Attachment A
DEER2024 Update Summary

Contents

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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 Section 2.7 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 for PY2023. Once the CET is updated to include a separate field for embedded water

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

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:

- Update to include eligibility of all measures.

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

- 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
- Building Type – Commercial or residential building type, e.g., Asm, RSD, MFm

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

- 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.

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

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

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.

Since D.21-05-031 adopted a portfolio segmentation approach—where equity and market support programs are not counted towards a PA's portfolio cost-effectiveness—the higher NTG ratio is no longer needed to bolster PAs' ability to serve HTR customers and should instead be based on empirical evidence (i.e., EM&V 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 2.5.3 and must use a direct install (DI) delivery channel." 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

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

> 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 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

[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.

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.

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."

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	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)

* Host proxy considerations will be reviewed on a case-by-case basis during each measure package approval process.

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 .

Table 1-4. Fields in FuelSub Table for DEER2024

FuelSub_ID	Description
Elec_to_Gas	Fuel substitution measure to replace primarily electric equipment with primarily natural gas equipment
Gas_to_Elec	Fuel substitution measure to replace primarily natural gas equipment with primarily electric equipment

FuelSub_ID	Description
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.

- IsFuelSub flag 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 in use	ElecImpactProfileID	Electric impact profile ID; TechIDs used for load shape identification
	GasImpactProfileID	Natural gas impact profile ID; TechIDs used for load shape identification
	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 the manufacturer
Mid-Distr		Incentivizes an energy-efficient technology through a program administrator partnership with the distributor
Mid-Retail		Incentivizes an energy-efficient technology through a program administrator partnership with the retailer
Down	Was DnDeemed and DnCust	Incentivizes an energy-efficient technology or service to a participating customer for them to install or have installed
DI	Was DnDeemDI and DnCustDI	Incentivizes the installation of an energy-efficient technology or service at a customer property by a program implementer managed third-party contractor or installer
C&S	None	Codes and Standards (C&S advocacy and related programs)

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 will be 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 will be consolidated as shown in Table 1-8.

Table 1-8. DEER2026 Measure Impact Types

Measure Impact Type	Change	Description of Measure Impact Type
Cust-FuelSub	None	Custom Fuel Substitution: site-specific calculation using approved tool or method (excluding NMEC, SEM, or RCT offerings)
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	None	Population-level Normalized Metered Energy Consumption (NMEC) energy impacts are specified on a custom basis.
Cust-NMEC-Pop-FuelSub	None	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	None	Site-level Normalized Metered Energy Consumption (NMEC) energy impacts for fuel-substitution measures are specified on a custom basis.

Measure Impact Type	Change	Description of Measure Impact Type
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	None	Custom SEM: uses a strategic energy-management method involving fuel substitution
Deem	Consolidates Deem-DEER and Deem-WP	Deemed measure
Deem-FuelSub	Consolidates Deem-DEER-FuelSub and Deem-WP-FuelSub	Deemed fuel-substitution 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

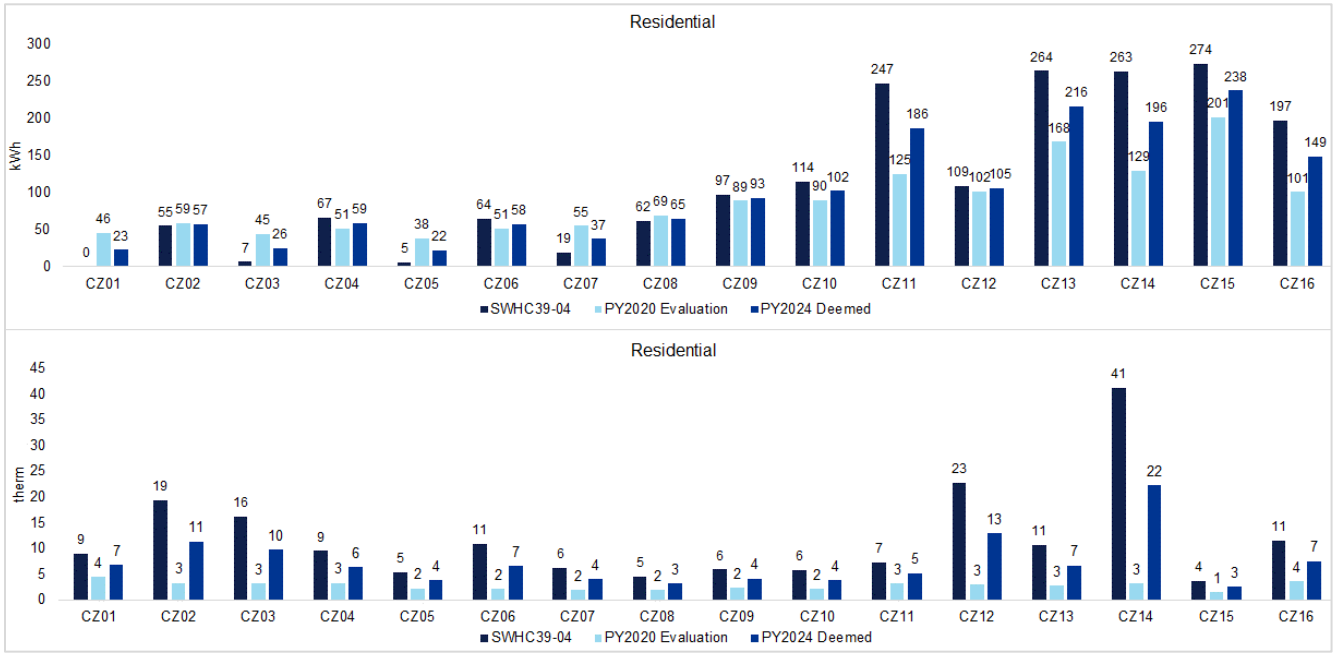

Figure 2-2. Deemed and Evaluated Electric Savings for Direct Install Delivery of SWHC39-04 Smart Thermostat

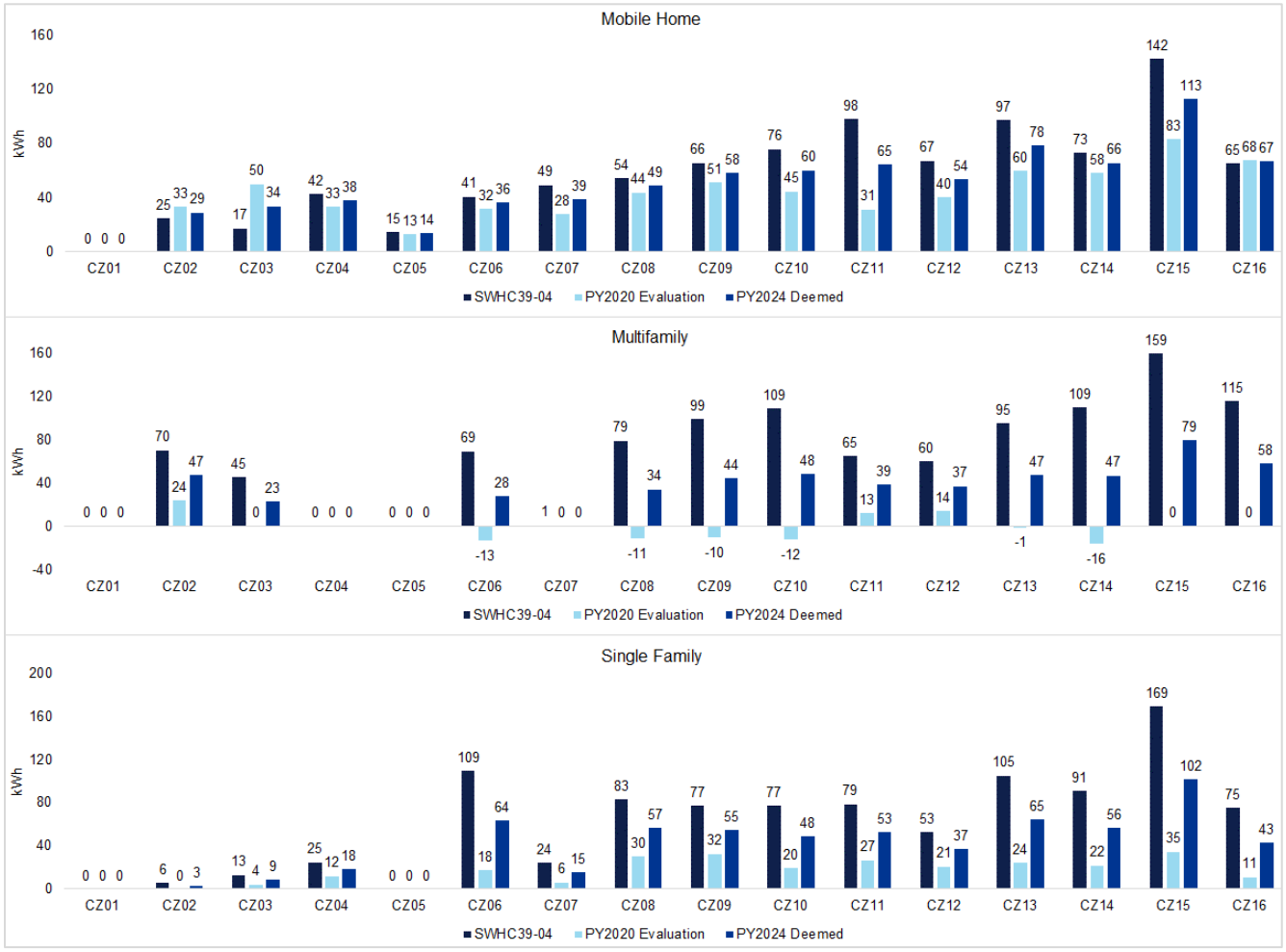

Figure 2-3. Deemed and Evaluated Gas Savings for Direct Install Delivery of SWHC39-04 Smart Thermostat

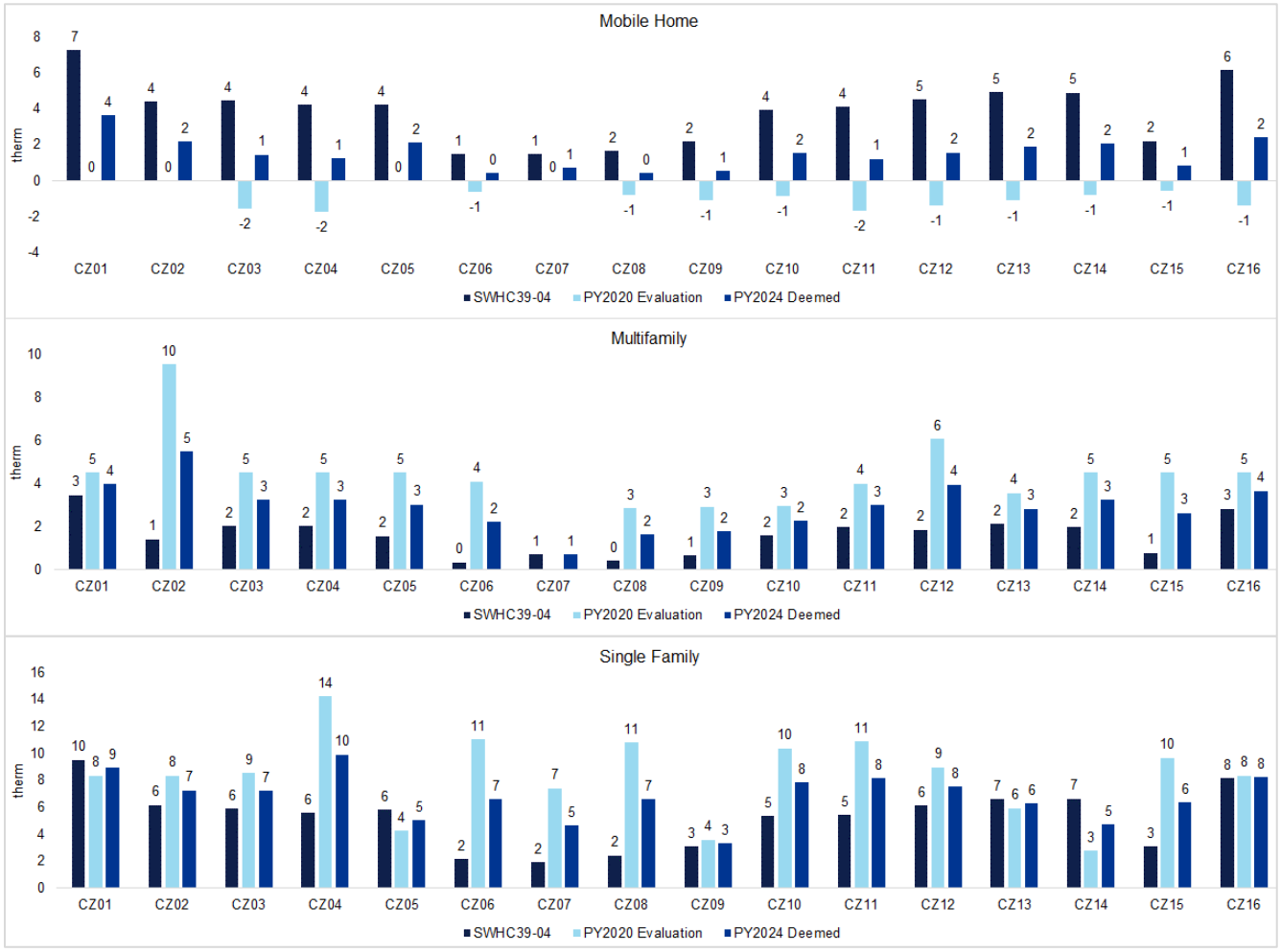

Table 2-5. DEER2024 Deemed Savings for Downstream (Rebate) Delivery of SCT

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

	Annual Gas Savings, therm		
Climate Zone	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

	Annual Electric Savings, kWh		
Climate Zone	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)