and Residential

SCE requested that CPUC:

1) clarify standard procedures for performance curve development, e.g. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Standard 205.

2) establish procedures for testing the integrity of new performance curves.

3) before requiring performance data collection: (a) reevaluate tier definitions for variable refrigerant flow (VRF) equipment and (b) update tier requirements in DEER2017 in alignment with the market that has improved part-load efficiencies rather than full-load efficiencies.

We agree with SCE regarding the need for more guidance on this research effort. The objective of the effort is to improve performance curves used in modeling of air conditioning and heat pump space heating measures in prototype models. This effort is more complex than merely using manufacturer performance curves reported per ASHRAE Standard 205 procedures (used to report performance curves for specific equipment that is modeled in a specific building type). This effort will entail the establishment of a set of curves that is representative of equipment in the market that would be installed through an energy efficiency program. We recommend a methodology similar to what was used in the National Renewable Energy Laboratory's (NREL) January 2013 study "Improved Modeling of Residential Air Conditioners and Heat Pumps for Energy Calculations." The PA undertaking this research will be required to submit a workplan for CPUC staff review before embarking on this project. Given summer reliability concerns, we maintain that a 15% full-load EER improvement over code remains important, especially in the fuel substitution context.

S. Boiler Compliance with Condensation of Exhaust Gasses and the Associated Energy Efficiency Assumptions

SCG commented on a typo in this section that indicated CPUC would perform the boiler compliance research. This has been corrected in the Resolution to "the CPUC directs PAs to perform this research".

NVGA submitted a comment that applied generally to the adoption of PY2024-25 measures. He recommended that the CPUC require measure package developers to report the duration of incentive support provided and submit a standard practice market assessment for measures that have not become code or standard practice in 15 years since their introduction in the EE portfolio. If the measure has not become code or standard practice in 15 years, the program delivery approaches should be re-examined and monitored over the next five years. If the measure still fails to become standard practice or code in 20 years after its introduction in the EE portfolio, the CPUC should consider sunsetting that measure.

We clarify that we update savings based on current codes and industry standard practices and we update savings methodology and NTG ratios based on evaluation studies. Not all worthwhile energy saving measures become code or ISP. In some cases, federal standards preempt more efficient equipment becoming California code. However, we agree with the commenter and will carefully consider updates to baselines and possibly sunsetting the older DEER measures.

T. Guidance Based on Industry Standard Practice (ISP) Studies

SDG&E recommended rephrasing language in the resolution describing the high efficiency boiler ISP study based on language in the attachment.

The study found high efficiency boilers are not yet industry standard practice. We are not inclined to rephrase our original language.

U. Guidance from 2019 Custom Industrial, Agricultural, and Commercial (CIAC) Impact Evaluation Review

Willdan recommended that prior to setting the NTGRs for future years, the CPUC should consider adjustments based on real grid impacts. They recommended not introducing a new NTG_ID until EM&V data can be collected on the Modified Lighting Calculator version 13.1.1 and subsequent versions.

SDG&E disagreed with adjusting the PY2024 Net to Gross (NTG) Ratios for Custom Projects "due to the length of time between installation and the impact evaluation and the high turn-over being experienced in companies." They lobby for "shortening the time between installation and CIAC Impact Evaluation interviews or surveys," and assert that it "will adversely affect the desire of Third-Party Implementers and companies to participate in the custom project process." Further, since a policy review of this issue has been officially requested in the Business Plan applications, SDG&E believes that the Draft Resolution errs in including and determining this issue at this time.

We are not inclined to make any changes. This CIAC report is the best available information on which to base NTG values.

V. Guidance from Review of 2022 EM&V Reports for PY2020 Deemed Measure Claims

SCG requested expanding the DEER2024 NTG ratio for fryers from only downstream delivery types to include upstream.

Since the evaluation results specifically pertain to downstream fryers, we recommend using the default NTG ratio for those delivered by an upstream or midstream delivery channel.

SCE recommended retention of midstream delivery type for residential ductless HVAC fuel substitution (measure package ID: SWHC044), suggesting an inclusion of a "customer affidavit acknowledging the decommissioning of existing gas furnace and capping of natural gas pipeline," to improve savings of baseline natural gas.

We do not find the proposed 'customer affidavit' attestation to gas decommissioning sufficient to sway the decision to only allow downstream and direct install delivery types for measure package ID SWHC044. Furthermore the midstream delivery type would have to adopt the evaluation finding of 40% NTGR, limiting its value in the portfolio compared to the downstream types.

SCE and Google requested using the savings values from the last approved measure package for Residential Smart Thermostats (SWHC39-04) while continuing to study the impacts on thermostat savings for future evaluations as the long-term impact of the pandemic becomes clear.

The 2020 impact evaluation results are the first evaluation results that include thermostat optimization as part of the thermostat measure. We have always believed it was important to replace the existing measure package (MP) savings estimates that include an ad hoc adjustment for thermostat optimization with empirically-based results when possible. However, we did not replace the existing MP completely because of the lock-downs due to the COVID-19 pandemic. The blended results reflects those competing motivations. Despite Google's statement to the contrary, all ex ante values are inherently based on assumptions of "how customer behavior will evolve" and a default to existing MP levels would imply an immediate return to pre-pandemic lock-down savings that is less supportable than any expectation that assumes some ongoing effect of the pandemic lock-down.

As for concerns regarding increased bias due to differential pandemic response between smart thermostat owners and comparison group members, the evaluation took this into consideration. The impact evaluation of rebated smart thermostats installed through a downstream delivery channel applied the same adjustment as the prior year. An increase in baseload consumption was assumed to be 100% explained by bias and was removed along with a consistent percentage increase in heating and cooling consumption. This adjustment generously adjusts for possible bias against thermostat savings and does so based on the empirical evidence used in that analysis. If, in fact, the differentials, pointed to by Google, affected the data used for the analysis, any biasing effects would have been controlled for by the adjustment designed to address just those issues.

For Direct Install results, the target population of many of the programs (multifamily or mobile home residents and “English as a second language” speakers) is quite different than typical smart thermostat owners such that the bias concern should be a non-issue.

SCG commented on the net-to-gross ratio change for space heating boilers. Their specific requests include: 1) Specify exclusion of residential and direct-install applications for NTG of space heating boilers; 2) categorize separately for condensing and non-condensing water heating boilers; 3) survey upstream customers to derive an upstream NTG ratio.

We agree with item 1 and have updated the text above in section V to stipulate the update applies to the upstream delivery type for space heating boilers.

With regard to item 2, we find the evaluated PY2020 commercial water heating boiler (SWWH005) claims were comprised of ~95% condensing water heating boilers, so the NTG finding of 0.10 is highly reflective of the program influence for condensing boiler technology delivered through a midstream program delivery. Based on the data in the boiler ISP study reviewed as part of Section T, code is requiring domestic hot water boiler efficiencies close to those of the higher efficiency non-condensing boilers, and thus those boilers do not need a NTG value as they represent no program influence on boiler efficiency above the norm.

Concerning item 3, we find the HVAC and water heating boiler savings claims evaluated for PY2020 were predominantly delivered through midstream programs (PGE21012, SCG3814). The evaluation surveyed end-user and distributors where appropriate. "The commercial boiler programs at PG&E and SCG were predominantly midstream programs providing incentives to influence distributors to stock, upsell, and (at the distributors discretion) reduce the price of high-efficiency boilers. This means that to have an effect on the final decision to purchase a high-efficiency boiler, the program must first change the distributors’ behaviors and then those behaviors have to make a difference to the person purchasing from the distributors. The evaluation team captured this “causal chain” by surveying both the distributors and the buyers (end users) to capture the program influence." Inclusion of the NTGR evaluation findings for SCG's downstream program only increases the overall statewide NTGR findings for water heating boiler by 3%, from 8% (for PGE 21012) to 11% statewide. The PY2020 Commercial HVAC Impact Evaluation findings on boiler measure NTG are predominantly indicative of midstream delivery type program activity, and so the DEER Resolution updates to the boiler measure NTGR values apply to midstream design.

FINDINGS

1. We find it reasonable for the eTRM to continue to be administered by the PAs.
2. Resolution E-5082 authorized the IOUs to fund eTRM development and CalTF support activities in their EE program budgets or their EM&V budgets.
3. Resolution E-5082 authorized CPUC staff to make adjustments to the eTRM development timeline to address issues that arise during development and testing.
4. Resolution E-5082 OP 6 required that DEER databases and eTRM shall continue to be administered and maintained by the IOU funders without changes to contract management structure until completion Phase 1 and Phase 2 activities, and both Phase 1 and Phase 2 have been satisfactorily completed.
5. The IOU funders will grant the CPUC an irrevocable, royalty-free license to use, copy, distribute, and own the eTRM in perpetuity while they continue to contract for administration, maintenance, and enhancements of the eTRM.
6. Decision D.15-10-028 retains the direction from D.12-05-015 that DEER values be updated to be consistent with existing and updated state and federal codes and standards.
7. Decision D.15-10-028 also states that CPUC staff may make changes at any time without a Resolution to fix errors or to change documentation.
8. We find it feasible to transition from the use of MASControl3© and eQUEST models that use the DOE2 simulation engine to the EnergyPlus simulation engine.
9. It is appropriate to update the DEER values as result of a) updates to underlying methodology, b) updates for corrections and clarifications, c) updates based on evaluation study results, d) new code updates, e) review of market and research studies, and f) addition of new measures.
10. Decision D.05-01-055 establishes the CPUC Energy Division authority to review and approve measures, including authority to designate a set of values as the deemed data source of record.

THEREFORE, IT IS ORDERED THAT:

1. The IOUs will continue to fund and administer the eTRM from the IOU portion of the EM&V budgets and will address support activities for eTRM and CalTF in their 2024-2027 Business Plans.
2. The IOUs may alter the structure of eTRM contract management upon completion of Phase 2 activities in order to alternate the role of lead contract manager and solicit contractors for software development and coordination.

3. The DEER2024 and Revised DEER2023 and DEER2022 Updates, listed in Table 1, as described in Attachment A, and per supporting documentation available on the DEER Module at the CEDARS website, are approved with effective dates as listed. The Appendices and the Attachment to this resolution may be updated by staff as needed.
4. Pacific Gas and Electric Company (PG&E), Southern California Electric Company (SCE), Southern California Gas Company (SCG), and San Diego Gas & Electric (SDG&E), the San Francisco Bay Area Regional Energy Network (BayREN), Southern California Regional Energy Network (SoCalREN), Tri-County Regional Energy Network (3CREN), Local Government Sustainable Energy Coalition (LGSEC), Lancaster Choice Energy (LCE), and Marin Clean Energy (MCE) must use the updated assumptions, methods and values for Program Years 2022 and 2023 planning and savings claims, and Program Years 2024-25 planning, implementation and reporting.
5. Pacific Gas and Electric Company (PG&E), Southern California Electric Company (SCE), Southern California Gas Company (SCG), and San Diego Gas & Electric (SDG&E), the San Francisco Bay Area Regional Energy Network (BayREN), Southern California Regional Energy Network (SoCalREN), Tri-County Regional Energy Network (3CREN), Local Government Sustainable Energy Coalition (LGSEC), Lancaster Choice Energy (LCE), and Marin Clean Energy (MCE) must follow the updated process adopted in this resolution for deemed ex ante activities as directed in this resolution.
6. Pacific Gas and Electric Company (PG&E), Southern California Electric Company (SCE), Southern California Gas Company (SCG), and San Diego Gas & Electric (SDG&E), the San Francisco Bay Area Regional Energy Network (BayREN), Southern California Regional Energy Network (SoCalREN), Tri-County Regional Energy Network (3CREN), Local Government Sustainable Energy Coalition (LGSEC), Lancaster Choice Energy (LCE), and Marin Clean Energy (MCE) must comply with the updated schedule for activities adopted in this resolution unless expressly authorized by CPUC staff.

This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed, and adopted at a conference of the Public Utilities Commission of the State of California held on November 3, 2022; the following Commissioners voting favorably thereon:

/s/ RACHEL PETERSON
Rachel Paterson
Executive Director

ALICE REYNOLDS
President

CLIFFORD RECHTSCHAFFEN
GENEVIEVE SHIROMA
DARCIE HOUCK
JOHN REYNOLDS
Commissioners

Attachment:

E-5221 Resolution ATTACHMENT A

A1. PY2023 Measures

The list provided for PY2023 in Table A1.1 is current as of the adoption of the final resolution.

A1.1. PY2023 Measure Package Updates

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWAP001-04	Refrigerator or Freezer, Residential	2023	SDGE	Approved
SWAP003-04	Clothes Dryer, Residential	2023	SCG	Approved
SWAP004-03	Clothes Washer, Residential & Multifamily	2023	SCG	Approved
SWAP005-02	Ozone Laundry, Commercial	2023	SCG	Approved
SWAP006-04	Dishwasher, Residential	2023	SCG	Approved
SWAP007-02	Room Air Conditioner, Residential	2023	SDGE	Approved
SWAP008-02	Room Air Cleaner, Residential	2023	SDGE	Approved
SWAP011-03	Vending and Beverage Merchandise Controller	2023	SCE	Approved
SWAP012-01	Gas Dryer Modulating Valve, Commercial and Multifamily	2023	SCG	Approved
SWAP013-02	Residential Cooking Appliances – Fuel Substitution	2023	SCE	Approved
SWAP014-01	Heat Pump Clothes Dryer, Residential, Fuel Substitution	2023	SCE	Approved
SWAP015-02	Induction Cooking Top with or without Electric Range, Residential	2023	SDGE	Approved
SWAP017-02	Oven, Gas, Residential	2023	SCG	Approved
SWBE001-03	Greenhouse Heat Curtain	2023	SCG	Approved
SWBE002-03	Greenhouse Infrared Film	2023	SCG	Approved
SWBE006-01	Residential Ceiling Insulation	2023	SCG	Approved
SWBE007-01	Residential Blow-In Wall Insulation	2023	SCG	Approved
SWCA001-03	Air Compressor VFD Retrofit	2023	SCE	Approved
SWCR001-03	Anti-Sweat Heat Controls	2023	SCE	Approved
SWCR002-03	Low-Temperature Display Case Doors with No Anti-Sweat Heaters	2023	SCE	Approved

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWCR003-02	High Efficiency Motor Retrofit for Refrigerated Display Case	2023	SCE	Approved
SWCR004-02	EC Motor Retrofit for A Walk-In Cooler or Freezer	2023	SCE	Approved
SWCR005-03	Auto Closer for Refrigerated Storage Door	2023	SCE	Approved
SWCR007-03	Floating Head Pressure Controls, Multiplex	2023	PG&E	Approved
SWCR008-03	Floating Suction Controls, Multiplex	2023	SCE	Approved
SWCR010-03	Bare Suction Pipe Insulation	2023	SCE	Approved
SWCR012-02	Compressor Retrofit, Multiplex	2023	PG&E	Approved
SWCR014-03	Medium or Low-Temperature Display Case	2023	PG&E	Approved
SWCR015-02	Medium-Temperature Case Doors	2023	PG&E	Approved
SWCR017-03	Ultra-Low Temperature Freezer	2023	PG&E	Approved
SWCR018-03	Reach-In Refrigerator or Freezer, Commercial	2023	PG&E	Approved
SWCR019-02	Low-Temperature Coffin to Reach-In Display Case Conversion	2023	PG&E	Approved
SWCR020-02	Medium-Temperature Open Display Case Retrofit	2023	PG&E	Approved
SWCR021-02	Medium or Low-Temperature Display Case with Doors	2023	PG&E	Approved
SWCR022-03	Efficient Adiabatic Condenser	2023	SCE	Approved
SWFS001-02	Commercial Convection Oven – Electric & Gas	2023	SCG	Approved
SWFS002-03	Door Type Dishwasher, Commercial	2023	SCG	Approved
SWFS003-02	Combination Oven, Commercial	2023	SCG	Approved
SWFS004-01	Commercial Griddle – Electric & Gas	2023	SCG	Approved
SWFS005-03	Steamer, Commercial	2023	SCG	Approved
SWFS006-02	Commercial Ice Machine	2023	PG&E	Approved
SWFS007-03	Insulated Hot Food Holding Cabinet	2023	SCG	Approved
SWFS008-01	Conveyor Oven, Gas, Commercial	2023	SCG	Approved
SWFS009-02	Commercial Deck Oven, Electric	2023	SCG	Approved

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWFS010-02	Commercial Hand Wrap Machine	2023	SCG	Approved
SWFS011-04	Fryer, Commercial	2023	SCG	Approved
SWFS012-01	Exhaust Hood Demand Controlled Ventilation, Commercial	2023	SCG	Approved
SWFS013-02	Low-Flow Pre-Rinse Spray Valve	2023	SCG	Approved
SWFS014-02	Rack Oven	2023	SCG	Approved
SWFS016-02	Refrigerated Chef Base	2023	SCE	Approved
SWFS017-02	Automated Conveyor Broiler, Commercial	2023	SCG	Approved
SWFS018-04	Undercounter Dishwasher, Commercial	2023	SCG	Approved
SWFS019-02	Underfired Broiler, Commercial	2023	SCG	Approved
SWFS021-03	Commercial Fryer, Fuel Substitution	2023	SCE	Approved
SWFS022-02	Commercial Convection Oven, Fuel Substitution	2023	SCE	Approved
SWFS023-02	Conveyorized Toaster, Commercial	2023	SCE	Approved
SWHC001-02	Wall Furnace, Residential	2023	SCG	Approved
SWHC002-02	Intermittent Pilot Light, Residential	2023	SCG	Approved
SWHC004-04	Space Heating Boiler, Multifamily	2023	SCG	Approved
SWHC005-03	Water-Cooled Chiller	2023	SDGE	Approved
SWHC006-02	Demand Control Ventilation for Single Zone HVAC	2023	PG&E	Approved
SWHC008-01	VSD For Central Plant System	2023	SCE	Approved
SWHC009-03	Supply Fan Controls, Commercial	2023	SDGE	Approved
SWHC011-02	Furnace, Commercial	2023	SCG	Approved
SWHC012-02	Classroom HVAC Occupancy Sensor	2023	SCE	Approved
SWHC013-03	Unitary Air-Cooled AC and HP, over 65 kBtu/hr, Commercial	2023	SDGE	Approved
SWHC014-03	Unitary Air-Cooled AC and HP, below 65 kBtu/hr, Commercial	2023	SDGE	Approved
SWHC018-03	VSD for HVAC Fan Controls, Commercial	2023	PG&E	Approved
SWHC020-03	Air Cooled Chiller	2023	SDGE	Approved

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWHC023-03	Enhanced Ventilation for Packaged HVAC	2023	PG&E	Approved
SWHC024-03	Cogged V-Belt for HVAC Fan, Commercial	2023	SCE	Approved
SWHC027-02	Packaged Terminal Air Conditioner or Heat Pump, Under 24kBtuh	2023	SCE	Approved
SWHC029-02	Fan controller for air conditioner, residential	2023	SCE	Approved
SWHC030-03	Whole House Fan	2023	SCE	Approved
SWHC031-02	High-Efficiency Furnace, Residential	2023	SCG	Approved
SWHC038-02	Brushless Fan Motor Replacement, Residential	2023	SCE	Approved
SWHC039-05	Smart Thermostat, Residential	2023	SCE	Approved
SWHC041-03	Software-Controlled Switch Reluctance Motor	2023	SCE	Approved
SWHC042-03	Evaporative Pre-Cooler System and Controls for Packaged HVAC Unit	2023	SCE	Approved
SWHC043-03	Multiple Capacity Unitary Air-Cooled Commercial Air Conditioners Between 65 and 240 kBtu/hr	2023	SDGE	Approved
SWHC044-02	Ductless HVAC, Residential, Fuel Substitution	2023	SCE	Approved[42]
SWHC045-01	Heat Pump HVAC, Residential – Fuel Substitution	2023	SCE	Approved[42]
SWHC046-02	Heat Pump, Unitary Air-Cooled HVAC, Commercial - Fuel Substitution	2023	SCE	Approved
SWHC047-02	Gas Fireplace, Residential	2023	SCG	Approved
SWHC048-03	Packaged AC Heat Recovery	2023	SCG	Approved
SWHC049-02	HVAC, SEER-Rated AC and HP Equipment, Residential	2023	SDGE	Approved[42]
SWHC050-02	Ductless Heat Pump, HVAC, Residential	2023	SDGE	Approved[42]

[42] Will be updated mid-cycle to meet Department of Energy Code of Federal Regulations, 10 CFR 430.32(c) – 2023 Central Air Conditioners and Heat Pumps, effective 2023-01-01.

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWHC052-02	Air-Cooled Chiller, Path B	2023	SDGE	Approved
SWLG009-04	LED, Tube, Type A	2023	SCE	Approved
SWLG011-04	LED, High or Low Bay	2023	SCE	Approved
SWLG018-03	LED, Tube Type B and Type C	2023	SCE	Approved
SWMI001-02	Water Energy Nexus	2023	SDGE	Approved
SWPR001-01	Ventilation Fan, Agriculture	2023	PG&E	Approved
SWPR002-02	VFD for Glycol Pump Motor	2023	PG&E	Approved
SWPR003-01	Steam Trap, Commercial	2023	SCG	Approved
SWPR004-03	Circulating Block Heater	2023	SCE	Approved
SWPR005-02	Dust Collection Fan VSD	2023	PG&E	Approved
SWPR006-02	VSD For Ventilation Fan	2023	PG&E	Approved
SWPR007-01	Steam Boiler Economizer, Industrial	2023	SCG	Approved
SWRE001-02	Pool Cover, Commercial	2023	SCG	Approved
SWRE003-03	Pool or Spa Heater, Commercial	2023	SCG	Approved
SWRE004-02	Pool or Spa Heater, Residential	2023	SCG	Approved
SWRE005-02	Heat Pump Pool Heater, Residential - Fuel Substitution	2023	SCE	Approved
SWSV001-04	Duct Seal, Residential	2023	PG&E	Approved
SWSV005-02	Economizer Repair, Commercial	2023	SDGE	Approved
SWSV010-02	Economizer Controls, Commercial	2023	SDGE	Approved
SWSV013-02	Duct Optimization, DMo	2023	SDGE	Approved
SWWB002-01	Universal Audit Tool	2023	PG&E	Approved
SWWB004-02	Home Energy Reports	2023	PG&E	Approved
SWWH001-03	Faucet Aerator, Residential	2023	SCG	Approved
SWWH002-03	Low-Flow Showerhead, Residential	2023	SCG	Approved
SWWH003-02	TSV with Low Flow Showerhead	2023	SCG	Approved
SWWH004-03	Laminar Flow Restrictor	2023	SCG	Approved
SWWH005-05	Boiler, Commercial	2023	SCG	Approved
SWWH006-07	Tankless Water Heater, Commercial	2023	SCG	Approved

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWWH007-05	Storage Water Heater, Commercial	2023	SCG	Approved
SWWH008-01	Boiler, Process	2023	PG&E	Approved
SWWH010-02	Boiler, Multifamily	2023	SCG	Approved
SWWH011-02	Central Storage Water Heater, Multifamily	2023	SCG	Approved
SWWH012-03	Storage Water Heater, Residential	2023	SCG	Approved
SWWH013-03	Tankless Water Heater, Residential	2023	SCG	Approved
SWWH014-04	Heat Pump Water Heater, Residential	2023	SCE	Approved
SWWH015-03	Demand Control for Centralized Water Heater Recirculation Pump, Multifamily & Commercial	2023	SCG	Approved
SWWH016-03	Domestic Hot Water Loop Temperature Controller, Multifamily & Commercial	2023	SCG	Approved
SWWH017-04	Hot Water Pipe Insulation, Nonresidential and Multifamily	2023	SCG	Approved
SWWH018-04	Hot Water Tank Insulation, Nonresidential and Multifamily	2023	SCG	Approved
SWWH019-04	Faucet Aerator, Commercial	2023	SCG	Approved
SWWH020-04	Low-Flow Showerhead, Commercial	2023	SCG	Approved
SWWH021-01	Recirculation Pump Timer, Commercial	2023	SCG	Approved
SWWH022-01	Smart Pump, Residential	2023	PG&E	Approved
SWWH023-02	Tub Spout TSV	2023	SCG	Approved
SWWH025-05	Residential Heat Pump Water Heater, Fuel Substitution	2023	SCE	Approved
SWWH026-02	Water Heater Pipe Wrap, Residential	2023	SCG	Approved
SWWH027-03	Heat Pump Water Heater, Commercial, Fuel Substitution	2023	SCE	Approved
SWWH028-02	Multi-Family and Commercial Large Heat Pump Water Heater– Fuel Substitution	2023	SCE	Approved
SWWH030-01	Tankless Combination Space and Water Heater, Residential	2023	SCG	Approved
SWWH031-02	Heat Pump Water Heater, Commercial	2023	SCE	Approved

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWWH032-01	Solar Thermal Water Heating System, Residential	2023	SCG	Approved
SWWH033-02	Gas Heat Pump Water Heater, Multifamily	2023	SCG	Approved
SWWH034-01	Solar Thermal Water Heating System, Multifamily	2023	SCG	Approved
SWWP002-02	VFD on Ag Pump	2023	PG&E	Approved
SWWP004-02	Water Pump Upgrade	2023	PG&E	Approved
SWWP005-02	Enhanced VFD On Irrigation Pump	2023	PG&E	Approved

A2. PY2024-25 Measures

The list provided in Table A2.1 is current as of the adoption of the final resolution.

Table A2.1. DEER2024-25 Measure Packages to be Updated

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWAP001-05	Refrigerator or Freezer, Residential	2024	SDGE	Approved
SWAP003-04	Clothes Dryer, Residential	2024	SCG	Approved
SWAP004-03	Clothes Washer, Residential & Multifamily	2024	PG&E	Approved
SWAP005-02	Ozone Laundry, Commercial	2024	SCG	Approved
SWAP006-04	Dishwasher, Residential	2024	SCG	Approved
SWAP007-02	Room Air Conditioner, Residential	2024	SDGE	Approved
SWAP008-02	Room Air Cleaner, Residential	2024	SDGE	Approved
SWAP011-03	Vending and Beverage Merchandise Controller	2024	SCE	Approved
SWAP012-01	Gas Dryer Modulating Valve, Commercial and Multifamily	2024	SCG	Approved
SWAP013-02	Residential Cooking Appliances – Fuel Substitution	2024	SCE	Approved
SWAP014-02	Heat Pump Clothes Dryer, Residential, Fuel Substitution	2024	SCE	Approved
SWAP015-02	Induction Cooking Top with or without Electric Range, Residential	2024	SDGE	Approved
SWAP017-02	Oven, Gas, Residential	2024	SCG	Approved
SWBE001-03	Greenhouse Heat Curtain	2024	SCG	Approved
SWBE002-03	Greenhouse Infrared Film	2024	SCG	Approved
SWBE006-02	Residential Ceiling Insulation	2024	SCG	Approved
SWBE007-02	Residential Blow-In Wall Insulation	2024	SCG	Approved
SWCA001-03	Air Compressor VFD Retrofit	2024	SCE	Approved
SWCR001-03	Anti-Sweat Heat Controls	2024	SCE	Approved
SWCR002-03	Low-Temperature Display Case Doors with No Anti-Sweat Heaters	2024	SCE	Approved
SWCR003-02	High Efficiency Motor Retrofit for Refrigerated Display Case	2024	SCE	Approved

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWCR004-02	EC Motor Retrofit for a Walk-In Cooler Or Freezer	2024	SCE	Approved
SWCR005-03	Auto Closer for Refrigerated Storage Door	2024	SCE	Approved
SWCR007-03	Floating Head Pressure Controls, Multiplex	2024	PG&E	Approved
SWCR008-03	Floating Suction Controls, Multiplex	2024	SCE	Approved
SWCR010-03	Bare Suction Pipe Insulation	2024	SCE	Approved
SWCR012-02	Compressor Retrofit, Multiplex	2024	PG&E	Approved
SWCR014-03	Medium or Low-Temperature Display Case	2024	PG&E	Approved
SWCR015-02	Medium-Temperature Case Doors	2024	PG&E	Approved
SWCR017-03	Ultra-Low Temperature Freezer	2024	PG&E	Approved
SWCR018-03	Reach-In Refrigerator or Freezer, Commercial	2024	PG&E	Approved
SWCR019-02	Low-Temperature Coffin to Reach-In Display Case Conversion	2024	PG&E	Approved
SWCR020-02	Medium-Temperature Open Display Case Retrofit	2024	PG&E	Approved
SWCR021-02	Medium or Low-Temperature Display Case with Doors	2024	PG&E	Approved
SWCR022-03	Efficient Adiabatic Condenser	2024	SCE	Approved
SWFS001-02	Commercial Convection Oven – Electric & Gas	2024	SCG	Approved
SWFS002-03	Door Type Dishwasher, Commercial	2024	SCG	Approved
SWFS003-02	Combination Oven, Commercial	2024	SCG	Approved
SWFS004-01	Commercial Griddle – Electric & Gas	2024	SCG	Approved
SWFS005-03	Steamer, Commercial	2024	SCG	Approved
SWFS006-02	Ice Machine, Commercial	2024	PG&E	Approved
SWFS007-03	Insulated Hot Food Holding Cabinet	2024	SCE	Approved
SWFS008-01	Conveyor Oven, Gas, Commercial	2024	SCG	Approved
SWFS009-02	Commercial Deck Oven, Electric	2024	SCE	Approved
SWFS010-02	Commercial Hand Wrap Machine	2024	SCE	Approved
SWFS011-05	Fryer, Commercial	2024	SCG	Approved

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWFS012-01	Exhaust Hood Demand Controlled Ventilation, Commercial	2024	SCE	Approved
SWFS013-02	Low-Flow Pre-Rinse Spray Valve	2024	SCG	Approved
SWFS014-02	Rack Oven	2024	SCG	Approved
SWFS016-02	Refrigerated Chef Base	2024	SCE	Approved
SWFS017-02	Automated Conveyor Broiler, Commercial	2024	SCG	Approved
SWFS018-04	Undercounter Dishwasher, Commercial	2024	SCG	Approved
SWFS019-02	Underfired Broiler, Commercial	2024	SCG	Approved
SWFS021-03	Commercial Fryer, Fuel Substitution	2024	SCE	Approved
SWFS022-02	Commercial Convection Oven, Fuel Substitution	2024	SCE	Approved
SWFS023-02	Conveyorized Toaster, Commercial	2024	SCE	Approved
SWHC001-03	Wall Furnace, Residential	2024	SCG	Approved
SWHC002-03	Intermittent Pilot Light, Residential	2024	SCG	Approved
SWHC004-05	Space Heating Boiler, Multifamily	2024	SCG	Approved
SWHC005-03	Water-Cooled Chiller	2024	SDGE	Approved
SWHC006-02	Demand Control Ventilation for Single Zone HVAC	2024	PG&E	Approved
SWHC008-01	VSD For Central Plant System	2024	SCE	Approved
SWHC009-03	Supply Fan Controls, Commercial	2024	SDGE	Approved
SWHC011-02	Furnace, Commercial	2024	SCG	Approved
SWHC012-02	Classroom HVAC Occupancy Sensor	2024	SCE	Approved
SWHC013-03	Unitary Air-Cooled AC and HP, over 65 kBtu/hr, Commercial	2024	SDGE	Approved
SWHC014-03	Unitary Air-Cooled AC and HP, below 65 kBtu/hr, Commercial	2024	SDGE	Approved
SWHC018-03	VSD for HVAC Fan Controls, Commercial	2024	PG&E	Approved
SWHC020-03	Air Cooled Chiller	2024	SDGE	Approved
SWHC023-03	Enhanced Ventilation for Packaged HVAC	2024	PG&E	Approved
SWHC024-03	Cogged V-Belt for HVAC Fan, Commercial	2024	SCE	Approved

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWHC027-03	Package Terminal Air Conditioner or Heat Pump, Under 24 kBtu/hr	2024	SDGE	Approved
SWHC029-03	Fan Controller for Air Conditioner, Residential	2024	SCE	Approved
SWHC030-03	Whole House Fan	2024	SCE	Approved
SWHC031-03	High-Efficiency Furnace, Residential	2024	SCG	Approved
SWHC038-02	Brushless Fan Motor Replacement, Residential	2024	SCE	Approved
SWHC039-06	Smart Thermostat, Residential	2024	SCE	Approved
SWHC041-03	Software-Controlled Switch Reluctance Motor	2024	SCE	Approved
SWHC042-03	Evaporative Pre-Cooler System and Controls For Packaged HVAC Unit	2024	SCE	Approved
SWHC043-03	Multiple Capacity Unitary Air-Cooled Commercial Air Conditioners Between 65 and 240 kBtu/hr	2024	SDGE	Approved
SWHC044-03	Ductless HVAC, Residential, Fuel Substitution	2024	SCE	Approved[43]
SWHC045-02	Heat Pump HVAC, Residential – Fuel Substitution	2024	SDGE	Approved[43]
SWHC046-02	Heat Pump, Unitary Air-Cooled HVAC, Commercial - Fuel Substitution	2024	SCE	Approved
SWHC047-03	Gas Fireplace, Residential	2024	SCG	Approved
SWHC048-03	Packaged AC Heat Recovery	2024	SCG	Approved
SWHC049-03	SEER-Rated AC and HP HVAC Equipment, Residential	2024	SDGE	Approved[43]
SWHC050-03	Ductless, Heat Pump, Residential	2024	SDGE	Approved[43]
SWHC052-02	Air-Cooled Chiller, Path B	2024	SDGE	Approved
SWMI001-02	Water Energy Nexus	2024	SDGE	Approved
SWPR001-01	Ventilation Fan, Agriculture	2024	PG&E	Approved

[43] Will be updated mid-cycle to meet Department of Energy Code of Federal Regulations, 10 CFR 430.32(c) – 2023 Central Air Conditioners and Heat Pumps, effective 2023-01-01.

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWPR002-02	VFD for Glycol Pump Motor	2024	PG&E	Approved
SWPR003-01	Steam Trap, Commercial	2024	SCG	Approved
SWPR004-03	Circulating Block Heater	2024	SCE	Approved
SWPR005-02	VFD for Dust Collection Fan	2024	PG&E	Approved
SWPR006-02	VSD For Ventilation Fan	2024	PG&E	Approved
SWPR007-01	Steam Boiler Economizer, Industrial	2024	SCG	Approved
SWRE001-02	Pool Cover, Commercial	2024	SCG	Approved
SWRE003-03	Pool or Spa Heater, Commercial	2024	SCG	Approved
SWRE004-03	Pool or Spa Heater, Residential	2024	SCG	Approved
SWRE005-02	Heat Pump Pool Heater, Residential - Fuel Substitution	2024	SCE	Approved
SWSV001-05	Duct Seal, Residential	2024	SDGE	Approved
SWSV005-02	Economizer Repair, Commercial	2024	SDGE	Approved
SWSV010-02	Economizer Controls, Commercial	2024	SDGE	Approved
SWSV013-03	Duct Optimization	2024	SDGE	Approved
SWWB002-01	Universal Audit Tool	2024	PG&E	Approved
SWWB004-02	Home Energy Reports	2024	PG&E	Approved
SWWH001-03	Faucet Aerator, Residential	2024	SCG	Approved
SWWH002-03	Low-Flow Showerhead, Residential	2024	SCG	Approved
SWWH003-02	TSV with Low Flow Showerhead	2024	SCG	Approved
SWWH004-03	Laminar Flow Restrictor	2024	SCG	Approved
SWWH005-06	Boiler, Commercial	2024	SCG	Approved
SWWH006-07	Tankless Water Heater, Commercial	2024	SCG	Approved
SWWH007-05	Storage Water Heater, Commercial	2024	SCG	Approved
SWWH008-01	Boiler, Process	2024	PG&E	Approved
SWWH010-02	Boiler, Multifamily	2024	SCG	Approved
SWWH011-02	Central Storage Water Heater, Multifamily	2024	SCG	Approved
SWWH012-03	Storage Water Heater, Residential	2024	SCG	Approved
SWWH013-03	Tankless Water Heater, Residential	2024	SCG	Approved

Measure Package ID	Measure Name	Program Year	Lead IOU	Status
SWWH014-04	Heat Pump Water Heater, Residential	2024	SCE	Approved
SWWH015-03	Demand Control for Centralized Water Heater Recirculation Pump, Multifamily & Commercial	2024	SCG	Approved
SWWH016-03	Domestic Hot Water Loop Temperature Controller, Multifamily & Commercial	2024	SCG	Approved
SWWH017-04	Hot Water Pipe Insulation, Nonresidential and Multifamily	2024	SCG	Approved
SWWH018-04	Hot Water Tank Insulation, Nonresidential and Multifamily	2024	SCG	Approved
SWWH019-04	Faucet Aerator, Commercial	2024	SCG	Approved
SWWH020-04	Low-Flow Showerhead, Commercial	2024	SCG	Approved
SWWH021-01	Recirculation Pump Timer, Commercial	2024	SCG	Approved
SWWH022-01	Smart Pump, Residential	2024	PG&E	Approved
SWWH023-02	Tub Spout TSV	2024	SCG	Approved
SWWH025-05	Residential Heat Pump Water Heater, Fuel Substitution	2024	SCE	Approved
SWWH026-02	Water Heater Pipe Wrap, Residential	2024	SCG	Approved
SWWH027-03	Heat Pump Water Heater, Commercial, Fuel Substitution	2024	SCE	Approved
SWWH028-02	Multi-Family and Commercial Large Heat Pump Water Heater– Fuel Substitution	2024	SCE	Approved
SWWH031-02	Heat Pump Water Heater, Commercial	2024	SCE	Approved
SWWH032-01	Solar Thermal Water Heating System, Residential	2024	SCG	Approved
SWWH033-02	Gas Heat Pump Water Heater, Multifamily	2024	SCG	Approved
SWWH034-01	Solar Thermal Water Heating System, Multifamily	2024	SCG	Approved
SWWP002-03	VFD on Well Pump, <= 300 hp	2024	PG&E	Approved
SWWP004-02	Water Pump Upgrade	2024	PG&E	Approved
SWWP005-03	Enhanced VFD on Irrigation Pump	2024	PG&E	Approved

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.[44]

Table A3.1. Measure Package Dispositions Directing Updates for PY2023 and PY2024-2025

Measure ID	Title	Date	Summary of Direction
SWWH028-02	Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution	2022-10-19	Disposition approves the statewide measure package Large Heat Pump Water Heater, Commercial and Multifamily, Fuel Substitution: SWWH028-02 to be effective on January 1, 2023. Measure package updates were in accordance with Resolution E-5152.
SWWH027-03	Heat Pump Water Heater, Commercial, Fuel Substitution	2022-10-14	Disposition approves the statewide measure package Heat Pump Water Heater, Commercial, Fuel Substitution: SWWH027-03 to be effective on January 1, 2023. Measure package updates were in accordance with Resolution E-5152.
SWWH025-05	Heat Pump Water Heater, Residential, Fuel Substitution	2022-10-14	Disposition approves the statewide measure package Heat Pump Water Heater, Residential, Fuel Substitution: SWWH025-05 to be effective on January 1, 2023. Measure package updates were in accordance with Resolution E-5152.
SWAP014-02	Heat Pump Clothes Dryer, Residential, Fuel Substitution	2022-10-13	Disposition approves the statewide measure package Heat Pump Clothes Dryer, Residential, Fuel Substitution: SWAP014-02 to be effective on January 1, 2023. Measure package updates were in accordance with Resolution E-5152.

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

Measure ID	Title	Date	Summary of Direction
SWLG018-02	LED, Tube, Type B and Type C	2022-10-05	Disposition approves the statewide measure package LED, Tube, Type B and Type C: SWLG018-02 to be effective retroactively from January 1, 2022, to December 31, 2022. Measure package updates were to correct the hours of use for the garage building type.
SWLG009-03	LED, Tube, Type A	2022-10-05	Disposition approves the statewide measure package LED, Tube, Type A: SWLG009-03 to be effective retroactively from January 1, 2022, to December 31, 2022. Measure package updates were to correct the hours of use for the garage building type.
SWAP001-03	Refrigerator or Freezer, Residential	2022-09-22	Disposition approves the statewide measure package Refrigerator or Freezer, Residential: SWAP001-03 to be effective retroactively from January 1, 2022, to December 31, 2022. Measure package updates were to correct the interactive effect factors.
SWAP013-02	Cooking Appliances, Residential, Fuel Substitution	2022-09-19	Disposition approves the statewide measure package Cooking Appliances, Residential, Fuel Substitution: SWAP013-02 to be effective on January 1, 2023. Measure package updates were in accordance with Resolution E-5152.
SWHC046-02	Packaged Heat Pump Air Conditioner, Commercial, Fuel Substitution	2022-09-13	Disposition approves the statewide measure package Packaged Heat Pump Air Conditioner, Commercial, Fuel Substitution: SWHC046-02 to be effective on January 1, 2023. Measure package updates were in accordance with Resolution E-5152.

Measure ID	Title	Date	Summary of Direction
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. Measure package updates were in accordance with Resolution E-5152.
SWAP010-02	Smart Connected Power Strip	2022-08-23	Disposition rejects the statewide measure package Smart Connected Power Strip: SWAP010-02 due to a lack of data collection to support measure package savings. SWAP010-01 will expire on December 31, 2022.
SWFS022-02	Convection Oven, Commercial, Fuel Substitution	2022-08-02	Disposition approves the statewide measure package Convection Oven, Commercial, Fuel Substitution: SWFS022-02 to be effective on January 1, 2023. Measure package updates were in accordance with Resolution E-5152.
SWFS021-03	Fryer, Commercial, Fuel Substitution	2022-08-02	Disposition approves the statewide measure package Fryer, Commercial, Fuel Substitution: SWFS021-03 to be effective on January 1, 2023. Measure package updates were in accordance with Resolution E-5152.
SWWH028-01	Heat Pump Water Heater, Multifamily and Commercial, Fuel Substitution	2022-01-25	Disposition approves the statewide measure package Heat Pump Water Heater, Multifamily and Commercial, Fuel Substitution: SWWH028-01 to be effective upon approval. The program administrators are directed to submit the incremental measure cost (IMC) addendum when the cost of the rebate exceeds the IMC.

Measure ID	Title	Date	Summary of Direction
SWHC039-04	Smart Thermostat, Residential	2021-12-20	Disposition approves the statewide measure package Smart Thermostat, Residential: SWHC039-04 to effective on January 1, 2022 and expire on December 31, 2022. The program administrators (PAs) are directed to revise the measure package for 2023 based on ongoing evaluation work in 2021 and early 2022. All additional analyses will be completed by Spring 2021 in time to facilitate a measure package update by June 1, 2022 to be effective January 1, 2023.
SWWP002-02	VFD on Well Pump, ≤300 hp	2021-09-01	Disposition approves the statewide measure package VFD on Well Pump, ≤ 300 hp: SWWP002-02 to be effective on January 1, 2022 and expire on December 31, 2023. The program administrators are directed to revise the measure package for PY 2024-2025 based on ISP research, possible combination of this measure with SWWP005-02 (Enhanced VFD on Irrigation Pump) based on the most recent data for operating profiles.
SWWP005-02	Enhanced VFD on Irrigation Pump	2021-09-01	Disposition approves the statewide measure package Enhanced VFD on Irrigation Pump: SWWP005-02 to be effective on January 1, 2022 and expire on December 31, 2023. The program administrators are directed to revise the measure package for PY 2024-2025 based on ISP research, possible combination of this measure with SWWP002-02 (VFD on Well Pump, <=300 hp) based on the most recent data for operating profiles.

Measure ID	Title	Date	Summary of Direction
SWRE005-01	Heat Pump Pool Heater, Fuel Substitution	2021-07-30	Disposition approves the statewide measure package Heat Pump Pool Heater, Fuel Substitution: SWRE005-01 to be effective upon approval. The program administrators are directed to submit the incremental measure cost (IMC) addendum when the cost of the rebate exceeds the IMC.
SWWH027-02	Heat Pump Water Heater, Commercial, Fuel Substitution	2021-06-11	Disposition approves the statewide measure package Heat Pump Water Heater, Commercial, Fuel Substitution: SWWH027-02 to be effective on January 1, 2022. The program administrators are directed to submit the incremental measure cost (IMC) addendum when the cost of the rebate exceeds the IMC.
SWWH025-04	Heat Pump Water Heater, Residential, Fuel Substitution	2021-06-11	Disposition approves the statewide measure package Heat Pump Water Heater, Residential, Fuel Substitution: SWWH025-04 to be effective on January 1, 2022. The program administrators are directed to submit the incremental measure cost (IMC) addendum when the cost of the rebate exceeds the IMC.
SWHC044-02	Ductless HVAC, Residential, Fuel Substitution	2021-04-21	Disposition approves the statewide measure package Ductless HVAC, Residential, Fuel Substitution: SWHC044-02 to be effective on July 21, 2021. The program administrators are directed to submit the incremental measure cost (IMC) addendum when the cost of the rebate exceeds the IMC.

A4. Measure Package Guidance

Table A4.1 lists the guidance released since the last DEER Resolution that informs PY2023 and PY2024 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 PY2023 and PY2024-2025

Date	Title (linked to full document)	Summary
2022-10-18	Measure Package Plan (MPP) Template	This template is to be used for proposed new measures or measure updates to receive early CPUC feedback.
2022-09-27	NTG Ratio for Nonresidential Package/Split System AC/HP	This guidance clarifies which NTG ratios should be applied to various nonresidential HVAC measures for program years 2022 and 2023.
2022-08-16	Duct Seal Measure Guidance	This guidance provides clarification regarding the duct sealing (SWSV001-04) and duct optimization (SWSV013-02) measure packages and the specific requirements related to: the duct leakage test method, the leakage reduction required to claim this measure, and the building era that can be claimed.
2022-06-09	Measure Package Adoption by PAs	This guidance sets forth the process for PAs and third-party implementers to upload and adopt PA implementation codes in eTRM. A measure log entry will be created and set to 'PA Implementation Codes' with an attachment summarizing the specific permutations each PA will offer.
2022-06-02	Addendum to Measure Package Documenting Incentive Greater than Incremental Measure Cost	This guidance sets forth 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.

Date	Title (linked to full document)	Summary
2022-02-22	Short- and Long-term Solutions for Integrating Embedded Energy Savings into CEDARS	Guidance outlining short- and long-term solutions for integrating water-energy embedded energy savings for claims.
2022-02-22	Measure Package Submission Cover Sheet Template Version 6	This document is an updated cover sheet template for the IOUs to use when submitting measure packages through the eTRM.
2022-02-03	Guidance for NTG ratios for HTR with DI	This guidance document summarizes the CPUC decision for applying the hard-to-reach (HTR) NTG ratio of 0.85 to HTR customers who receive equipment through direct install delivery channels.
2021-12-16	Energy Plus Files Memo	This memo describes the files and supporting documents that should be submitted for residential non-DEER measures that were previously modeled using MASControl3 and eQUEST/DOE2 building simulations.
2021-12-03	Guidance for Refrigerant Avoided Cost Addendum (RACC) to Measure Packages	This guidance provides the PAs with the approved RACC cover sheet and calculator to be submitted as an addendum to active measure packages.
2021-09-30	CPUC Guidance on the use of Negative Incremental Measure Cost (IMC) in the Cost Effectiveness Tool	This guidance sets the precedent for fuel substitution measures to use zero for negative IMC value in the CET and use the standard addendum template for rebates greater than IMC values.

Attachment A
DEER2024 Update

Contents

Tables

Figures

1 Management of DEER Processes

The following sections provide detail on policy changes and updates affecting the DEER database and measure packages[1]—both structural and to ex ante values.

1.1 (B) Updates to eTRM and Measure Packages

Effective Program Year: 2024-2026. This section and the subsections below provide additional detail for resolution E-5221 section B. California's statewide electronic Technical Reference Manual (eTRM) version 2.3 is the *Official Source of California Energy Efficiency Measure Data*[2] and is now the sole source for energy efficiency measure package development, submittal, review, and publishing. Measure developers shall follow the rules and procedures as laid out in the documents provided by California Technical Forum (CalTF) as they move measures through the development phase prior to submittal.

1.1.1 (B.1) eTRM Table Structure Changes

Effective Program Year: 2026. Additional fields shall be added to the eTRM measure permutations table as needed to support 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 shall 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 Cost Effectiveness Tool (CET), the CPUC staff will review and approve necessary changes to meet these needs. Examples of such fields include but are not limited to: Refrigerant Avoided Costs (RACC), ex ante annual water savings, in gallons (one for indoor water savings and a second for outdoor water savings), low-Global Warming Potential (GWP) refrigerants, and water-energy nexus (WEN) direct energy savings.

1.1.2 (B.2) Refrigerant Impacts (RACC)

Effective Program Year: 2024. Per Resolution E-5152, starting in PY2022 the reporting of refrigerant leakage avoided costs (RLAC) is required for all energy efficiency measure

[1] Formerly referred to as "workpapers"
[2] https://www.caetrm.com/

claims as calculated from the CPUC's Refrigerant Avoided Cost Calculator (RACC)[3] for measure packages where the retrofit involves adding (not replacing) equipment that uses refrigerant—these include fuel substitution and electric resistance to heat pump measures—or where low-GWP measure benefits will be claimed. In a memorandum issued on November 24, 2021 CPUC staff provided guidance on the new process required by program administrators (PAs) for submittal of an addendum to measure packages for the inclusion of the updated version of the RACC and a cover sheet summarizing the changes, see Appendix A4 of this resolution. The updates to the RACC required adding language to the non-energy impacts section of the eTRM Measure Characterization and two new fields to the eTRM permutations table. These new fields were also added to CEDARS reporting data and to CET inputs.

The RACC, AR measures should be treated the same as normal replacement (NR) measures until the RACC is revised. PAs should continue to work with CPUC staff to update the RACC to include the calculations for AR measures as well as updates based on directed research of performance data for low-GWP as described in Resolution E-5221 Section B.2 by June 1, 2023. Measure developers will need to submit the updated RACC for applicable measure packages thereafter.

1.1.3 (B.3) Aggregated Values in Permutations

Effective Program Year: 2024. CPUC staff clarifies that aggregated values (e.g., "Any", "Res", "Com") shall only be used in some fields of the permutations table when those conditions listed in Table 1-1 are met. The definitions of the listed delivery types are provided in Section 1.8.2. This guidance is not intended to direct what is permitted for claims reporting.

Table 1-1. Conditions for Usage of Aggregated Values in Permutations

Field	Value	Conditions for Usage of Aggregated Value(s) by Delivery Type
Building HVAC	Any	For all delivery types: · UES values are equal across all HVAC types
	rWtd or cWtd	For all delivery types except direct install: · UES values are weighted averages of the UES values for each HVAC type of given sector

[3] http://deeresources.com/index.php/racc-resources

Field	Value	Conditions for Usage of Aggregated Value(s) by Delivery Type
Building Location	Any	For all delivery types: · UES values are equal across all climate zones
Building Type	Any	For midstream, downstream, or direct install delivery type: · UES values are equal across all DEER building types of given sector
	Res or Com	For upstream delivery type: · UES values are weighted averages of the UES values for each building type of given sector
Building Vintage	Any	Cannot be used

1.1.4 (B.4) Water-Energy Nexus (WEN) Impacts

In December 2021 the CPUC released the new Water-Energy (W-E) Calculator 2.0.[4] The new calculator replaces W-E Calculator 1.0 and is to be used to calculate the embedded energy savings for Water-Energy Nexus (WEN) energy efficiency measures starting PY2023 for existing measures. W-E savings are no longer to be reported in a single rolled-up measure package (SWMI001); instead, the WEN calculated savings are to be included with each measure package involving water savings. PAs can now add the embedded energy savings to the direct energy savings from these WEN measures to claim incentives which will count towards PAs' energy efficiency goals.

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 must be added to direct energy savings and integrated into the eTRM, CEDARS, and CET; and how outputs must be used to update W-E savings in existing measure packages and for the development of new measures packages, see Appendix A4.

The short-term solution is only suitable for measures that use the default marginal water supply—recycled water (non-potable), and the output embedded energy savings added to the direct energy savings generated by that measure are reported as one value. The short-term solution resulted in the update to eighteen existing measure packages

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

for PY2023. Once the CET is updated to include a separate field for embedded water savings, the long-term solution will 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 embedded-water-energy savings will be calculated following the same methodology described in the short-term solution, but the embedded energy savings will be stored independently of the direct energy savings within the eTRM to facilitate reporting and cost-effectiveness calculations.

The PA will continue to receive the same credit for both the direct and embedded energy savings as they received using the short-term solution, but for accounting purposes the two types of savings will be entered into the CET separately through CEDARS. The updates to the WEN measures required adding language to the non-energy impacts section of the eTRM Measure Characterization and two new fields to the eTRM permutations table: one for the indoor annual water savings and one for outdoor annual water savings. Both will be reported in gallons.

When CPUC staff informs the relevant PAs of this transition, the PAs will create a Measure Log entry that includes a Measure Package Plan (MPP). The MPP will describe the administrative change to the measure package that will incorporate the long-term solution used to calculate the total energy savings as well as when the change will take effect. This administrative change will not trigger a new version of the measure package since impacts (including savings, cost, and measure life) have not changed.

1.1.5 (B.5) Rebates Exceeding Incremental Measure Cost (IMC)

In 2020, CPUC staff released an *Addendum to Fuel Substitution Workpaper Documenting Incentive Greater that Incremental Measure Cost*[5]. The purpose of this addendum was to provide a pathway for PAs to inform the CPUC staff of the need to offer rebates to the customer that exceeds the net cost to the participant of installing more efficient equipment.

On June 2, 2022, CPUC staff released an updated guidance document *Addendum to Measure Package Documenting Incentive Greater than Incremental Measure Cost*, see Appendix A4. The guidance included the following:

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

- Update to include eligibility of all measures.
- Update to change the term workpaper to measure package.
- Update title of document "Addendum to Measure Package Documenting Incentive Greater than Incremental Measure Cost".
- Added directions for posting addendum to the measure log for referenced measure package.
- Added third party to Incentive Requirements narrative.
- Removed PA contact information

1.1.6 (B.6) Measure Cost Updates

Measure costs will be updated in accordance with the Measure Lifecycle Management table, see Section F, but no less frequently than every four years using methods described in CalTF's whitepaper on cost updates for measure package updates.[6] In the cost section of a measure package, the author must note whether the technology has quickly-changing costs that would indicate more frequent measure package updates.

1.1.7 (B.7) Data Requirements for Distributor/Contractor-delivered Measures

Multiple evaluation reports have recommended improvements in documentation quality to meet the measure data collection and evaluation requirements. Data requirements must be added to measure packages updated for PY2023 and PY2024—as relevant—for all offerings using the UpDeemed delivery type. At a minimum, the data collected through the program must allow identification of each piece of incented equipment for EM&V verification purposes. The specific data requirements will be reviewed on a case-by-case basis through the measure package review process. The following is an example of data requirements.

- SiteID – A unique identifier for the shipped location (upstream) or installed location (midstream) of the incentivized equipment. The site address can be used in cases where it uniquely identifies one building. If an address identifies a building complex then an additional building identifier must also be included.
- EquipmentID - A unique identifier for each unit of incentivized equipment, e.g., serial number

[6] https://static1.squarespace.com/static/53c96e16e4b003bdba4f4fee/t/5f99c8d60e9651515f53a3db/1603913944726/Cal+TF+White+Paper+Cost+Analysis+Methods+Affirmed+2020.09.24++v1.0.pdf

- Building Type – Commercial or residential building type, e.g., Asm, RSD, MFm
- Measure Size category – General size or capacity range specific to each measure type, for example HVAC equipment would be AHRI product type and size range
- Equipment manufacturer – Manufacturer of the incentivized equipment, e.g., Carrier, Trane, Nest, Philips, GE, etc.
- Equipment model number – Manufacturer number that can be used to lookup size, features, performance, etc. for the incentivized equipment
- Rated capacity – Actual size, capacity, load rating, etc. for the incentivized equipment
- Rated efficiency unit (EfficUnit) – The engineering unit basis for the efficiency or performance rating, e.g., Unit Energy Factor (UEF), thermal efficiency (TE), seasonal energy efficiency ratio (SEER)
- Rated efficiency (ref. EfficUnit) – Efficiency or performance rating value for the Rated efficiency unit basis
- Quantity per sales transaction, project, or site – Total units of incentivized equipment located at the site or project
- Control strategy – document the relevant control strategy to demonstrate compliance with measure specifications (e.g., for space-heating boiler measures, supply hot water temperature reset strategy based on outside-air temperature).

Additional data requirements for specific measure packages may be required for inclusion and will be addressed as part of the measure package review process.

1.2 (C) DEEResources Website Content Migrated to CEDARS

Effective Program Year: 2024. This section provides additional detail for resolution section C. During Q4 2021, infrastructure to house the existing contents of the DEEResources.com and DEEResources.net websites was built within a new module on the CPUC's CEDARS website: DEER Module.[7] Enhancements were made to the infrastructure during Q1 2022 and:

- All content from DEEResources.net was migrated.
- All contents from DEEResources.com was migrated. No new content will be uploaded to DEEResources.com.

[7] https://cedars.sound-data.com/deer-resources/

As information, CEDARS' DEER Module is organized as described in Table 1-2.

Table 1-2. DEER Module on CEDARS

DEER Module's Sub-module	Page(s) within Sub-module	Description
+ Deemed Measure Packages	Resolutions for Deemed Measures	PDF repository of final resolutions for DEER updates
	Dispositions for Deemed Measures	PDF repository of dispositions regarding deemed measures
	Guidance for Deemed Measures	PDF repository of dispositions regarding deemed measures
	Deemed Measure Archive	Repository of measure packages (a.k.a. workpapers) and supporting documentation approved by the CPUC through 2021-12-31. All statewide measure packages are available at eTRM.
+ Tools	EnergyPlus	Information about the transition to EnergyPlus, including a Git[8] repository of idf[9] files and other supporting files
	MASControl	Git repository of zipped files, supporting workbooks, and documentation for building simulations that use the eQUEST/DOE2 engine.
	Water Heaters	Git repository of zipped files, supporting workbooks, and documentation for service/domestic water heating equipment.
	Load Shapes	Git repository of python code, supporting workbooks, and documentation for DEER load shapes and their associated Generalized Load Shape Parameters (GLSPs).
	Other	Git repository of other supporting workbooks outside of the above categories (e.g., chiller workbook, modified lighting calculator, RACC)

[8] Git is software for tracking changes in any set of files; gits are usually used for coordinating work among software programmers.
[9] .idf is the file extension used by EnergyPlus input files

DEER Module's Sub-module	Page(s) within Sub-module	Description
+ DEER Database	DEER Change Log	Information about updates made to tables of the DEER database
	Archived PEAR Change Log	Archive of updates made to the former PEAR database through 2021-12-31; the PEAR database was renamed to DEER in January 2022.
	Archived ExAnte Change Log	Archive of updates made to the former ExAnte database through 2021-12-31; the ExAnte database was retired as of 2022-01-01.
+ DEER Versions	DEER 2024	PDF repository for this and future documents up to and including the final resolution for the DEER2024 update
	DEER 2023	PDF repository of all documents up to and including the final resolution for each of the past four DEER update cycles
	DEER 2022	
	DEER 2021	
	DEER 2020	
	DEER Versions Archive	A copy of the contents of all DEER updates pages prior to DEER2020 from the legacy website of DEEResources.com
Ex Ante Review Memos	N/A	PDF repository of mid-year and final ex ante review memos to IOUs
Help and Contact	N/A	PDF repository of responses to FAQs and an email link to DEERsupport@dnv.com

1.3 (D) PAs Responsible for Modeling DEER and Historically Non-DEER Values

Effective Program Year: 2023. This section provides additional detail for resolution section D. Decision D.21-05-031 eliminated "the DEER and non-DEER distinction and clarified that all deemed ex ante values approved by staff and housed in the existing DEER systems, and ultimately in the eTRM, are considered DEER values."[10]

[10] D.21-05-031, "Assessment of Energy Efficiency Potential and Goals and Modification of Portfolio Approval and Oversight Process," adopted 2021-05-20, p. 38.

Subsequently, Resolution E-5152 DEER2023 Update reiterated the removal of the "DEER versus non-DEER distinction for deemed ex ante values"[11] and laid out the revisions to measure package submission, review, and approval processes.

Effective Program Year: 2026. CPUC staff and staff consultants have been responsible for producing and updating the DEER tools that are approved for use to generate unit energy savings values for deemed measures (e.g., MASControl3© and the water heater calculator) and for using these tools to calculate the unit energy savings (UES) values for some evaluated deemed measures. While that practice is expected to persist through the coming two-year cycle, this resolution shifts the responsibility for running the building simulations and calculating the UES values for all deemed measures to the measure package developers. CPUC staff will continue to develop and maintain the DEER building simulation tools and the DEER water heater calculator. During the upcoming transition period—scheduled to end by the beginning of 2025—those measures for which CPUC staff generate the UES values would continue to have an associated DEER MeasureID; subsequent to the conclusion of this two-year transition period, the DEER MeasureID will no longer be used.

1.4 (J) Hard-to-Reach/Direct-Install Net-to-Gross Ratios

Effective Program Year: 2024. This section provides additional detail for resolution section I. The default 0.85 net-to-gross (NTG) ratio for hard-to-reach (HTR) customers served through direct install (DI) programs was introduced to the DEER database in 2008, but this was not addressed in a CPUC-approved decision or resolution approving the default HTR NTG ratio. The 2015 Energy Savings Performance Incentive (ESPI) Resolution (G-3510) stated that the 0.85 NTG ratio for HTR customers is limited to programs, projects, and measures that utilize a DI delivery channel.

The CPUC first approved an HTR definition in D.01-11-066, which was fairly broadly applied; this definition was narrowed in Resolution G-3497, which caused confusion among program administrators using different definitions. D.18-05-041 clarified the definition of HTR customers, but it did not address whether the default NTG ratio applied to energy efficiency measures delivered to HTR customers. After D.18-05-041 was adopted, in 2018, the 2020 DEER Update Resolution (E-4952) addressed the default

[11] Resolution E-5152 DEER2023 Update, p. 10.

0.85 NTG ratio for HTR customers served through DI program delivery, stating that the NTG value was not supported by evaluation evidence, but they retained the default NTG—subject to review of future evaluation results.

CPUC released guidance on February 3, 2022 titled "CPUC Guidance on Use of default net-to-gross ratio for hard-to-reach customers" stating "Staff has determined that the 0.85 NTG ratio for HTR customers in California eTRM only applies to HTR customers as defined in D.18-05-041, Section 2.5.2 and 2.5.3 and must use a direct install (DI) delivery channel." This resolution does not change or address the definition of HTR in the public or private sector. Section 1.8.1 of this document broadens the measure application types (MAT) that are eligible to use the HTR-DI NTGRs and Section 1.8.2 clarifies the definition of the direct-install delivery channel.

Resolution E-4952 called into question the NTGR of 0.85 but did not examine data specific to HTR customers. CPUC staff is considering whether HTR-specific NTGRs should differ from default NTGRs. Under consideration is whether:

- A higher NTGR for HTR customers served through DI is supported compared to non-HTR customers served through DI
- A higher NTGR for HTR customers served through downstream is supported compared to non-HTR customers served through downstream

1.5 (K) Fuel Substitution Calculator Updates

Effective Program Year: 2024. This section provides additional detail for resolution section J. In accordance with Decision 19-08-009, CPUC developed Fuel Substitution Technical Guidance Document v.1 and Fuel Substitution Calculator v1.1 using the retail energy sales, emissions, and heat rates, from avoided cost calculator (ACC) 2019.[12] The Decision states:

> "The Commission should utilize the electric Avoided Cost Calculator heat rates and the natural gas Avoided Cost Calculator, run through the Cost Effectiveness Tool, to estimate the carbon dioxide equivalent GHG emissions as a proxy for environmental impact of fuel substitution measures. Commission staff should update this guidance from time to

[12] https://www.cpuc.ca.gov/about-cpuc/divisions/energy-division/building-decarbonization/fuel-substitution-in-energy-efficiency

> time, as additional information becomes available, and within the policy parameters outlined in this decision."

The CPUC staff established a working group with stakeholders with plans to update the guidance document and calculator by June 1, 2023. The updated calculator shall be used to update all fuel-substitution measure packages to become effective for PY2026-27.

1.6 (L) Add-on-equipment Host Clarification

Effective Program Year: 2023-2024. This section provides additional detail for resolution section K. Resolution E-4818 adopted the definition for Add-On Equipment (AOE) as presented in Section 2.2.5 of the Preponderance of Evidence guidance document.[13] The AOE definition states that

> "An Add-on Equipment (AOE) measure installs new equipment onto an existing host improving the nominal efficiency of the host system. The existing host system must be operational without the AOE, continue to operate as the primary service equipment for the existing load, and is able to fully meet the existing load at all times without the add-on component. The AOE must not be able to operate on its own. The actual energy reduction occurs at the host equipment, not at the add-on component, although any add-on component energy usage must be subtracted from the host savings."

The AOE is defined as improving the nominal efficiency of the host equipment and the host equipment is defined as the equipment that uses less energy as a result of the add-on measure.[14] However, AOE has been used in some cases where the add-on measure does not improve the nominal efficiency of the host equipment, but rather reduces the energy burden (load) on the host equipment. Recognizing this, CPUC refines the definition of host equipment to include equipment connected to the AOE—either directly or indirectly—to either increase the efficiency of the host equipment or to reduce the load served by the host equipment.

[13] "Early Retirement Using Preponderance of Evidence" (also Resolution E 4818, p. 24) http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5325.

[14] Resolution E-4818, Section 1.3.6.2 Add-On Equipment, pp. 26-27.

Determining the measure life of AOE can be controversial when the AOE is not directly connected to the host equipment. For instance, while the host equipment for a faucet aerator is the water heater, the aerator is not typically replaced or removed from service when a water heater is replaced or removed from service since it is connected to the faucet. In such instances, the equipment to which the AOE is connected—referred to as the "host proxy"—is a better indicator of the measure life. The measure life of the AOE shall be determined as described in Table 1-3. While in Resolution E-5152 we indicated that showerheads, faucet aerators, and pipe insulation should not be categorized as AOE, we hereby reverse that assessment.

Since the addition, replacement, or supplementation of building insulation and infrared film has no bearing on, or vice versa, the replacement of the host equipment (e.g., furnace, air conditioner, or boiler), building insulation measures as well as greenhouse heat curtains and infrared film shall be recategorized from AOE to the building weatherization (BW) measure application type. Where the host proxy is part of the building system (e.g., electrical outlets or piping), the EUL of the AOE will be used to determine the measure life (see Table 1-3). This is consistent with the following language from Resolution E-4818 (p. 20): "Wall and pipe insulation, windows, and ducts are expected to last through the building life cycle without scheduled replacement."

There remains some debate about the frequency with which VFDs remain in place when its host, typically a fan or pump motor, is replaced on burnout. VFD measure package updates shall err on the side of assuming that VFDs are replaced when the host equipment is replaced unless measure package developers are able to provide documentation supporting the assertion that VFDs for the given application are more likely to remain in place than not.

Finally, controls measures shall remain categorized as BRO-RCx and shall not be treated as AOE when completely shutting off or de-energizing the equipment that uses less energy as a result.

Table 1-3. Measure Life for Add-On Equipment by Host and Host Proxy

AOE Host	AOE Host Proxy*	Measure Life	Example
AOE is typically replaced or removed from service at same time as host equipment	None	Lesser of: · EUL of AOE · RUL of Host	AOE: Anti-Sweat Heater Controls Host: Refrigerated Case
AOE is not typically replaced or removed from service at same time as host equipment	None	EUL of AOE	AOE: Pool Cover Host: Pool Heater
	AOE is typically replaced or removed from service at same time as host proxy	Lesser of: · EUL of AOE · RUL of Host Proxy	AOE: Aerator Host: Water Heater Host proxy: Faucet
	AOE is not typically replaced or removed from service at same time as host proxy	EUL of AOE	AOE: Ozone Laundry Host: Water Heater Host proxy: Building System (Piping)

1.7 (M) Structural Changes to DEER Tables

This section and the subsections that follow provide additional detail for resolution section K. The subsections that follow describe changes that will be made to the structures of some new and existing DEER database tables.

1.7.1 New Table for Fuel Substitution Measures

Effective Program Year: 2024. CPUC staff will add a new table to DEER's "costeff" schema titled "FuelSub." Since the cost-effectiveness calculation differs for fuel-substitution measures, this new field will serve to signal to CEDARS and the CET that a given measure involves fuel substitution. The table and its contents will include the key fields shown in **Error! Reference source not found.**.

Table 1-4. Fields in FuelSub Table for DEER2024

FuelSubID	Description
Elec_repl_Gas	Measure replaces primarily natural gas equipment with all-electric equipment

FuelSubID	Description
Gas_repl_Elec	Measure replaces all-electric equipment with primarily natural gas equipment
None	Same fuel energy-efficiency measure

1.7.2 Net-to-Gross (NTG) Table

Effective Program Year: 2024. Ever since the NTG_2020 table was established per Resolution E-4952 DEER2020 Update, Program Administrators have been asking for improvements to this table. To this end, a new table—serving as a companion to the NTG_2020 table—will be created to clarify when a given NTG ID may be used. The companion table will contain a complete list of all valid combinations of NTG IDs, Measure Application Types, Measure Impact Types, and Delivery Types for deemed and custom measures. Within the NTG_2020 table itself, however, the existing string-type fields that contain sometimes-vague descriptions of which Measure Application Types, Measure Impact Types, and Delivery Types they can be used for will be deleted. The California eTRM (eTRM) and CEDARS shall synchronize with this new companion table nightly.

1.7.3 Effective Useful Life (EUL) Table

Effective Program Year: 2024. Program Administrators have also been asking for improvements to this table. To this end, a new table—serving as a companion to the EUL_basis table—will be created to clarify when a given EUL ID may be used. The companion table will contain a complete list of all valid combinations of EUL IDs, Measure Application Types and Building Types for deemed and custom measures. Within the EUL_basis table itself, however, the existing string-type fields contain sometimes-vague descriptions of which Measure Application Types and Building Types they can be used for will be deleted. The eTRM and CEDARS shall synchronize with this new companion table nightly.

1.7.4 Measure Table

Effective Program Year: 2024. CPUC staff plans to add two new fields:

- WeatherSim to the Measure table to track the typical meteorological year (TMY) weather data that were used to model weather-sensitive measures.
- FuelSubID field to indicate whether a given measure is a fuel-substitution measure.

Also under consideration, is adding flags to indicate whether a given measure requires inclusion of one of the following supplemental workbooks with its measure package: Fuel Substitution, RACC, or WEN. The eTRM and CEDARS will continue to synchronize with this table nightly.

1.7.5 Energy Impact Table

Effective Program Year: 2024. CPUC staff plans to make significant changes to DEER's EnergyImpact table to accommodate updates to load shapes. Plans include adding new fields and populating them, as appropriate, and no longer maintaining those fields that are no longer needed as shown in Table 1-5. The eTRM will continue to synchronize with this table nightly.

Table 1-5. Changes to EnergyImpact Table for DEER2024

Update Type	Field Name	Description
New field	APreUseEUkWh	Annual electric end-use-specific consumption for pre-existing baseline, kWh
	APreUseEUtherm	Annual natural gas end-use-specific consumption e for pre-existing baseline, therm
	AStdUseEUkWh	Annual electric end-use-specific consumption for standard/code baseline, kWh
	AStdUseEUtherm	Annual natural gas end-use-specific consumption for standard/code baseline, therm
	AMsrUseEUkWh	Annual electric end-use-specific consumption for measure case, kWh
	AMsrUseEUtherm	Annual natural gas end-use-specific consumption for measure case, therm
No longer maintained	ElecImpactProfileID	Electric impact profile ID; TechIDs used for load shape identification
	GasImpactProfileID	Natural gas impact profile ID; TechIDs used for load shape identification

Update Type	Field Name	Description
	Flag	unknown
	SourceDesc	Measure package ID and version

1.8 (N) Updates to DEER Support Table Values

This section and the subsections below provide additional detail for resolution section L. The following changes to the DEER support table values are planned.

1.8.1 Expand MATs for HTR-DI NTGRs

Effective Program Year: 2022. According to the NTG_2020 table, the four default NTG_IDs available for hard-to-reach (HTR) customers—and restricted to direct install deliveries—are only available for use with the Normal Replacement (NR) or Accelerated Replacement (AR) Measure Application Types (MAT). These are listed here:

- Agricult-Default-HTR-di
- Com-Default-HTR-di
- Ind-Default-HTR-di
- Res-Default-HTR-di

CPUC staff clarifies that Add-on Equipment (AOE) and Building Weatherization (BW) MATs can reasonably be offered via direct install delivery to HTR customers. Retro-commissioning measures (BRO-RCx) may be categorized as direct install if the vendor, as part of the program, performs the installation. Whether a given measure can be categorized as direct install will need to be determined on a case-by-case basis. For example, an energy audit does not involve an installation. It is further clarified that if the measure installation is performed by the customer—or the customer's contractor—then the BRO-RCx measure cannot be categorized as direct install.

1.8.2 Updates to Delivery Types

Effective Program Year: 2026. The Delivery Type options no longer meet the needs of CPUC staff and EM&V. The Delivery Types shown in Table 1-6 are to be used starting for PY2026.

Table 1-6. DEER2026 Delivery Types

Delivery Type	Change	Description of Delivery Type
Up-Manuf	Was UpDeemed[15]	Incentivizes an energy-efficient technology through a program administrator partnership with a manufacturer
Mid-Distr		Incentivizes an energy-efficient technology through a program administrator partnership with a distributor
Mid-Retail		Incentivizes an energy-efficient technology through a program administrator partnership with a physical or online 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 delivery and/or installation of an energy-efficient technology and/or service at a customer property by a program implementer-managed third-party contractor or trade professional
C&S	None	Codes and Standards (C&S advocacy and related programs)

The reasons for these updates include:

- Most of the previously available delivery types introduced the potential for conflicts since Measure Impact Types already account for whether measures are deemed or custom. The distinction between Deemed and Custom delivery types was redundant since that distinction is made in the Measure Impact Type (MeasImpactType). This update removes all references to whether measures are deemed or custom from the Delivery Type field.
- Since midstream programs were previously using the UpDeemed Delivery Type, the additional customer data that is typically tracked by product distributors was unavailable or difficult to collect for EM&V purposes. Creating two midstream delivery types enables distinguishing between the types of customer data that can be required for programs to collect and make available for EM&V.

[15] "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

It is also noted that the Upstream Flag used by CEDARS may have become redundant since Delivery Type was added to the required reporting fields for all measures.

1.8.3 Updates to Measure Impact Types

Effective Program Year: 2022-2025.[16] Since NMEC and SEM measures that involve fuel substitution require their own Measure Impact Types (MITs) for claims in PY2022-2025, new MITs have been added for use in program year 2022 as shown in Table 1-7.

Table 1-7. DEER2022-2025 Measure Impact Types

Measure Impact Type	Change	Description of Measure Impact Type in DEER
Cust-FuelSub	None	Custom Fuel Substitution: site-specific calculation using approved tool or method
Cust-Gen	Updated description	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	None	Population-level Normalized Metered Energy Consumption (NMEC) energy impacts are specified on a custom basis.
Cust-NMEC-Pop-FuelSub[16]	New	Population-level Normalized Metered Energy Consumption (NMEC) energy impacts for fuel-substitution measures are specified on a custom basis.
Cust-NMEC-Site	None	Site-level Normalized Metered Energy Consumption (NMEC) energy impacts are specified on a custom basis.
Cust-NMEC-Site-FuelSub[16]	New	Site-level Normalized Metered Energy Consumption (NMEC) energy impacts for fuel-substitution measures are specified on a custom basis.
Cust-RCT	None	Custom RCT: uses a randomized-control trial (RCT) or experimental design method
Cust-SEM	None	Custom SEM: uses a strategic energy-management method
Cust-SEM-FuelSub[16]	New	Custom SEM: uses a strategic energy-management method involving fuel substitution
Deem-DEER	None	Deemed DEER: uses DEER-adopted values

[16] As indicated in Table 1-7, footnoted new MITs are needed for DEER2022 (retroactive to January 1, 2022).

Measure Impact Type	Change	Description of Measure Impact Type in DEER
Deem-DEER-FuelSub	None	Deemed DEER Fuel Substitution: uses DEER-adopted values
Deem-WP	None	Deemed Workpaper: uses values from an approved workpaper
Deem-WP-FuelSub	None	Deemed Workpaper Fuel Substitution: uses values from an approved workpaper

Effective Program Year: 2026. Since there is no longer a distinction between DEER and non-DEER measures, the Measure Impact Types (MITs) will be consolidated as shown in Table 1-8. Further, with the addition of a FuelSub table, there is no longer a need to track whether a given MIT involves fuel substitution; those MITs appended with "FuelSub" will be expired in DEER.

Table 1-8. DEER2026 Measure Impact Types

Measure Impact Type	Change	Description of Measure Impact Type
Cust-Gen	None	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	Consolidates Cust-NMEC-Pop and Cust-NMEC-Pop-FuelSub	Population-level Normalized Metered Energy Consumption (NMEC) energy impacts are specified on a custom basis.
Cust-NMEC-Site	Consolidates Cust-NMEC-Site and Cust-NMEC-Site-FuelSub	Site-level Normalized Metered Energy Consumption (NMEC) energy impacts are specified on a custom basis.
Cust-RCT	None	Custom RCT: uses a randomized-control trial (RCT) or experimental design method
Cust-SEM	None	Custom SEM: uses a strategic energy-management method

Measure Impact Type	Change	Description of Measure Impact Type
Deem	Consolidates Deem-DEER and Deem-WP	Deemed measure

1.8.4 NTGR Updates

In the past, NTGR were sometimes rounded to the nearest 0.05, sometimes rounded to the next higher 0.05, and sometimes rounded to 0.01. Given the variation of practices used to update NTGRs and the preceding guidance from Decision 12-05-015, the following clarification is provided as follows:

- NTGRs resulting from EM&V studies and approved via dispositions shall round all results to the nearest 0.05 in DEER.
- NTGRs results from EM&V studies shall only be updated in DEER when the EM&V NTGR (without rounding) differs from the current DEER value by ≥ 0.05.
- If a new EM&V study determines that an existing and active measure-specific NTGR is—after rounding—equal to the relevant default NTGR, the measure-specific NTGR will be expired. In such cases, PAs shall update the relevant measure package to utilize said default NTG ID.

2 Measure Adoption

New DEER2024 measure package guidance that has not been previously issued is provided in the sections below.

2.1 (T) Guidance Based on Industry Standard Practice Studies

This section and the subsections below provide additional detail for resolution section S. Five ISP studies were conducted by the IOUs as directed by Resolution E-4939. The ISP studies can inform the proper standard practice baseline to use in measure packages. Completed ISP studies included:

1. Industry Standard Practice Study of Unitary AC and HP Study, SDG&E
2. Market Impacts of Low-GWP Refrigerants for Refrigeration Equipment, SCE
3. Industrial Standard Practice Study of Commercial Domestic Hot Water Boilers for Commercial and Multifamily Sectors, PG&E
4. Retrofit Modulating Gas Dryer Valve for Commercial Dryers, SCG
5. Industry Standard Practice Study of Residential Low Flow Showerheads and Aerators, SCG

2.1.1 Unitary AC and HP Study

This study was lacking in sufficient data to be useful in establishing an ISP. CPUC staff did find that—in some cases—the offerings did not increase the efficiency by a large percentage. CPUC staff declines to update the DEER2024 baselines using the results from this study. ISP should be kept up-to-date with future minimum efficiency standards.

2.1.2 Refrigerants: Low Global Warming Potential Refrigerants for Refrigeration

This study focused on low global warming potential (LGWP) refrigerants used in refrigeration equipment. It provided information on the current state of the market and concluded that LGWP refrigerants were not ISP. No update will be required for DEER2024. Low GWP Refrigeration is a developing market with codes, standards and availability of product changing rapidly.

2.1.3 Boilers and Water Heaters

The ISP report states that "Measure Packages SWWH005-02 (Boiler, Commercial), SWWH007-03 (Storage Water Heater, Commercial), SWWH010-01 (Boiler, Commercial), and SWWH011-01 (Central Storage Water Heater, Multifamily) would need to be updated to reflect current state codes." The study concluded that high efficiency Domestic Hot Water (DHW) boilers were not yet ISP, but the study did not define high efficiency. While the study did not specify a specific efficiency for the ISP, we note that a new federal minimum efficiency standard for hot water boilers, ≥300 kBtuh and ≤2,500 kBtuh will be set at 84% thermal efficiency and will become effective on January 10, 2023. Based on data in the report, these would seem to be close to the efficiency of non-condensing boilers sold on the market.

2.1.4 Gas Dryer Modulating Valves

The ISP study shows that the commercial dryer market is aided by program intervention to make modulating gas valve retrofit kits/installations available to customers. CPUC staff agrees that gas dryer modulating valves are not ISP. No update is required in DEER2024.

2.1.5 Low-Flow Showerheads and Aerators

This study concluded that low flow fixtures are not yet ISP but are trending towards that. The study included showerheads and faucets. Previous code requirements included lower flow showerheads, but newer product offerings include even lower flow showerheads. No update is required in DEER2024. CPUC staff requires Water Sense specifications be included as a measure offering requirement to ensure customer satisfaction with the product.

2.2 (U) Guidance from 2019 Custom Industrial, Agricultural, and Commercial (CIAC) Impact Evaluation Review

Effective Program Year: 2024. The 2019 CIAC study[17] found lower NTGRs than the defaults reported in the DEER database. Evaluated NTGRs were determined based on

[17] "Group D 2019 Custom Industrial, Agricultural, and Commercial (CIAC) Impact Evaluation," by SBW Consulting for CPUC, February 1, 2022. (https://pda.energydataweb.com/#!/documents/2583/view)

surveys with decision makers in the organizations that implemented custom projects. The updates to the NTG_IDs are detailed in Table 2-1.

Table 2-1. Default Custom NTGR Parameter Updates in DEER Based on Evaluation

Default Statewide NTG_IDs to be Updated or Added*	Current NTGR		Evaluated NTGR (if different)		DEER2024 NTGR	
	Elec.	Gas	Elec.	Gas	Elec.	Gas
NonRes-sAg-mCust-ci	0.70	0.70	0.47	0.47	0.50	0.50
NonRes-sAll-mCust	0.60	0.50	0.50	-	0.50	0.50
NonRes-sAll-mCust-Elec	0.60	0.60	0.50	0.50	0.50	0.50
NonRes-sAll-mCust-Lighting-di (new)	N/A	N/A	0.45	0.45	0.45	0.45

* NonRes-sAll-mCust-Gas will remain available and unchanged with electric and gas NTGRs of 0.50.

2.3 (V) Guidance from 2022 EM&V Review

Effective Program Year: 2024. This section and the subsections below provide additional detail for resolution section U. The Deemed Ex Ante Review team has examined the 2020 EM&V final impact evaluation reports and other studies to identify findings that may result in updates to deemed measure parameters and/or savings estimation approaches.

Table 2-2. Final EM&V Studies Reviewed

Study	Study Title (with link)	Evaluated PY2020 Measures
1	Impact Evaluation of Residential HVAC Measures Residential Sector - Program Year 2020	SWHC029 - Fan Controller for Air Conditioner, Residential SWHC038 - Brushless Fan Motor Replacement, Residential SWHC039 - Smart Thermostat, Residential SWSV001 - Duct Seal, Residential
2	Group A Draft Impact Evaluation PY2020 HVAC Fuel Substitution	SWHC044 - Ductless HVAC, Residential, Fuel Substitution SWHC045 - Heat Pump HVAC, Residential, Fuel Substitution

Study	Study Title (with link)	Evaluated PY2020 Measures
3	Impact Evaluation Report Commercial HVAC Sector – Program Year 2020	SWHC004 - Space Heating Boiler, Commercial & Multifamily SWWH005 - Boiler, Commercial SWWH008 - Boiler, Process SWWH010 - Boiler, Multifamily SWHC013 - Unitary Air-Cooled Air Conditioner, Over 65 kBtu/hr, Commercial SWHC014 - Unitary Air-Cooled Air Conditioner or Heat Pump, Under 65 kBtu/hr, Commercial SWHC043 - Multiple Capacity Unitary Air-Cooled Commercial Air Conditioners Between 65 and 240 kBtu/hr
4	PY20 Non-Res Lighting Impact Evaluation Report	SWLG009 - LED, Tube SWLG011 - LED, High or Low Bay SWLG012 - LED Ambient Fixtures and Retrofit Kits, Commercial
5	Program Year 2020 Nonresidential Deemed Pump and Food Service Impact Evaluation	SWFS011 - Fryer, Commercial SWPR002 - VFD for Glycol Pump Motor SWWP002 - VFD on Well Pump, <= 300 hp SWWP004 - Water Pump Upgrade SWWP005 - Enhanced Variable Frequency Drive on Irrigation Pump

2.3.1 Residential HVAC Measures Impact Evaluation

The Residential HVAC Measures report evaluates gross and net-to-gross savings through a billing analysis and participant surveys respectively. NTG ratio updates are only for Smart Thermostats delivered through downstream rebates. Gross UES savings are changed only for Smart Thermostat measures and are described below. Participation in downstream rebate programs remained steady throughout the pandemic leading to robust evaluation results for the rebate program. Evaluated NTG ratios shown in Table 2-3 for the past three evaluation cycles do not show a consistent trend, but fluctuate around an average value of 0.50. Thus, an updated NTGR of 0.50 for DEER2024 will be used. (This is a slight and deliberate departure from the policy

described in Section 1.8.4—due to extenuating circumstances—that would have revised the DEER2024 NTGR to 0.45.)

Table 2-3. Historic Evaluated NTG Ratios for Rebated Smart Thermostat Measure

Measure	Evaluated PY2018 NTGR	Evaluated PY2019 NTGR	Evaluated PY2020 NTGR	DEER2024 NTGR
Smart Thermostat, Residential (rebate/downstream) NTG History: · DEER2019 ID: Res-Default>2, NTGR = 0.55 · DEER2021 ID: Res-sAll-mHVAC-SCT-dn, NTGR = 0.55 · DEER2022 ID: Res-sAll-mHVAC-SCT-dn, NTGR = 0.60	kWh: 0.48 therm: 0.48	kWh: 0.60 therm: 0.51	kWh: 0.46 therm: 0.47	0.50

All the direct install programs experienced decreased participation in PY2020 due to the pandemic and have evaluated NTG ratios lower than those for PY2019. The NTG ratio values for fan controllers and brushless fan motor replacement shown in Table 2-4 changed less than 0.05 from the current DEER NTGR so CPUC staff will not change these values. Although the ratios for direct installed thermostats and duct sealing changed more than 0.05, the 2020 evaluation results are inconsistent with the trend over the past three years; since they deviated from previously stable results, CPUC staff will not make a change based on the 2020 evaluation results per section 1.8.4.

Table 2-4. Historic Evaluated NTG Ratio Results for Measures Without Updates

Measure	2018 Evaluated NTGR	2019 Evaluated NTGR	2020 Evaluated NTGR	DEER2024 NTGR
SWHC029 - Fan Controller for Air Conditioner, Residential NTG History: · DEER2019 ID: Res-Default>2, NTGR = 0.55 · DEER2023 ID: Res-sAll-mHVAC-FanCtrl, NTGR = 0.88	N/A	0.88	0.86	No change*
SWHC038 - Brushless Fan Motor Replacement, Residential (direct install) NTG History: · DEER2019 ID: Res-Default>2, NTGR = 0.55 · DEER2022 ID: Res-sAll-mHVAC-FanMotor, NTGR = 0.85	0.85	0.90	0.89	No change*
SWSV001 - Duct Seal, Residential NTG History: · DEER2019 ID: Res-Default>2, NTGR = 0.55 · DEER2019 ID: Res-sAll-mDuctSeal, NTGR = 0.78 · DEER2022 ID: Res-sAll-mHVAC-DuctSeal, NTGR = 0.95	0.94	0.95	0.79	No change*
SWHC039 - Smart Thermostat, Residential (direct install) NTG History: · DEER2019 ID: Res-Default>2, NTGR = 0.55 · DEER2021 ID: Res-sAll-mHVAC-SCT-di, NTGR = 0.90 · DEER2022 ID: Res-sAll-mHVAC-SCT-di, NTGR = 0.95	0.89	0.94	0.80	No change*

* Existing NTG_ID will remain active.

The most up to date gross savings estimates, include thermostat optimization (TO) that requires the customer to opt in to "eco" settings which include energy-saving features such as "auto-away" that lowers the thermostat setpoint when it detects that the customer is not home and slight weather-informed adjustments to occupied thermostat setpoints. The TO feature was negatively affected by COVID due to customers working from home, limiting the times that the auto-away feature could be used. At this point we have two possible estimates of SCT savings that include TO.

- SWHC39-04 values - 2018 and 2019 evaluation results adjusted to include TO. These values were not affected by residential occupancy due to COVID. A TO adjustment was made to the existing values (see Figure 2-1, Figure 2-2, and Figure 2-3 in black).
- 2020 evaluation results—which included TO as part of the delivered measure—but were likely reduced compared to a typical year due to COVID (see Figure 2-1, Figure 2-2, and Figure 2-3 in light blue).

These are both valid estimates of SCT savings with extremes of no-COVID and all-COVID periods. From an ex ante perspective, it is reasonable to believe that, in the future, we will fall somewhere between these two states, as occupancy rates are unlikely to return to pre-COVID levels. The approach the makes the most sense would be to take the midpoint between the black and light blue bars shown in navy blue in Figure 2-1, Figure 2-2, and Figure 2-3. The UES values shown in these figures are listed in tabular form in Table 2-5, Table 2-6, and Table 2-7.

Figure 2-1. Deemed and Evaluated Electric and Gas Savings for Downstream (Rebate) Delivery of SWHC39-04 Smart Thermostat

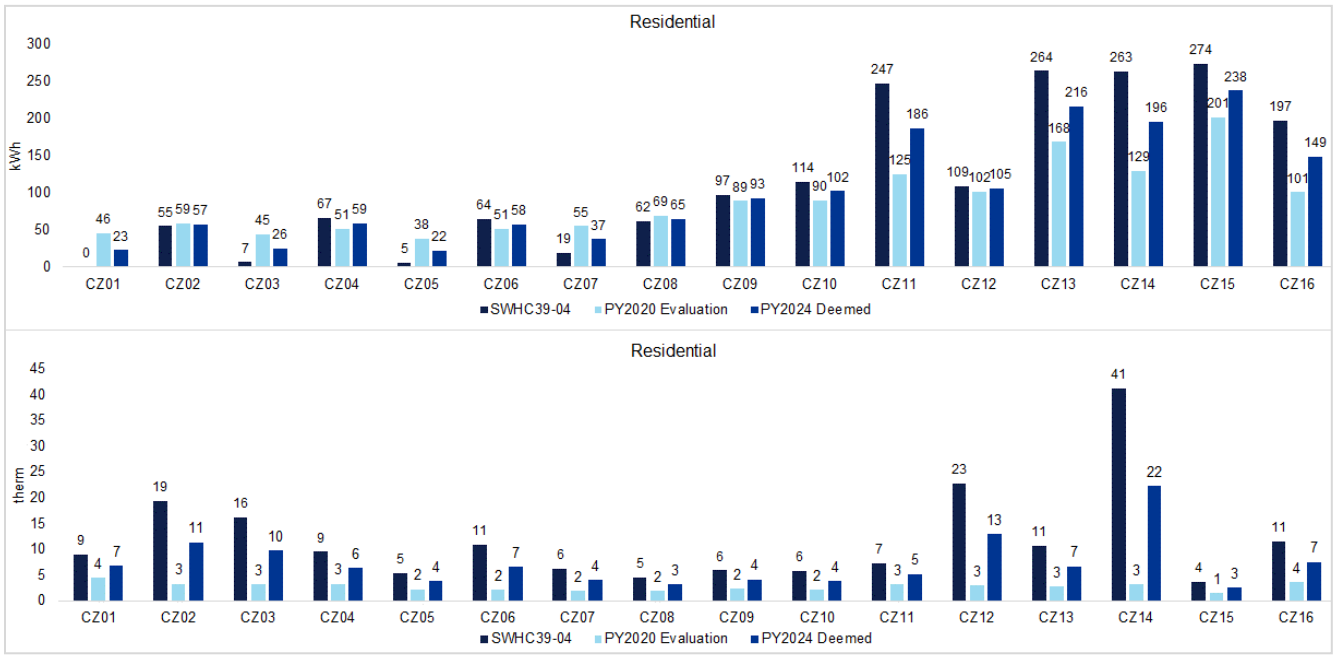

Figure 2-2. Deemed and Evaluated Electric Savings for Direct Install Delivery of SWHC39-04 Smart Thermostat

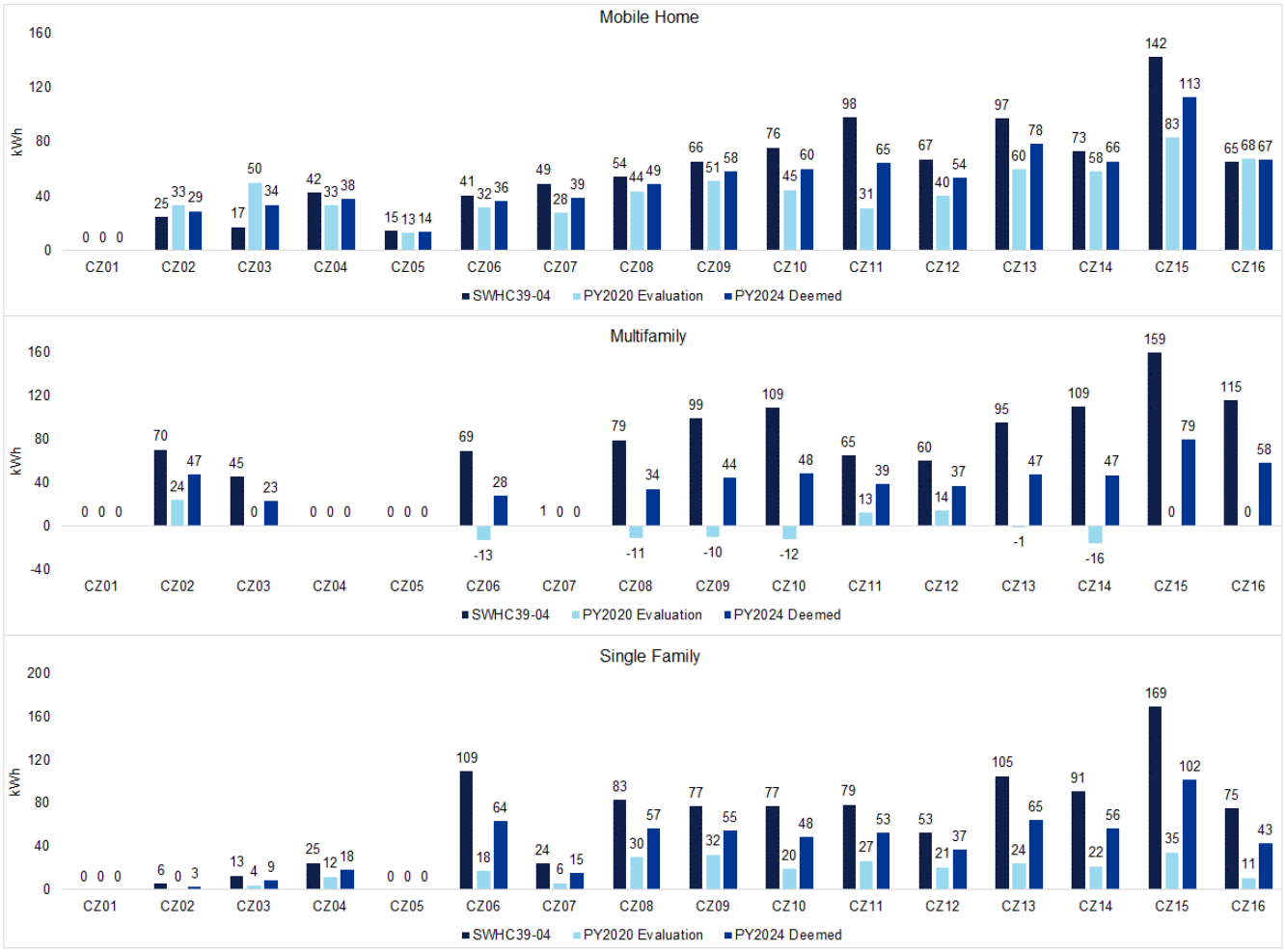

Figure 2-3. Deemed and Evaluated Gas Savings for Direct Install Delivery of SWHC39-04 Smart Thermostat

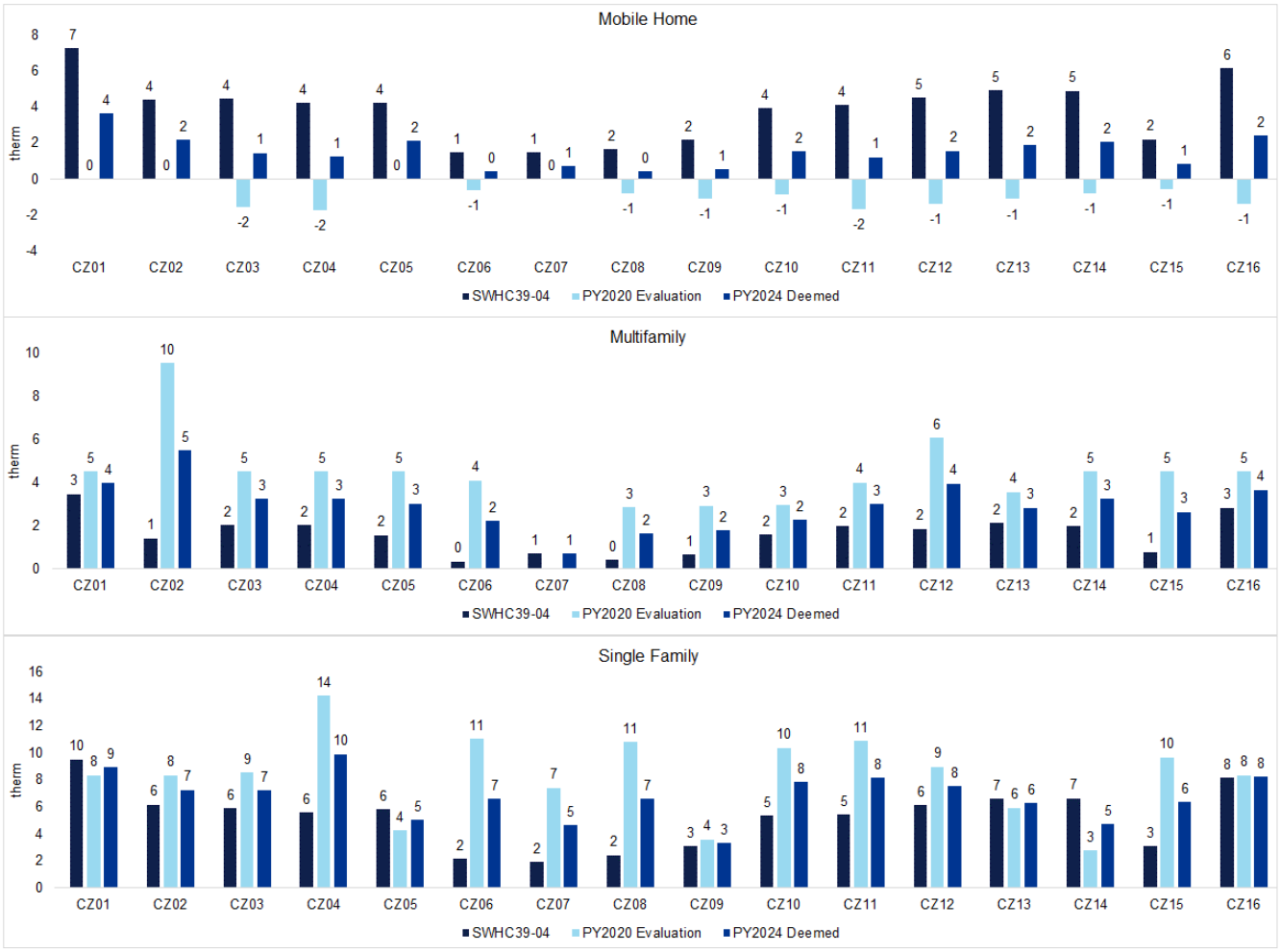

Table 2-5. DEER2024 Deemed Savings for Downstream (Rebate) Delivery of SCT

Climate Zone	Annual Electric Savings, kWh	Annual Gas Savings, therm
CZ01	22.9	6.74
CZ02	57.2	11.30
CZ03	25.6	9.72
CZ04	59.0	6.38
CZ05	21.6	3.74
CZ06	57.8	6.53

Climate Zone	Annual Electric Savings, kWh	Annual Gas Savings, therm
CZ07	37.4	4.06
CZ08	65.2	3.23
CZ09	92.8	4.11
CZ10	102.0	3.87
CZ11	186.0	5.18
CZ12	105.0	12.90
CZ13	216.0	6.65
CZ14	196.0	22.20
CZ15	238.0	2.53
CZ16	149.0	7.50

Table 2-6. DEER2024 Deemed Gas Savings for Direct Install Delivery of SCT

Climate Zone	Annual Gas Savings, therm		
	DMo	MFm	SFm
CZ01	3.63	3.99	8.93
CZ02	2.19	5.47	7.25
CZ03	1.44	3.27	7.21
CZ04	1.26	0.00	9.90
CZ05	2.10	0.00	0.00
CZ06	0.43	2.23	6.58
CZ07	0.74	0.70	4.67
CZ08	0.44	1.64	6.60
CZ09	0.54	1.80	3.33
CZ10	1.54	2.29	7.86
CZ11	1.22	2.99	8.15
CZ12	1.57	3.96	7.54
CZ13	1.91	2.84	6.26
CZ14	2.06	3.24	4.70
CZ15	0.83	2.64	6.36
CZ16	2.40	3.67	8.24

Table 2-7. DEER2024 Deemed Electric Savings for Direct Install Delivery of SCT

Climate Zone	Annual Electric Savings, kWh		
	DMo	MFm	SFm
CZ01	0.0	1.0	2.0
CZ02	29.1	47.2	2.9
CZ03	33.7	22.6	8.5
CZ04	38.0	0.0	18.4
CZ05	13.8	0.0	0.0
CZ06	36.2	28.0	63.6
CZ07	38.6	0.4	15.2
CZ08	49.1	34.0	56.5
CZ09	58.4	44.3	54.6
CZ10	60.2	48.1	48.5
CZ11	64.5	38.7	52.7
CZ12	53.7	37.1	36.7
CZ13	78.4	47.2	64.6
CZ14	65.6	46.8	56.3
CZ15	113.0	79.5	102.0
CZ16	66.5	57.7	43.1

2.3.2 HVAC Fuel Substitution Draft Impact Evaluation

The midstream-delivered ductless HVAC fuel substitution systems fell short of expectations for gas savings; this is likely because the evaluation survey results found they are often not being used to replace existing gas heating; they are supplementing the existing gas system. To ensure the gas savings expectations are met, residential ductless HVAC measure packages shall be revised so that only direct install and downstream delivery types are eligible and measure package eligibility requirements include decommissioning the existing gas system. CPUC staff will maintain the 1.00 NTGR for the revised ductless HVAC measure package (where upstream/midstream measure delivery is discontinued) until it is further evaluated. No changes will be made to UES values for ductless HVAC fuel substitution measures.

The PY2020 evaluation identified a NTGR of 57% for central HVAC fuel substitution systems delivered through the midstream design program (see Table 2-8). CPUC staff revises the central HVAC fuel substitution measure package NTGR to use a 55% NTGR, rounding the 57% finding from the evaluation, for the midstream delivery type. Since this measure used the default NTGR previously, it requires a new NTGR ID. No changes will be made to UES values for central HVAC fuel substitution measures.

Table 2-8. NTGR Updates for Central Ducted HVAC Fuel Substitution Systems

Measure (with current NTGR values)	Evaluated NTGR	DEER2024 NTGR
SWHC045 - Heat Pump HVAC, Residential, Fuel Substitution (midstream only) NTG History: · DEER2020 ID: FuelSubst-Default, NTGR = 1.00	0.57	0.55 (New ID: Res-sAll-mHVAC-HP-MidDistr-FuelSub)

2.3.3 Commercial HVAC Measures Impact Evaluation

This study determined that energy savings vary significantly by building type. The measure package, however, does not provide savings by building type and offers only the "Com" average savings. The CPUC requires revisions to the three measure packages listed in Table 2-9 to include UES for each commercial building type.

Table 2-9. Measure Packages Must Include UES Values for Each Building Type

Measure ID	Measure Name
SWHC013	Unitary Air-Cooled Air Conditioner, Over 65 kBtu/hr, Commercial
SWHC014	Unitary Air-Cooled Air Conditioner or Heat Pump, Under 65 kBtu/hr, Commercial
SWHC043	Multiple Capacity Unitary Air-Cooled Commercial Air Conditioners Between 65 and 240 kBtu/hr

The evaluation also found that the reported savings for Multiple Capacity Unitary Air-Cooled Commercial Air Conditioners Between 65 and 240 kBtu/hr were based only on the improved part load savings (IEER) while the installed air conditioners also had

improved full load efficiency (EER) from the measure package standard baseline condition. Updating the measure package to reflect the improved full-load efficiency found in the evaluated air conditioners is necessary.

The NTG ratio found in this study for replacement HVAC systems confirms the earlier finding so the existing NTGR of 0.70 will persist. Similarly, the NTG ratio found in this study for space heating boilers confirms the PY2018 finding so the DEER2022 NTGR of 0.20 will persist and will be expanded to include upstream delivery types.

The water heating boiler NTG ratio results, though based on a smaller sample than anticipated, are 11% ±4% and warrant a change from the 60% default NTG ratio currently used for these measures for the upstream delivery types. Process boiler NTG ratio results were not statistically robust so no updates are warranted.

Table 2-10. NTGR Updates Based on Results from the Commercial HVAC Measures Impact Evaluation Report

Measure (with current NTGR values)	Evaluated NTGR	DEER2024 NTGR
SWHC004 - Space Heating Boiler, Commercial & Multifamily NTG History: · DEER2019 ID: Com-Default>2yrs, NTGR = 0.60 · DEER2022 ID: NonRes-sAll-mHVAC-NGBoiler, NTGR = 0.20 (downstream, only)	0.17	0.20 will be expanded to include upstream (NonRes-sAll-mHVAC-NGBoiler)
SWWH005 - Boiler, Commercial NTG History: · DEER2019 ID: Com-Default>2yrs, NTGR = 0.60	0.11	0.10 for upstream (New ID: Com-sAll-mSHW-NGBoiler)
		0.60 for downstream (Com-Default>2yrs)

2.3.4 Non-Residential Lighting Impact Evaluation

The Non-Residential Lighting Sector Impact Evaluation studied indoor LED fixtures, indoor LED tubes and parking garage LEDs. It found overall higher fixture operating

hours, particularly in some sectors such as retail establishments, and hotel/motels. PAs will update measure packages to reflect the higher HOU in these building types. It also found some inconsistencies between EUL values referenced in measure package wording and in the associated eTRM tables. These inconsistencies must be corrected in the next revision of the measure package.

The study found evaluated NTG ratios shown in Table 2-11 lower than claimed for both LED tubes and fixtures. The 0.67 TLED downstream value is based on a Direct Install program, as this was the only program offering downstream TLEDs. The study could not develop a non-DI downstream value because there was no program participation in that combination. The 0.57 for fixtures is based only on a non-DI downstream approach since there was no participation installing fixtures with a DI approach. Finally for midstream, distributors sell both fixtures and TLEDs, so for this reason, the study did not differentiate the NTG ratio between these two measure categories, they combined them.

Table 2-11. Statewide Evaluated NTGRs for Lighting Measures

Measure	Evaluated PY2020		Evaluated PY2019	
	Downstream	Midstream	Downstream	Midstream
Fixtures	0.57 (rebate)	0.64	0.67	0.63
TLEDs	0.67 (direct install)		0.71	

We examined the PY2019 results compared to PY2020 results in Table 2-11. Since the midstream savings are consistent between the two evaluations, we retain the NTG ratio to 0.65 for midstream distributer and retail program delivery types. The downstream TLED NTG ratios are also similar between the two evaluations, and we revise the TLED NTG ratio based on the average of the two evaluations at 0.69 rounded to 0.7. While further apart, we averaged the NTG ratios from the 2019 and 2020 evaluations for rebated fixtures delivered downstream, resulting in a 0.62 NTGR that rounds to 0.60. The NTGRs will be revised because of this study to the values shown in Table 2-12.

Table 2-12. NTGR Updates Based on Results from the Non-Residential Lighting Impact Evaluation Report

Measure (with current NTGR values)	Evaluated NTGR	DEER2024 NTGR
LED Tubes, Indoor NTG History: · DEER2019 ID: Com-Default>2yrs, NTGR = 0.60 · DEER2019 ID: All-Ltg-LED-WRR, NTGR = 0.91 · DEER2023 ID: NonRes-sAll-mLtg-TLEDLamp, NTGR = 0.65	0.67 downstream; 0.64 midstream	0.7 downstream (rebate and direct install) and 0.65 midstream (retailer and distributor)
LED Fixtures, Indoor (including High/Low Bay) NTG History: · DEER2019 ID: All-Ltg-LED-WRR, NTGR = 0.91 · DEER2019 ID: Com-InHB-Ltg-LEDFixt, NTGR = 0.91 · DEER2019 ID: NonRes-In-Ltg-LEDFixt, NTGR = 0.91 · DEER2023 ID: NonRes-In-Ltg-LEDFixt, NTGR = 0.65	0.57 downstream; 0.64 midstream	0.60 downstream (rebate and direct install); 0.65 midstream-retailer and distributor

2.3.5 Pump and Food Service Impact Evaluation

The three evaluated measures include VFD agricultural pumps, energy efficient clean water pumps and gas fryers. The VFD data collected in the evaluation and presented in the report should be used to update the measure package model inputs in SWWP002 and SWWP005. The energy efficient pumps had a 19% lifecycle gross savings realization rate because the actual efficiencies of installed pumps were 69% lower than that reflected in program deemed savings. The measure package shall be updated to reflect the characteristics of pumps rebated in 2020. Gas fryers do not require adjustments to the gross savings methodology based on this evaluation.

The VFD agricultural pump evaluated NTG ratio is stable over the past three evaluations, see Table 2-13, and the average (0.37) over that three-year period is more

than 0.05 different from the NTG ratio currently used for this measure. The NTG ratio for agricultural pumping VFDs will be updated and will be assigned a value of 0.40.

Table 2-13. Historic Evaluated NTG Ratio Results for Downstream Agricultural Pump VFDs

Measure	Evaluated PY2018	Evaluated PY2019	Evaluated PY2020	DEER2024
Agricultural Pumping VFD (downstream)	0.39	0.34	0.39	0.40

The gas fryer evaluated NTG ratio (0.39) is more than 0.05 different from the default NTG ratio currently used for this measure. A new NTG ratio ID will be created for downstream gas fryers (Com-sAll-mFS-Fryer-dn) and will be assigned a value of 0.40. The affected measure packages and the DEER NTG ratio history are summarized in Table 2-14 along with the new NTR ratios.

Table 2-14. NTGR Updates Based on Results from the Pump and Food Service Impact Evaluation Report Measure (with current NTGR values)

Measure	Evaluated NTGR	DEER2024 NTGR
SWWP002 - VFD on Well Pump, ≤ 300 hp and SWWP005 - Enhanced Variable Frequency Drive on Irrigation Pump (direct install and downstream) NTG History: · DEER2019 ID: Agric-Default>2yrs, NTGR = 0.60 · DEER2022 ID: NonRes-sAg-Irrig, NTGR = 0.30	0.39	0.40
SWFS011 - Fryer, Commercial (downstream only) NTG History: · DEER2019 ID: Com-Default>2yrs, NTGR = 0.60	0.34	0.35 (New ID: Com-sAll-mFS-Fryer-dn)