



CLAIMS REVIEW PROGRAM YEAR 2024

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ABBREVIATIONS AND ACRONYMS

- ASH - Anti-Sweat Heater (used in refrigeration)
- ATR - All Things Reported (CPUC's internal database of individual savings claims)
- AVA – AVA Community Energy
- BAY - Bay Area Regional Energy Network (BayREN)
- CA eTRM - California Electronic Technical Reference Manual
- CCA- Community Choice Aggregator
- CEDARS - California Energy Data and Reporting System
- CPUC – California Public Utilities Commission
- CZ – Climate Zone
- EUL – Expected Useful Life
- GWh – Gigawatt-hour
- HPWH – Heat Pump Water Heater
- HVAC – Heating, Ventilation, Air Conditioning
- IREN – Inland Regional Energy Network
- IOU – Investor-Owned Utility
- kWh – Kilowatt-hour
- LED – Light-Emitting Diode
- MCE – Marin Clean Energy
- MM Therms – Million Therms
- MW – Megawatt
- NTGR – Net-to-gross Ratio
- PA – Program Administrator
- PGE – Pacific Gas and Electric
- PY – Program Year
- RCA – Refrigerant Charge Adjustment
- REN – Regional Energy Network
- RR – Realization Rate



RRN – Rural REN North
RUL – Remaining Useful Life
SCE – Southern California Edison
SCG – Southern California Gas Company
SCR – Southern California Regional Energy Network
SDGE – San Diego Gas and Electric
SDRN – San Diego REN
SJCE – San Jose Clean Energy
TCR – Tri-County Regional Energy Network
TLED – Tubular Light Emitting Diode
TSB – Total System Benefit
VFD – Variable Frequency Drive

GLOSSARY OF KEY TERMS

Accelerated Replacement - A measure installed before the end of the existing equipment's useful life.

Deemed Savings - Pre-calculated energy savings values assigned to specific energy efficiency measures.

Embedded Water Savings – The water purification and pumping energy saved by implementing energy efficient measures that save water in addition to energy.

Hard to Reach (HTR) - Customer segments that may require additional effort to engage in energy efficiency programs.

Measure Group - A collection of similar measures grouped for evaluation purposes.

Measure Package – A collection of CA eTRM tables and documents that describe the assumptions and calculations used to estimate the CPUC-approved savings for a deemed measure.

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

Energy efficiency programs save energy by encouraging customers to install efficient technologies such as appliances and Heating, Ventilation and Air Conditioning (HVAC) systems. Fuel substitution programs complement these efforts by promoting the switch from gas technologies to electric alternatives, which despite increasing electricity usage, leads to an overall decrease in total energy consumption. To guide these efforts, the CPUC sets energy savings targets that Program Administrators (PAs) must meet by administering programs that install these technologies.¹ The CPUC then evaluates the effectiveness of these programs to ensure they deliver the intended energy savings.

This report provides the results of a comprehensive review of savings submitted by 13 Program Administrators (PAs) across 108 programs and 63 technology groups² that are classified as Group A Deemed savings.³ These savings represent \$415 million in Total System Benefits (TSB). This review plays a critical role in ensuring the integrity, accuracy, and accountability of reported energy savings, which directly inform CPUC oversight, policy development, and future program design.

Throughout the review, the team made the necessary adjustments for all records where reported savings deviated from CPUC approved “typical” values. The team then recalculated the savings to ensure accuracy and consistency.

¹ PAs that administered programs in PY2024 include the California Investor-Owned Utilities (IOUs) Pacific Gas & Electric, Southern California Edison, Southern California Gas, and San Diego Gas & Electric; the Community Choice Aggregators (CCAs) Ava Community Energy, Marin Clean Energy, and San Jose Clean Energy; and the Regional Energy Networks (RENs) Bay Area Regional Energy Network, Southern California Regional Energy Network, Tri-County Regional Energy Network, Inland Regional Energy Network, Rural REN North, and San Diego REN.

² Examples of technology groups include Residential Appliances, Nonresidential Heat Pump Water Heaters, Residential Smart Thermostats, and Nonresidential WalkIn Refrigeration Equipment.

³ For evaluation purposes, the CPUC has grouped programs into three evaluation groups: Group A (includes “Deemed” savings which are pre-approved “typical” and aggregated meter-based savings estimates), Group B (Codes and Standards programs and programs without savings targets), and Group D (custom calculated and site-level meter-based savings). The scope of this review covers all Group A “typical” savings records. For Group A savings, the CPUC approves and relies on “typical savings” estimates, also called “deemed savings” for each type of technology installation (also known as a “measure”).



ES.2 KEY FINDINGS AND RESULTS

- **High Accuracy:** Only 1% of the savings records reviewed required corrections to savings parameters, and these adjustments affected less than 0.1% of savings. The team found that when comparing the adjusted savings to the reported savings were approximately 100%, affirming the reliability of PA-reported data.
- **Technology Groups with High Savings:** Just 21 of the 63 technology groups accounted for more than 86% of total energy savings.
- **Energy Efficiency (Non-Fuel Substitution) Performance:** In PY2024, non-fuel substitution technologies delivered, over their lifetime, substantial program attributable (net)⁴ savings, 440 GWh of electricity and 209 million Therms. Approximately 97% of these savings were reported by the IOU programs, while 3% were reported through the REN and CCA programs. Reported savings were closely aligned with CPUC benchmarks, exceeding typical values by just 0.05% for electricity and 0.01% for gas.
- **Fuel Substitution Performance:** Fuel substitution technologies in PY2024 resulted, over their lifetime, substantial program attributable (net) savings of 130 million Therms gas savings shifting 987 GWh to electricity use, increasingly sourced from clean sources including solar, wind, and geothermal, over the lifetime of these technologies. IOU programs accounted for 94–97% of these reported impacts, while the REN and CCA programs accounted for 3-6% of these savings. Reported values were closely aligned with CPUC benchmarks within 0.03% for electricity and 0.01% for gas.

ES.2.1 At the PA Level

- **High IOU Accuracy.** The four IOUs were nearly 100% aligned with CPUC typical savings. The only exception to this is PG&E at 97.8% for Therms.

⁴ Participants who would have installed the same energy efficient equipment in the absence of the program are referred to as free-riders because they are receiving program incentives for actions they already would have undertaken. The total amount of savings derived among all participants, including free-riders, is referred to as gross savings, and the amount of savings excluding free-riders is referred to as net savings.

- **Non-IOU programs⁵ have room to improve.** Non-IOU programs had more variation, ranging from variances of 0-101% for GWh savings and 0-38% for Therm savings.
- **Four programs out of 108 with PY2024 savings had the highest deviations.**
 - MCE’s Single Family Home Energy Savings Program (MCE01) – lower electric savings by 19% due to errors found in the reported per unit savings and remaining use life of the replaced equipment (RUL).
 - MCE’s Multifamily Energy Savings Program (MCE08) – higher electric savings by 41% due to errors found in the reported per unit savings and climate zone.
 - San Jose Clean Energy’s Non-Residential Program (SJCE01) – lower electric savings by 14% and gas savings by 69% due to errors found in the reported per unit savings and remaining use life of the replaced equipment.
 - PG&E’s Industrial Strategic Energy Management Program (PGE_Ind_001) – lower gas savings by 52% due to errors found in the reported free ridership rates.
 - Sixteen other programs – nine from non-IOU PA programs and seven from IOU programs, including two Statewide Programs -- had variations that ranged from less than 1% to 8%.

ES.2.2 Recommendations

The review detailed in this report indicates a need for additional validation of data submitted by the PAs.

- **The program administrators, especially the REN and CCA Program Administrators, should work directly with the CPUC’s quarterly quality control exercise to identify and resolve issues promptly rather than through an annual process.**
 - The CPUC and its contractors have begun a process to complete a timely quality control process. This process includes a thorough review of detailed reported savings records and a reporting protocol to provide feedback on potential errors and technical assistance on how to correct them.
 - The REN and CCA reporting teams should engage in this process to understand the errors, how to correct them and avoid reporting savings with the same errors going forward.

⁵ Non-IOU PAs that administered programs in PY2024 include the Community Choice Aggregators (CCAs) Ava Community Energy, Marin Clean Energy, and San Jose Clean Energy; and the Regional Energy Networks (RENs) Bay Area Regional Energy Network, Southern California Regional Energy Network, Tri-County Regional Energy Network, Inland Regional Energy Network, Rural REN North, and San Diego REN.



Below are two illustrative examples of quality control processes that could be implemented prior to submission of data that will increase accuracy and clarity in reporting.

- **Ensure Consistency of Technical Reporting Parameters**
 - CPUC-approved typical savings for some technologies vary by parameters such as building type or location. The PAs should add validation checks to ensure that the parameters included in the reported savings are consistent with technology installation conditions indicated by other fields found in that same, or linked, datasets. Examples of internally inconsistent data found include: building type, geographic location, energy efficient technology installed, etc.).
- **Continue to Improve Water Savings Reporting**
 - For technologies that save water (faucet aerators, low-flow showerheads, food service appliances, etc.), the CPUC defines two separate energy savings values: the energy used by the home or building’s water heating system to heat the water; and the energy embedded in the public water distribution system—that is, the energy used to supply, treat, and convey cold water.⁶ For such measures, the PAs should calculate the embedded water energy savings separately from the energy savings and ensure that they are being reported in the appropriate categories in the datasets.

⁶ The CPUC calculated embedded water-energy savings in Decision 15-09-023. See <https://www.caetrm.com/media/reference-documents/D1509023.pdf>

SECTION 1

INTRODUCTION

Energy efficiency programs save energy by encouraging customers to install efficient technologies (appliances, HVAC, etc.) that use less energy. Fuel substitution programs promote the replacement of gas technologies with electric technologies to reduce natural gas consumption and reduce total energy consumption; since the replacement technologies are electric, this increases electricity use. The California Public Utilities Commission (CPUC) sets energy savings targets that Program Administrators (PAs) meet by administering programs that install these technologies. The CPUC then evaluates the performance of these programs.

For evaluation purposes, the CPUC has grouped programs into three evaluation groups: Group A (pre-approved deemed and aggregated meter-based savings estimates), Group B (Codes and Standards programs and programs without savings targets), and Group D (custom calculated and site-level meter-based savings). The scope of this review covers all Group A “typical” savings claims. For Group A claims, the CPUC approves and relies on “typical savings” estimates, also called “deemed savings” for each type of technology installation (also known as a “measure”). PAs identify the appropriate “typical savings” for their installations and calculate “gross” program energy savings (GWh, MW, and Therms), by multiplying the CPUC-estimated savings per measure times the number of measure installations. The PAs also calculate “net” energy savings by estimating what portion of the “gross” savings can be attributed to the influence of the program instead of other factors. The PAs report gross and net savings to the CPUC.

In Program Year (PY) 2024, thirteen PAs in California reported 668 thousand individual savings claims for deemed measures in Group A, across 108 programs and 63 measure groups, delivering \$415.2 million in Total System Benefits (TSB).⁷ Similar to the PY2023 review, this effort reviewed the PAs’ PY2024 reported savings and compared them to the CPUC’s approved savings estimate for each

⁷ The System Benefit (TSB) is “an expression, in dollar value, of the lifecycle energy, capacity, and GHG benefits of a utility’s energy efficiency program portfolio.” (California Public Utilities Commission, “CPUC Better Aligns Energy Efficiency Programs to Reduce GHG Emissions, Support Equity, and Increase Grid Stability.” Available at: <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M385/K242/385242131.PDF>)

technology, to identify and correct inaccurate claims and detect technical or administrative risks within the portfolio. For any cases where the PAs deviated from the approved CPUC “typical” values, the team adjusted the values and re-calculated the savings.

This report contains the results of Quantum Energy Analytics (Quantum’s) (hereafter referred to as the study team’s) review of PA savings claims for deemed measures in PY2024.

1.1 BACKGROUND

Table 1-1 summarizes the lifecycle net savings claimed by PAs for Group A programs in PY2024. The table shows savings for Residential, Commercial, Industrial, and Public Sector deemed measures grouped into two categories: non-fuel substitution measures, which are like-for-like replacements, and fuel substitution measures, which switch the predominant fuel type of the measure from gas to electric. An example is replacing a gas clothes dryer with a highly efficient all-electric clothes dryer.

Table 1-1 Lifecycle Net Savings for Deemed Claims in PY2024

Measure Category	Count of Claims	Claimed MW	Claimed GWh	Claimed MMTherms
Non-Fuel Substitution Measures	624,350	138.93	439.76	209.09
Fuel Substitution Measures	44,197		(986.51)	130.47
All	668,547	138.93		339.56

The primary goal of this effort was to focus reviews on measure groups responsible for the vast majority of claimed energy savings. While the Group A programs collectively included over 668 thousand claims, 21 of the 63 measure groups accounted for more than 86% of total energy savings. Among non-fuel substitution measures, 13 groups represented 87% of claimed electric (kWh) savings, and eight groups represented 86% of claimed natural gas savings. Among fuel substitution measures, only two groups accounted for 99% of fuel substitution natural gas savings and the associated increase in electric usage. Fuel substitution measures also accounted for a disproportionate amount of gas savings relative to the number of claims. The study team reviewed all claims, with a focus on these 21 groups of greatest

savings impact. Ultimately the reviewed measure groups collectively represented 100% total energy savings and claims.

1.2 OBJECTIVES

This study addresses the following objectives:

- **Review claims** to identify errors in reporting savings parameters and any reporting error patterns that can be addressed systematically
- **Generate the All Things Reported (ATR) database** containing side-by-side claimed and reviewed savings estimates based on this analysis.⁸
- **Report findings and recommendations for PY2024 deemed measures** to address any systematic reporting issues identified through the study, and to inform CPUC processes and policy.

1.3 REPORT ORGANIZATION

This report contains the following sections:

- Section 2 describes the study methodology.
- Section 3 presents key findings.
- Section 4 contains more detailed results in table form.
- Section 5 provides recommendations to PAs.

⁸ The ATR Database is a CPUC internal database of every individual savings claim in California across all programs and measure groups. When claims are evaluated, any incorrect parameters are updated, and the corrected value is added to the ATR Database. This recordkeeping process supports CPUC's oversight of programs by tracking the accuracy of claims.

SECTION 2

METHODOLOGY

The study consists of the following tasks:

- **Generate aggregated savings claim dataset and prioritize high impact measure groups for review.**
- **Review savings claims to identify discrepancies with CPUC-approved “typical parameters”.**
- **Conduct close review of savings claims that deviate from CPUC-approved “typical parameters”.**

The following subsections describe each of these steps in detail.

2.1 AGGREGATE SAVINGS CLAIMS AND PRIORITIZE MEASURE GROUPS

To focus study resources on the most impactful measures, the study team aggregated over 668 thousand deemed claims from PY2024 into measure groups and identified which of those contributing the largest share of portfolio savings.

First, the study team aggregated the individual savings claims into a manageable set for review. The California Energy Data and Reporting System (CEDARS) database includes each individual claim from PA programs hundreds of thousands of records. The first step in the review of savings claims was to aggregate those claims to unique combinations of fields: PA, MeasureDetailID (unique identifier for a set of CPUC-approved savings parameters), statewide program claim flag, residential flag, and fuel substitution flag. The 668 thousand deemed claims from PY2024 were aggregated to just over 18,000 unique combinations of these fields, which is referred to as the aggregated savings claims dataset.

Next, the study team analyzed the aggregated savings claims dataset to identify the measure groups associated with the highest savings in PY2024. Measure groups include one or more Measure Package IDs that identify the CPUC-approved parameters and savings in the California Electronic Technical



Reference Manual (CA eTRM).⁹ ¹⁰ The team aggregated savings claims for kWh, kW and Therms at the measure group level.

Finally, the study team determined the scope of the aggregate dataset review. The study team targeted measures that would collectively cover at least 86% of Group A energy savings in aggregate, which resulted in 21 of the 63 measure groups. Each of the 21 measure groups represent at least 2% of the Group A savings individually (hereafter referred to as “prioritized measure groups”). While the following tables focus on the prioritized measure groups, this effort compared the entire aggregate dataset against CPUC-approved “typical parameters.”

Table 2-1, Table 2-2, and Table 2-3 show the measure groups that account for the majority of electric, gas, and fuel substitution savings, respectively. Some measure groups appear in both electric and gas tables because they save electricity and gas. For example, HVAC Duct Sealing reduces the loss of conditioned (cooled or heated) air through duct cracks or disconnects, resulting in lower cooling and heating needs for the building. Notably, HVAC measures including duct sealing, controls, and the installation of high efficiency unitary systems and motors, represent 40% of electric savings. Horticulture lighting used in greenhouse applications provide an additional 16% of electric savings. Gas savings are dominated by one measure group, tankless water heaters, which represent 54% of gas savings. Planned water heating evaluation research will examine these in depth.

⁹ www.caetrm.com

¹⁰ For example, Measure Package ID SWWH025-05 is for Residential Heat Pump Water Heater, Fuel Substitution, version 04 which was effective from January 1, 2023 through April 24, 2023. Measure ID SWWH025-06 is the version effective from April 25, 2023 through December 31, 2023, and Measure ID SWWH025-07 is the version effective from January 1, 2024 through December 31, 2024. The Measure Group “Water Heating Heat Pump Water Heater – Fuel Substitution” includes Measure Package IDs SWWH025, SWWH027, and SWWH028.

Table 2-1: Non-Fuel Substitution Measure Groups with High Electric Savings

Measure Group	Percent of Lifecycle GWh Savings
Lighting Horticulture LED	15.6%
HVAC Duct Sealing	12.7%
HVAC Controls Fan	9.4%
Food Service	8.1%
HVAC High Efficiency Unitary	7.6%
Refrigeration Freezer	5.8%
Process Fan High Efficiency	5.3%
Refrigeration Controls - ASH	5.2%
Process Fan VFD	5.0%
HVAC Motor Replacement	3.7%
HVAC Controls Smart Thermostat	3.6%
HVAC RCA	2.7%
Refrigeration Display Case	2.7%
Total Groups with High Electric Savings	87.5%

Table 2-2: Non-Fuel Substitution Measure Groups with High Gas Savings

Measure Group	Percent of Lifecycle Therm Savings
Water Heating Tankless Water Heater	53.8%
Food Service	10.0%
Process Greenhouse Heat Curtain	7.2%
Water Heating Storage Water Heater	5.0%
Pipe Insulation Hot Application	2.9%
HVAC Duct Sealing	2.5%
Water Heating Showerhead	2.5%
Water Heating Faucet Aerator	2.4%
Total Groups with High Gas Savings	86.3%



Table 2-3: Fuel Substitution Measure Groups with High Gas Savings

Measure Group	Percent of Lifecycle Therm Savings
Water Heating Heat Pump Water Heater – Fuel Substitution	92.8%
HVAC High Efficiency Unitary – Fuel Substitution	6.7%
Total Groups with High Fuel Sub Savings	99.5%

2.2 REVIEW AGGREGATE CLAIMS TO IDENTIFY DISCREPANCIES FROM CPUC-APPROVED PARAMETERS

The study team proceeded with a verification of each field from the aggregated savings claims dataset against the CPUC-approved value from the corresponding eTRM measure package (that is, the corresponding deemed value in the CA eTRM database.) For this purpose, the study team joined the aggregated savings claims dataset to the eTRM parameters for each MeasureDetailID, facilitating a side-by-side review of claimed vs. eTRM parameters. More specifically, the study team conducted the following verifications:

- That the Source Description from the claim matches the eTRM version description
- That the claim Application Date or Installation Date fall inside the effective date range for the eTRM version referenced by the claim.
- That the following savings parameters from the claim match the CPUC-approved savings parameters from eTRM:
 - Net-to-gross (NTGR) ID and NTGR ratios for kW, kWh and Therms
 - Effective Useful Life (EUL)
 - Remaining Useful Life (RUL) for accelerated replacement measures
 - Per-unit kW, kWh and Therms savings
 - Per-unit embedded water kWh savings

- Measure Installation Type – this is an indicator of fuel substitution measures
- Impact load shapes for electric and gas savings
- Per-unit measure costs
- Per-unit miscellaneous benefits
- **For weather-sensitive measures the team verified the PA claims used the correct climate zone (CZ) by comparing**
 - The site zip code against the claimed CZ
 - The claimed CZ against the CZ referenced in the MeasureDetailID field
 - The CZ against the IOU territory in which the site is located

Throughout this review the study team flagged any discrepancy between the aggregated savings claims dataset and the CPUC-approved parameters and values for further review in Step 3.

2.3 IN-DEPTH REVIEW OF SAVINGS CLAIMS

Not every discrepancy between the aggregated savings claims dataset and the measure package parameters is, in fact, an error, since other considerations may override default values in the measure package parameters. To ensure consistent application of review, the study team established protocols for evaluating and addressing discrepancies to determine whether they are justified or should be corrected, and if the latter, what the correct value should be. Table 2-4 lists the protocols.



Table 2-4: Protocols for In-Depth Review of Claims with Discrepancies

Parameter	Discrepancy	Protocol
Measure ID	Measure package ID as reported in the Source Description field does not match MeasureDetailID.	Review claim parameters to identify the correct measure.
Measure Version	Claim installation date does not fall within eligible date range of measure version.	Update parameters to match measure version in effect at time of installation.
Climate Zone	Listed climate zone is not consistent with installation zip code or PA service territory	Update climate zone to match known information and update per-unit savings accordingly
Measure Impact Type	Measure Impact Type indicates a non-fuel substitution measure but claimed MeasureDetailID indicates Fuel Substitution.	Review claim parameters to determine whether the measure is a fuel substitution measure and update the fields to match the measure type.
Per-Unit Savings (kWh, kW, Therms, and embedded water-energy savings)	Claimed per-unit savings are different from deemed measure per-unit savings.	If the claim was made by a Statewide Program, verify that there are multiple entries for the claim that assign a share of the per-unit savings to different IOUs for each installation, and verify that the sum of the per-unit savings for each IOU adds up to the total deemed per-unit savings. If the claim was not made by a Statewide program, review and update the per-unit savings.
Effective Useful Life (EUL) and Remaining Useful Life (RUL)	EUL and/or RUL are different from deemed values	Update the EUL and/or RUL.
Net-to-Gross (NTGR) Values	NTGR value is different from CPUC-approved NTGR value for the measure package	Determine if the measure was a Direct Install measure at a hard-to-reach (HTR) or educational facility, which may claim a NTGR value of 0.85. Do not change the value if the measure was installed at a HTR facility or school as indicated in the NTGR ID, or if the program plan has a stated primary goal of targeting HTR customers and the claim has a NTGR of 0.85. If the study team cannot verify the source of the deviation from the CPUC-approved deemed value, update the NTGR to match the deemed value.
Impact Load Profile	Load profile is different from CPUC-approved load profile for the measure package	Note the discrepancy
Per-unit Measure Costs	Measure costs are different from CPUC-approved measure costs for the measure package	Note the discrepancy

SECTION 3

KEY FINDINGS

The PY2024 claims database includes over 668 thousand individual deemed savings claims within the prioritized and non-prioritized measure groups in this study. Once the claims were aggregated to just over 18 thousand unique combinations of parameters, the study team reviewed all aggregate combinations. The initial review found that approximately 2% of the total Group A claims contained one or more savings parameter values that did not match the parameters in the referenced eTRM measure group. Additionally, 1.6% of claims did not claim refrigerant benefits, and over half the claims deviated from the CPUC-approved measure costs.

The study team then conducted an in-depth review of claims with savings parameter discrepancies and found that half could either be explained by legitimate reasons or that they did not result in significant savings deviations. The study team found that only about 5,800 claims, or just under 1% of the total claims, contained errors that required an adjustment to the savings parameters. These in turn represented less than 0.1% of total deemed savings, resulting in overall realization rates of approximately 100% (when estimated to the nearest whole percent).

Table 3-1 summarizes the most significant reasons for discrepancies. Discrepancies requiring savings parameter changes are listed first, followed by discrepancies that do not result in savings changes.



Table 3-1: Summary of Findings

Adjustment Type	Nature of Discrepancy	Claims Affected	Impact of Results as Percent of Group A Lifecycle Net Savings	
			kWh	Therms
Discrepancies that Require Savings Parameter Corrections				
Unit Savings	Claimed parameters do not correspond to the CPUC-approved values for the referenced MeasureDetailID	1,776	-0.11%	0.17%
NTGR	Incorrect NTGR value used	166	0.24%	-0.16%
EUL/RUL	EUL or RUL or both do not match CPUC-approved values	498	0.01%	-0.03%
Climate Zone Designation	Claim uses savings parameters for a different climate zone than the one documented in building location field	3,331	-0.02%	0.01%
Measure Package	Incorrect measure package used	4	-0.01%	0.00%
Embedded Water Savings	Embedded water savings claimed incorrectly	52	-0.01%	0.00%
Discrepancies that Do Not Require Energy Savings Correction				
SW Programs	Statewide program claims allocate a percent of the per-unit savings for each installation to each of the IOUs, rather than using the total per-unit savings value in the measure package	186,975	None – we verified the correct allocation	
NTGR=0.85	Net-to-gross ratio (NTGR) used an allowed customer-specific value instead of the value from the measure package.	262,018	None – HTR customer-specific value overrides the measure package default value	
Discrepancies that Do Not Affect Energy Savings				
Refrigerant Benefits	One program neglected to claim refrigerant benefits	10,827	No effect on savings	
Impact Load Profiles	Impact load profiles do not match CPUC-approved impact load profiles for the	677	No effect on savings	
Measure Cost	Unit measure costs claimed do not match CPUC-approved measure costs for the referenced measure package	365,102	No effect on savings	

3.1 DISCREPANCIES THAT REQUIRED CORRECTIONS

The following describes the categories of discrepancies that required parameter corrections.

3.1.1 Unit Savings

Many deemed measure packages have different savings parameters depending on the version effective during a given time period, as required, for example, by changing appliance standards. The study team compared the unit savings parameters from the claim with those from the measure package referenced in the MeasureDetailID field.

- **The vast majority of claims claimed the correct unit savings parameters.** No changes were made.
- **If the claims had unit savings that were different than those specified by the CA eTRM, the team updated the unit savings to match the correct version of the measure package referenced in the claim.** For some claims this resulted in significant savings changes due to savings parameter changes across measure package versions.
- **For a small subset of claims the Measure Detail ID did not match the measure package version referenced in the field Source Description.** For these cases the team noted that the Source Description field was closely aligned with the savings parameters from the claims. The team researched possible measure package versions and noted the most likely Measure Detail ID value that corresponded to the claimed parameters. The comparison with eTRM proceeded based on the corrected Measure Detail ID value, and in some cases uncovered the need for additional parameter corrections.



Table 3-2: Electric Savings Adjustments due to Unit Savings Discrepancies

PA	Number of Claims Affected	Claimed LC Net kWh for Affected Claims	Average Claimed LC Net kWh for Affected Claims	Average Adjustment LC Net kWh for Affected Claims	Adjustment as % of Claimed Lifecycle Net kWh Savings
Non-Fuel Substitution Measures					
BAY	696	365,387	525	(1)	-0.3%
MCE	50	62,723	1,254	378	30.1%
SCR	924	88,009	95	364	382.5%
SJCE	68	17,912	263	(100)	-38.1%
TCR	1	1,198	1,198	-	0.0%
SCE	20	22,232,886	1,111,644	(10,861)	-1.0%
SCG	1	113	113	504	447.3%
Fuel Substitution Measures					
BAY	2	(96,120)	(48,060)	(270,435)	562.7%
MCE	1	11	11	(23,967)	Large
SCR	12	(3,624,020)	(302,002)	86,117	-28.5%
PGE	1	(131,250)	(131,250)	(6,300)	4.8%

Table 3-3: Gas Savings Adjustments due to Unit Savings Discrepancies

PA	Number of Claims Affected	Claimed LC Net Therm for Affected Claims	Average Claimed LC Net Therm for Affected Claims	Average Adjustment LC Net Therm for Affected Claims	Adjustment as % of Claimed Lifecycle Net Therm Savings
Non-Fuel Substitution Measures					
BAY	696	8,258	12	-	0.0%
MCE	50	31,908	638	335	52.5%
SCR	924	283,568	307	11	3.5%
SJCE	68	2,025	30	0	0.0%
TCR	1	171	171	-	0.0%
SCE	20	-	-	31,485	
SCG	1	33	33	-	0.0%
Fuel Substitution Measures					
BAY	2	50,979	25,490	-	0.0%
MCE	1	0.05	0	2,003	Large
SCR	12	465,349	38,779	(7,954)	-20.5%
PGE	1	14,490	14,490	735	5.1%

3.1.2 Net-to-Gross Ratio (NTGR)

The study team compared the claim NTGR_ID and NTGR values to the NTGR_ID and NTGR values for the permutation indicated by MeasureDetailID. For discrepancies that did not match the measure permutation values and could not otherwise be justified, the study team corrected the NTGR value to match the measure permutation parameters. Although only a small number of individual claims were affected, the magnitude of the savings per claim was large enough to have a small but observable impact on the overall Group A savings.



Table 3-4: Electric Savings Adjustments due to Net-to-Gross Discrepancies

PA	Number of Claims Affected	Claimed LC Net kWh for Affected Claims	Average Claimed LC Net kWh for Affected Claims	Average Adjustment LC Net kWh for Affected Claims	Adjustment as % of Claimed Lifecycle Net kWh Savings
Non-Fuel Substitution Measures					
PGE	4	-	-	-	-
BAY	87	9,738	112	848	757.5%
Fuel Substitution Measures					
BAY	75	(68,370)	(912)	(18,232)	Large

Table 3-5: Gas Savings Adjustments due to Net-to-Gross Discrepancies

PA	Number of Claims Affected	Claimed LC Net Therms for Affected Claims	Average Claimed LC Net Therms for Affected Claims	Average Adjustment LC Net Therms for Affected Claims	Adjustment as % of Claimed Lifecycle Net Therm Savings
Non-Fuel Substitution Measures					
PGE	4	1,325,546	331,387	(173,583)	-52.4%
BAY	87	2,908	33	186	557.8%
Fuel Substitution Measures					
BAY	75	7,283	97	1,942	Large

3.1.3 Expected Useful Life (EUL) and Remaining Useful Life (RUL)

Several claims with incorrect EUL or RUL values were corrected to match the CPUC-approved values from the measure permutations. Since the EUL and RUL indicate the number of years over which annual savings persist, EUL and RUL changes affect the lifecycle net savings.

Table 3-6: Electric Savings due to EUL or RUL Discrepancies

PA	Number of Claims Affected	Claimed LC Net kWh for Affected Claims	Average Claimed LC Net kWh for Affected Claims	Average Adjustment LC Net kWh for Affected Claims	Adjustment as % of Claimed Lifecycle Net kWh Savings
Non-Fuel Substitution Measures					
BAY (EUL)	317	287,145	906	413	45.6%
MCE (RUL)	2	547	273	545	199.1%
SCR (EUL)	25	292,246	11,690	(5,821)	-49.8%
SJCE (RUL)	7	842,693	120,385	(80,256)	-66.7%
PGE (RUL)	22	(28,756)	(1,307)	0	0.0%
Fuel Substitution Measures					
BAY (EUL)	125	(2,287,537)	(18,300)	4,050	-22.1%

Table 3-7: Gas Savings due to EUL or RUL Discrepancies

PA	Number of Claims Affected	Claimed LC Net Therms for Affected Claims	Average Claimed LC Net Therms for Affected Claims	Average Adjustment LC Net Therms for Affected Claims	Adjustment as % of Claimed Lifecycle Net Therm Savings
Non-Fuel Substitution Measures					
BAY (EUL)	317	101,853	321	187	58.2%
MCE (RUL)	2	526	263	524	199.1%
SCR (EUL)	25	163,972	6,559	(4,234)	-64.5%
SJCE (RUL)	7	5,716	817	(544)	-66.7%
PGE (RUL)	22	484,011	22,000	(114)	-0.5%
Fuel Substitution Measures					
BAY (EUL)	125	228,595	1,829	(286)	-15.6%



3.1.4 Climate Zone Designation

Climate zone discrepancies caused minor differences in the analysis because the climate zone only affects the per-unit savings for weather-dependent measures. For these measures, the study team used a protocol to analyze individual claims to determine if the correct climate zone was specified, and whether savings were consistent with the climate zone. The protocol consisted of the following activities:

- Mapped site zip code to climate zone and compared to the claimed building location field
- Compared the claimed building location CZ to the CZ referenced in the Measure Detail ID field
- Compared the claimed building location CZ to the IOU territory in which the site is located

Most claims passed these tests, with the exception of claims from three programs

- Two SCG programs used Measure Detail IDs for CZ09 for claims corresponding to sites located in other Climate Zones.
- One MCE program used Measure Detail IDs for CZ03 for claims corresponding to sites in CZ12.

Table 3-8: Electric Savings Adjustments due to Climate Zone Discrepancies

PA	Number of Claims Affected	Claimed LC Net kWh for Affected Claims	Average Claimed LC Net kWh for Affected Claims	Average Adjustment LC Net kWh for Affected Claims	Adjustment as % of Claimed Lifecycle Net kWh Savings
Non-Fuel Substitution Measures					
SCG	3,216	1,502,539	467	(8)	-1.7%
MCE	89	150,152	1,687	1,444	85.6%
Fuel Substitution Measures					
MCE	26	(358,565)	(13,791)	(611)	4.4%

Table 3-9: Gas Savings Adjustments due to Climate Zone Discrepancies

PA	Number of Claims Affected	Claimed LC Net Therms for Affected Claims	Average Claimed LC Net Therms for Affected Claims	Average Adjustment LC Net Therms for Affected Claims	Adjustment as % of Claimed Lifecycle Net Therm Savings
Non-Fuel Substitution Measures					
SCG	3,216	137,152	43	5	12.2%
MCE	89	51,530	579	289	50.0%
Fuel Substitution Measures					
MCE	26	58,429	2,247	(4)	-0.2%

3.1.5 Measure Package

The study team found that one BAYREN program referenced the Commercial measure package SWWH027 for heat pump water heater – fuel substitution installations in Multifamily buildings. The team corrected the savings parameters with those from the appropriate Residential measure package SWWH025.

Table 3-10: Electric Savings Adjustments due to Measure Package Discrepancies

PA	Number of Claims Affected	Claimed LC Net kWh for Affected Claims	Average Claimed LC Net kWh for Affected Claims	Average Adjustment LC Net kWh for Affected Claims	Adjustment as % of Claimed Lifecycle Net kWh Savings
Fuel Substitution Measures					
BAY	4	(123,512)	(30,878)	20,412	-66.1%



Table 3-11: Gas Savings Adjustments due to Measure Package Discrepancies

PA	Number of Claims Affected	Claimed LC Net Therms for Affected Claims	Average Claimed LC Net Therms for Affected Claims	Average Adjustment LC Net Therms for Affected Claims	Adjustment as % of Claimed Lifecycle Net Therm Savings
Fuel Substitution Measures					
BAY	4	14,884	3,721	(2,171)	-58.3%

3.1.6 Embedded Water

Discrepancies in embedded water savings were another source of differences in savings which caused significant adjustments to individual claims but had a minimal impact on the overall Group A savings due to the small number of affected claims.

Table 3-12: Electric Savings Adjustments due to Embedded Water Savings Discrepancies

PA	Number of Claims Affected	Claimed LC Net kWh for Affected Claims	Average Claimed LC Net kWh for Affected Claims	Average Adjustment LC Net kWh for Affected Claims	Adjustment as % of Claimed Lifecycle Net kWh Savings
Non-Fuel Substitution Measures					
BAY	2	34,854	17,427	1,871	10.7%
MCE	6	0	0	716	
TCR	7	61,322	8,760	2,049	23.4%
PGE	22	0	0	70	
SW	15	197,637	13,176	1,047	7.9%

3.2 DISCREPANCIES THAT DID NOT REQUIRE SAVINGS PARAMETER ADJUSTMENTS

3.2.1 Statewide Program Savings Allocation

Statewide Program claims allocate a fraction of the per-unit savings for each installation to each of the IOUs, based on a pre-determined allocation rule. The study team verified that the unit savings were allocated correctly. No adjustments were necessary.

3.2.2 Situation-Specific Net-to-Gross Values

Acceptable situation-specific NTGR values that can override CPUC-approved measure package deemed values are for Direct Install measures at hard-to-reach or education facilities, which can claim a NTGR of 0.85. If the study team found NTGR values of 0.85 in conjunction with NTGR_IDs indicating HTR or educational site installations, these values were not adjusted.

3.3 DISCREPANCIES THAT DO NOT AFFECT SAVINGS

Measure package parameters include some that are influential for benefits calculations, but that do not affect savings calculations. The study team found discrepancies in the following fields:

3.3.1 Refrigerant Benefits

Program SCE-13-TP-001, Comprehensive Manufactured Homes, did not claim refrigerant benefits corresponding to measure package SWSV014. This resulted in lower Total System Benefits for nearly 11,000 claims.

3.3.2 Impact Load Profiles

Impact load profiles, in conjunction with avoided costs, contribute to the Total System Benefit calculation. Deemed claims should specify the deemed impact load profiles listed in each measure package. In PY2024 there were over 650 claims from four PAs that claimed different load impact profiles than those specified in the corresponding measure packages.



Table 3-13: Deemed Claims with Impact Load Profile Discrepancies in PY2024

Program ID	Measure Package ID	End Use Shape	eTRM End Use Shape	Claims Affected
Electric				
BAYREN02	SWWH025	DEER:Indoor_CFL_Ltg	DEER:Res_ClothesDish Washer	4
BAYREN08	SWSV001	DEER:HVAC_Duct_Sealing	DEER:HVAC_Eff_AC	212
BAYREN09	SWWH001	21 = Res. Wtr. Heating	DEER:Res_ClothesDish Washer	70
BAYREN09	SWWH001	32 = Res. Clothes Dry	DEER:Res_ClothesDish Washer	31
BAYREN09	SWWH002	21 = Res. Wtr. Heating	DEER:Res_ClothesDish Washer	14
BAYREN09	SWWH002	32 = Res. Clothes Dry	DEER:Res_ClothesDish Washer	10
MCE08	SWSV001	DEER:HVAC_Duct_Sealing	DEER:HVAC_Eff_AC	196
SJCE02	SWAP001	DEER:HVAC_Eff_AC	DEER:RefgFrzr_HighEff	4
SJCE02	SWAP003	DEER:HVAC_Eff_AC	DEER:Res_ClothesDish Washer	60
SJCE02	SWAP004	DEER:HVAC_Eff_AC	DEER:Res_ClothesDish Washer	61
BAYREN02	SWWH025	DEER:Indoor_CFL_Ltg	DEER:Res_ClothesDish Washer	4
Gas				
SCE_3P_2021A GPUB_001	SWPR001	Annual	Summer Only	14
SCE_Res_Equity _001	SWHC049	Annual	Summer Only	1

3.3.3 Unit Measure Cost

Unit measure costs, including labor and materials, are required for each claim and contribute to the Total Resource Cost (TRC) calculation. Accelerated replacement (AR) claims, in which an energy efficient technology replaces a still-functional older piece of equipment, require two measure costs.

- The full measure cost is the cost incurred by the customer to install the efficient technology while the old equipment is still functional.
- The incremental cost is the cost that would be incurred by the customer if they waited to install the efficient technology in the future, after the still-functional piece of equipment broke down. At that time the customer would install the same efficient technology as a “normal replacement”, under the assumption that it is still more efficient than standard practice. The incremental cost is the amount above standard practice that the customer would be expected to spend, some years in the future, to install the same efficient technology that they are installing now.

A review of the PY2024 claims shows over 137,000 accelerated replacement claims with nonzero savings after the remaining life of the older piece of equipment, but for which the PA reported zero incremental cost.¹¹

¹¹ The CEDARS User Guide rules surrounding measure costs are here: https://cedars.cpuc.ca.gov/cet_ui/cet-user-guide/



Table 3-14: Accelerated Replacement Deemed Claims with Zero Incremental Costs in PY2024

Program Administrator	Program ID	Measure Package ID	Measure	Claims Affected
MCE	MCE01	SWWH001	Faucet Aerator	3
SCG	SCG3764*	SWWH002	Low-flow Showerhead	1,637
SCG	SCG3831	SWWH002	Low-flow Showerhead	124,998
SCG	SCG3832	SWWH002	Low-flow Showerhead	22
SCG	SCG3833*	SWWH002	Low-flow Showerhead	30
SCG	SCG3861*	SWWH002	Low-flow Showerhead	2,015
SCG	SCG3883*	SWWH002	Low-flow Showerhead	64
SCG	SCG3884*	SWWH002	Low-flow Showerhead	280
SCG	SCG3886	SWWH020	Low-flow Showerhead	1
SCG	SCG3889*	SWWH001	Faucet Aerator	1,331
SCG	SCG3889*	SWWH002	Low-flow Showerhead	1,446
SCG	SCG3935*	SWWH002	Low-flow Showerhead	296
SCG	SCG3936*	SWWH001	Faucet Aerator	3,225
SCG	SCG3936*	SWWH002	Low-flow Showerhead	2,485
All				137,833

** These programs reported zero incremental costs for accelerated replacement claims in Q1-Q2 PY2025. SCG3831 has not yet filed claims in PY2025.*

SECTION 4

RESULTS

This section summarizes the quantitative results of the PY2024 claims review, including claimed and evaluated GWh and Therms values after parameter corrections. Realization rates are also presented, with Group A achieving nearly 100% (within 0.1%), indicating that PAs are submitting claims with a high degree of accuracy. Table 4-1 and Table 4-2 present GWh and Millions of Therms results for Group A measures.

Table 4-1: Lifecycle Net Electric Savings by Type of Measure

Category	Claimed GWh	Evaluated GWh	Claims Review RR
Non-Fuel Substitution Measures			
IOU PAs	427.72	427.50	99.95%
Non-IOU PAs	12.04	12.04	99.98%
All Non-Fuel Sub	439.76	439.53	99.95%
Fuel Substitution Measures			
IOU PAs	(920.73)	(920.73)	100.00%
Non-IOU PAs	(65.78)	(66.11)	100.50%
All Fuel Sub	(986.51)	(986.84)	100.03%



Table 4-2: Lifecycle Net Gas Savings by Type of Measure

Category	Claimed MM Therms	Evaluated MM Therms	Claims Review RR
Non-Fuel Substitution Measures			
IOU PAs	203.13	203.08	99.98%
Non-IOU PAs	5.96	5.98	100.33%
All Non-Fuel Sub	209.09	209.06	99.99%
Fuel Substitution Measures			
IOU PAs	122.40	122.40	100.00%
Non-IOU PAs	8.07	8.08	100.10%
All Fuel Sub	130.47	130.48	100.01%

Some individual PAs had rates different from 100%, which could indicate systematic errors. Table 4-3 shows results for each PA.¹² Overall, the IOUs had realization rates closer to 100% than non-IOU PAs, suggesting non-IOU PAs may need additional assistance reporting savings. Most instances of high or low realization rates occurred for PAs with relatively small savings claims, so the effect on Group A savings overall is small.

¹² IREN, RRN and SDREN had only zero savings claims in PY2024.

Table 4-3: Non-Fuel Substitution Measures: Lifecycle Net Savings and Realization Rates by Program Administrator

PA	Number of Claims	Claimed GWh	Adjusted GWh	Claims Review RRkWh	Claimed MM Therms	Adjusted MM Therms	Claims Review RRTherms
AVA	1	2.36	2.36	100.0%	0.00	0.00	100.0%
BAY	6,772	2.95	3.16	107.0%	0.92	1.00	108.2%
MCE	980	1.02	1.17	115.0%	0.68	0.72	106.5%
SCR	2,752	0.93	1.12	120.5%	4.29	4.20	97.8%
SJCE	746	4.17	3.60	86.4%	0.01	0.01	65.8%
TCR	33	0.61	0.62	102.4%	0.06	0.06	100.0%
PGE	5,556	82.63	82.63	100.0%	16.34	15.64	95.7%
SCE	52,266	155.05	154.83	99.9%	3.67	4.30	117.2%
SDGE	9,558	15.44	15.44	100.0%	8.42	8.42	100.0%
SCG	399,554	55.05	55.03	100.0%	72.75	72.77	100.0%
SW	146,095	119.54	119.56	100.0%	101.95	101.95	100.0%



Table 4-4: Fuel Substitution Measures: Lifecycle Net Savings and Realization Rates by Program Administrator

PA	Number of Claims	Claimed GWh	Adjusted GWh	Claims Review RRkWh	Claimed MM Therms	Adjusted MM Therms	Claims Review RRTherms
AVA	0	0.00	0.00		0.00	0.00	
BAY	1,415	(21.89)	(23.21)	106.0%	2.82	2.92	103.6%
MCE	125	(1.24)	(1.28)	103.2%	0.21	0.22	100.9%
SCR	72	(39.67)	(38.63)	97.4%	4.33	4.23	97.8%
SJCE	330	(0.04)	(0.04)	100.0%	0.00	0.00	100.0%
TCR	13	(2.95)	(2.95)	100.0%	0.70	0.70	100.0%
PGE	272	(118.39)	(118.40)	100.0%	15.54	15.54	100.0%
SCE	1,009	(608.38)	(608.38)	100.0%	79.73	79.73	100.0%
SDGE	81	(58.72)	(58.72)	100.0%	7.91	7.91	100.0%
SCG	0	0.00	0.00		0.00	0.00	
SW	40,880	(135.23)	(135.23)	100.0%	19.23	19.23	100.0%

Table 4-5 and Table 4-6 identify specific programs for which electric and or gas realization rates, respectively, were less than 90% or greater than 110%. Major discrepancies were limited to a relatively small number of programs, most of which were administered by the RENs or CCAs identified in the previous table.

Table 4-5: Lifecycle Electric Net Savings and Realization Rates by Program

Program ID	Claimed MWh	Reviewed MWh	Claims Review RR	Main Drivers of Discrepancies
MCE01	78	63	80.8%	Unit savings, RUL
MCE02a	0	5	-	Unit savings, embedded water
MCE08	(302)	(178)	59.1%	Unit savings, Climate Zone
SJCE01	4,102	3,534	86.1%	Unit savings, RUL

Table 4-6: Lifecycle Gas Net Savings and Realization Rates by Program

Program ID	Claimed Therms (1,000s)	Reviewed Therms (1,000s)	Claims Review RR	Main Drivers of Discrepancies
SJCE01	5	2	30.7%	Unit savings, RUL
PGE_Ind_001a	1,326	631	48%	NTGR
SCE_3P_2021AGPUB_001	0	630	-	Unit savings

Table 4-7 and Table 4-8 present results by measure group for electricity and gas, respectively. When considered at the level of the measure group, there were no measure groups that had significant discrepancies between claimed and adjusted savings.



Table 4-7: Lifecycle Net Electric Savings and Realization Rates by Measure Group

Measure Group	Claimed GWh	Adjusted GWh	Claims Review RR
Non-Fuel Substitution Measures			
Lighting Horticulture LED	68.8	68.5	99.7%
HVAC Duct Sealing	56.0	56.1	100.2%
HVAC Controls Fan	41.2	41.2	100.0%
Food Service	35.5	35.5	100.0%
HVAC High Efficiency Unitary	33.3	33.3	100.1%
Refrigeration Freezer	25.7	25.7	100.0%
Process Fan High Efficiency	23.5	23.5	100.0%
Refrigeration Controls ASH	23.1	23.1	100.0%
Process Fan VFD	22.1	22.1	100.0%
HVAC Motor Replacement	16.2	15.6	96.5%
HVAC Controls Smart Thermostat	15.8	15.7	99.8%
HVAC RCA	12.1	12.1	100.0%
All Other Non-Fuel Substitution	66.8	67.2	100.6%
All Non-Fuel Substitution	439.8	439.5	99.9%
Fuel Substitution Measures			
Water Heating HPWH - Fuel Substitution	-925.8	-925.6	100.0%
HVAC High Efficiency Unitary - Fuel Substitution	-56.0	-56.5	100.9%
All Other Fuel Substitution	-4.7	-4.8	101.4%
All Fuel Substitution	(986.5)	(986.8)	100.0%

Table 4-8: Lifecycle Gas Savings and Realization Rates by Measure Group

Measure Group	Claimed MM Therms	Adjusted MM Therms	Claims Review RR
Non-Fuel Substitution Measures			
Water Heating Tankless Water Heater	112.6	112.6	100.0%
Food Service	20.9	20.9	100.0%
Process Greenhouse Heat Curtain	15.0	15.0	100.0%
Water Heating Storage Water Heater	10.4	10.4	100.0%
Pipe Insulation Hot Application	6.0	5.3	88.4%
HVAC Duct Sealing	5.3	5.4	100.7%
Water Heating Showerhead	5.1	5.1	100.0%
Water Heating Faucet Aerator	5.1	5.1	100.2%
All Other Non-Fuel Substitution	28.7	29.4	102.1%
All Non-Fuel Substitution	209.1	209.1	100.0%
Fuel Substitution Measures			
Water Heating HPWH - Fuel Substitution	121.1	121.0	99.9%
HVAC High Efficiency Unitary - Fuel Substitution	8.7	8.8	101.1%
All Other Fuel Substitution	0.7	0.7	101.7%
All Fuel Substitution	130.5	130.5	100.0%

SECTION 5

RECOMMENDATIONS

Based on the 2024 claims review, the study team has developed the following recommendations to support the PAs in aligning claims with deemed measure parameters and address the most significant discrepancies found in the claims.

- **The program administrators, especially the REN and CCA Program Administrators, should work directly with the CPUC’s quarterly quality control exercise to identify and resolve issues promptly rather than through an annual process.**
 - The CPUC and its contractors have begun a process to complete a timely quality control process. This process includes a thorough review of detailed reported savings records and a reporting protocol to provide feedback on potential errors and technical assistance on how to correct them.
 - The REN and CCA reporting teams should engage in this process to understand the errors, how to correct them and avoid reporting savings with the same errors going forward.
- **The vast majority of discrepancies can be avoided by aligning the claim parameters: building type, building location, measure type with the correct permutation from the appropriate deemed measure package.** The study team recommends that PAs do the following to reduce future errors:
 - Start a claim by establishing the correct building type, location and measure, based on information collected during measure installation.
 - Identify the correct measure package and follow CPUC guidelines surrounding the correct measure package version corresponding to the claim date. Identify the correct permutation that quantifies savings for the building type and location of that installation.
 - Populate the claim with the parameters from the appropriate permutation. Verify that all parameters agree with the CPUC-approved values in the permutation.
 - For measures that save water: be sure to populate embedded water savings in the correct fields: Unit_kWh_IOU_Water_1st_baseline and Unit_kWh_IOU_Water_2nd_baseline.
- **For claims that might have started as custom projects but were ultimately claimed as deemed: make sure to use NTGR values from the permutations, and to specify deemed realization rates.**