CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

2025 Cost-Effectiveness Study: Single Family New Construction

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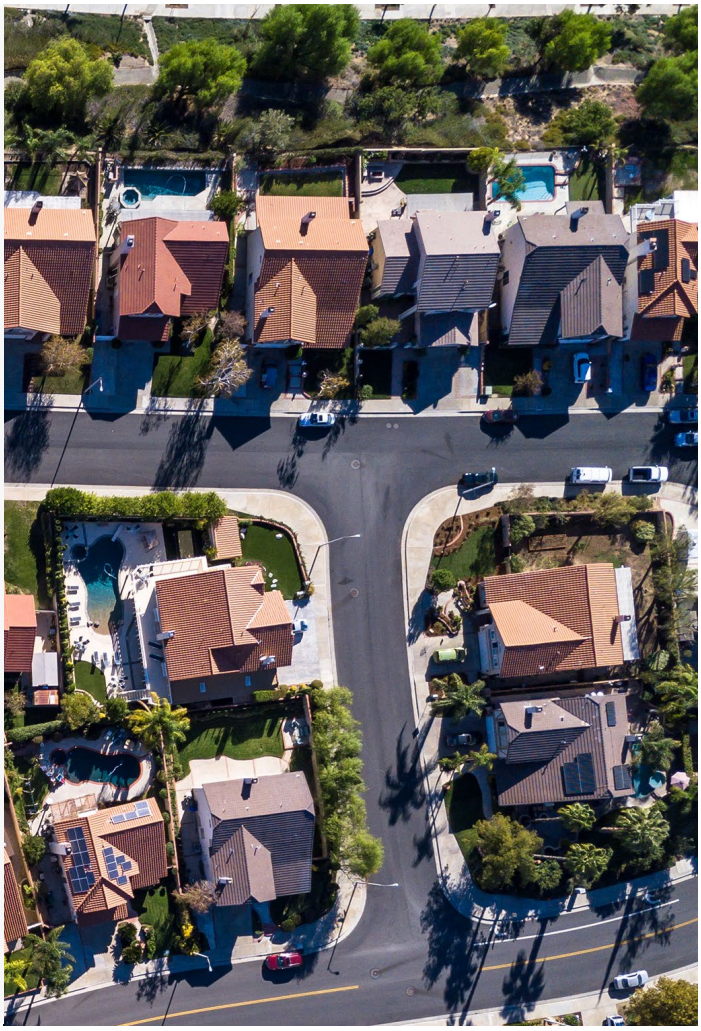

Table 1. Summary of Revisions

Date	Description	Reference (page or section)
5/11/2026	Original Release	N/A

Acronym List

2026 PV$ – Present value costs in 2023

ACH50 – Air Changes per Hour at 50 pascals pressure differential

ACM – Alternative Calculation Method

ADU – Accessory Dwelling Unit

B/C – Lifecycle Benefit-to-Cost Ratio

BSC – Building Standards Commission

CA IOUs – California Investor-Owned Utilities

CASE – Codes and Standards Enhancement

CBECC-Res – Computer program developed by the California Energy Commission for demonstrating compliance with the California Residential Building Energy Efficiency Standards

CO_2 – Carbon Dioxide

CPAU – City of Palo Alto Utilities

CPUC – California Public Utilities Commission

CZ – California Climate Zone

DHW – Domestic Hot Water

DOE – Department of Energy

EDR – Energy Design Rating

EER – Energy Efficiency Ratio

Cost-Effectiveness Analysis: Single Family New Construction

GHG – Greenhouse Gas

HERS Rater – Home Energy Rating System Rater

HPWH – Heat Pump Water Heater

HSPF – Heating Seasonal Performance Factor

HVAC – Heating, Ventilation, and Air Conditioning

IECC – International Energy Conservation Code

IOU – Investor Owned Utility

kBtu – kilo-British thermal unit

kWh – Kilowatt Hour

LCC – Lifecycle Cost

LSC – Long-term Systemwide Cost

NEM – Net Energy Metering

NPV – Net Present Value

PG&E – Pacific Gas and Electric Company

POU – Publicly-Owned-Utility

PV – Photovoltaic

SCE – Southern California Edison

SDG&E – San Diego Gas and Electric

SEER – Seasonal Energy Efficiency Ratio

SF – Single Family

SMUD – Sacramento Municipal Utility District

SoCalGas – Southern California Gas Company

TDV – Time Dependent Valuation

Therm – Unit for quantity of heat that equals 100,000 British thermal units

Title 24 – Title 24, Part 6

TOU – Time-Of-Use

UEF – Uniform Energy Factor

Table of Contents

Executive Summary **3**
1 Introduction **5**
2 Energy Code Background & 2025 Updates **7**
3 Methodology and Assumptions **10**
3.1 Modeling 10
3.1.1 Analysis Tools 10
3.1.2 Prototypes 10
3.1.3 Prototype Characteristics 11
3.2 Greenhouse Gas Emissions 12
3.3 Cost-Effectiveness 13
3.3.1 Benefits 13
3.3.2 Costs 14
3.3.3 Metrics 14
3.3.4 Utility Rates and Escalation 15
3.4 Measures 17
3.4.1 Metric Selection 17
3.4.2 Measure Details 18
3.4.3 Measure Packages 20
3.4.4 Measure Costs 21
4 Results **24**
4.1 Single Family Cost-Effectiveness Results 24
4.2 ADU Cost-Effectiveness Results 26
4.3 Greenhouse Gas Reductions 28
4.4 CARE Rate Comparison 28
5 Key Takeaways **31**
6 References **33**
7 Appendices **34**
7.1 Map of California Climate Zones 34
7.2 Utility Rate Schedules 35
7.2.1 Pacific Gas & Electric 35

7.2.2 Southern California Edison 43
7.2.3 Southern California Gas....47
7.2.4 San Diego Gas & Electric 49
7.2.5 City of Palo Alto Utilities 55
7.2.6 Sacramento Municipal Utilities District (Electric Only) 57
7.3 Utility Rate Escalation 59

List of Tables

Table 1. Summary of Revisions 1
Table 2. Prototypes 11
Table 3. Base Case Characteristics of the Prototypes 12
Table 4. Utility Tariffs Used Based on Climate Zone 16
Table 5. Statewide Average Residential Utility Rate Escalation Assumptions 59
Table 6. Measure or Measure Package per Climate Zone 21
Table 7. Measure Lifetime Incremental Costs – Single Family....22
Table 8. Measure Lifetime Incremental Costs – ADU....23
Table 9. Single Family Cost-Effectiveness Results 25
Table 10. ADU Cost-Effectiveness Results 27
Table 11. Greenhouse Gas Reductions (kg) 28
Table 12. On-Bill Cost-Effectiveness with CARE Tariffs 30
Table 13. Efficiency LSC and Source Results....32
Table 14. PG&E Baseline Territory by Climate Zone....35
Table 15. PG&E Monthly Gas Rate ($/therm) 40
Table 16. SCE Baseline Territory by Climate Zone 43
Table 17. SoCalGas Baseline Territory by Climate Zone 47
Table 18. SoCalGas Monthly Gas Rate ($/therm)....48
Table 19. SDG&E Baseline Territory by Climate Zone 49
Table 20. SDG&E Monthly Gas Rate ($/therm) 53
Table 21. CPAU Monthly Gas Rate ($/therm) 55

List of Figures

Figure 1. Map of California Climate Zones 34

Executive Summary

The California Codes and Standards (C&S) Reach Codes program provides technical support to local governments considering the adoption of local energy ordinances (reach codes) to support meeting local and/or statewide energy efficiency and greenhouse gas (GHG) reduction goals. The program facilitates adoption and implementation of the code when requested by local jurisdictions by providing resources such as cost-effectiveness studies, model language, sample findings, and other supporting documentation.

The California Energy Code (Part 6 of Title 24) requires that every newly constructed single family building meets or exceeds a baseline score for each of three compliance metrics. As of the 2025 code cycle, the three metrics are Efficiency Long-term Systemwide Cost (LSC), Total LSC, and Source Energy. Each metric covers different contributors to site energy use and uses different methods for calculating impact in terms of statewide energy efficiency and greenhouse gas reduction goals.

This report documents cost-effective building upgrades, or measures, which exceed the minimum state requirements of the Energy Code. It evaluates efficiency measures such as added attic insulation with duct burial, high efficiency windows, reduced air infiltration, compact hot water distribution, and – for ADUs only – a variable capacity heat pump, across all 16 California climate zones. Measures were analyzed in terms of the Efficiency LSC metric only. The focus on this metric reflects key changes from the 2022 code cycle, including revised compliance metrics and adoption of the dual heat pump prescriptive baseline. Three single family home prototypes were evaluated in this study – a 2,100 and 2,700 square foot home with an attached garage (combined into one representative 2,400 square foot home) and a detached 625 square foot small home or accessory dwelling unit (ADU) with no garage.

This analysis used two different metrics to assess the cost-effectiveness of the proposed upgrades: On-Bill and LSC cost-effectiveness. Both methodologies require estimating and quantifying the incremental costs and energy savings associated with each energy efficiency measure over a 30-year analysis period. On-Bill cost-effectiveness is a customer-based lifecycle cost (LCC) approach that values energy based upon estimated site energy usage and customer utility bill savings using present and projected future electricity and natural gas utility tariffs. LSC is the California Energy Commission's (Energy Commission) LCC methodology for the 2025 code cycle (previously referred to as Time Dependent Valuation (TDV)). LSC is intended to capture the long-term projected cost of energy, including costs for providing energy during peak periods of demand, carbon emissions, and grid transmission and distribution impacts. The Energy Commission uses this metric to evaluate cost-effectiveness for efficiency measures in Title 24, Part 6 development.

The 2025 building energy code cycle significantly narrows the range of cost-effective measures available for reach codes due to the introduction of a dual heat pump baseline. As a result, fewer measures provide cost-effective incremental compliance benefits compared to prior code cycles, and this analysis focuses exclusively on measures that are cost-

effective under the Efficiency Lifecycle Savings Cost (LSC) metric. All evaluated measures meet Efficiency LSC requirements across climate zones, and most are also On-Bill cost-effective, with limited exceptions in certain publicly owned utility (POU) territories. All measures produce positive utility cost savings over both first-year and lifetime horizons, though On-Bill cost-effectiveness is sensitive to customer rate structures such as CARE rates. Although narrower, the findings demonstrate that viable compliance pathways remain.

To be legally enforceable, ordinances adopted by local jurisdictions that amend state or municipal codes must comply with the specific federal and state requirements. At the federal level, the requirements may not preempt (exceed) federal equipment efficiency standards. At the state level, amendments to Title 24, Part 6 of the California Building Standards Code that exceed statewide energy performance standards must demonstrate cost-effectiveness and obtain approval from the Energy Commission as well as the Building Standards Commission (BSC). In contrast, amendments to Part 11, such as requirements for increased water efficiency or electric vehicle infrastructure, only require BSC approval. Although a formal cost-effectiveness study is only required for amendments to Title 24, Part 6, this study provides valuable context for jurisdictions pursuing alternative ordinance paths to understand the economic impacts resulting from the policy. Specifically, this study documents the estimated costs, benefits, energy impacts, and greenhouse gas emission reductions associated with the evaluated measures. In doing so, the Reach Codes Team supports informed policy decision-making by local officials, stakeholders, and residents.

Assembly Bill 130 (2025) limits the ability of local jurisdictions to amend the California Building Standards Code with respect to residential buildings. Jurisdictions should consult with appointed legal counsel to determine the extent of their authorities.

This report documents the key results and conclusions from the Reach Codes Team analysis. A full dataset of all results can be downloaded at https://localenergycodes.com/content/resources. Results alongside policy options can also be explored using the Cost-effectiveness Explorer at https://explorer.localenergycodes.com/. Model ordinance language and other resources are posted on the C&S Reach Codes Program website at LocalEnergyCodes.com. Local jurisdictions that are considering adopting an ordinance may contact the program for further technical support at info@localenergycodes.com.

1 Introduction

California's Building Energy Efficiency Standards constitute Part 6 of Title 24, the California Building Code (California Energy Commission, 2025) – also referred to in this report as the Energy Code or Standards. The Standards are jointly maintained and updated on a triennial basis by the California Energy Commission (the CEC or Energy Commission) and the Building Standards Commission (BSC). The most recent updates were adopted in 2025 and became effective on January 1, 2026.

In addition to enforcing Title 24, local jurisdictions are authorized to adopt local energy efficiency ordinances – or reach codes – that exceed the minimum standards defined by Title 24, pursuant to Public Resources Code Section 25402.1(h)2 and Section 10-106 of the Building Energy Efficiency Standards. Reach codes can be effective strategies to support meeting local and/or statewide energy efficiency and greenhouse gas reduction goals.

To adopt a reach code, local jurisdictions must demonstrate that the requirements of the proposed ordinance are cost-effective (see Section 3.3.3), and result in buildings consuming less energy than is permitted by Title 24. In addition, the jurisdiction must obtain approval from the Energy Commission and file the ordinance with the BSC for the ordinance to be legally enforceable.

The California Statewide Reach Codes Program provides technical support to local governments considering such a reach code adoption. This program is part of the California Statewide Investor-Owned Utilities (IOUs) Codes and Standards (C&S) Program and is implemented through collaboration with key consultants and engaged cities, collectively referred to as the Statewide Reach Codes Team. Upon request, the Reach Codes Program facilitates adoption and implementation of reach codes by providing resources such as cost-effectiveness studies, model language, sample findings, and other technical support.

The purpose of this study is to evaluate energy performance and determine cost-effectiveness of various energy efficiency upgrade measures in newly constructed single family buildings. It presents two cost-effective measure packages – one for single family homes and one for small homes, or accessory dwelling units – for each of the 16 California climate zones (CZ)[1]. The results presented are illustrative of approaches that local jurisdictions may adopt. The key results and conclusions presented in this report are part of a larger analysis by the Reach Codes Team; a full dataset of all results can be downloaded at https://localenergycodes.com/content/resources. These results, alongside policy options, can also be explored using the interactive Cost-effectiveness Explorer tool at https://explorer.localenergycodes.com/. Results for some measures within this report have been refined and may differ from those presented in the Preliminary Results Report (Statewide Reach Codes Team, 2025), published in December 2025, and the March 2026

[1] See graphical depiction of California CZs in Appendix 7.1.

presentation[2] that preceded this final report. Differences in results were due mainly to refinements in source data and how it was applied. One other major change was the inclusion of small home (or accessory dwelling unit, or ADU) cost-effectiveness results. ADU results were completed when necessary modeling updates were made in CBECC-Res and when an updated, comprehensive cost study of the proposed ADU measure was completed.

[2] Recording is available on the Local Reach Codes YouTube channel here: https://youtu.be/1hGD0oBIzy0?si=QfQHd74q8D5Ogg3M.

2 Energy Code Background & 2025 Updates

To comply with the Energy Code, newly constructed single family buildings must follow either 1) the prescriptive approach, which specifies required materials, performance levels, and building practices, or 2) the performance approach, where building designers can deviate from prescriptive requirements as long as resulting compliance scores meet or exceed those of the prescriptive approach. Both approaches must include mandatory measures that cannot be excluded or traded-off. While most builders utilize the performance approach, analyses conducted by the Reach Codes Team are based on the prescriptive standards or "base case" as it defines the minimum compliance baseline and associated savings assumptions.

Energy Codes are updated every three years to continue meeting statewide energy goals effectively. The latest standards, effective January 1, 2026, include several significant changes from the previous (2022) code cycle. Notably, the introduction of a 'dual heat pump baseline' impacts energy efficiency and electrification analyses used to support reach code development. This new baseline prescriptively requires a heat pump for both space conditioning and water heating in all climate zones. Under the previous code, most climate zones assumed a heat pump water heater paired with a natural gas furnace for space heating, while Climate Zones 3, 4, 13 and 14 assumed the inverse configuration. While heat pumps are now the prescriptive standard, their prescriptive efficiencies continue to reflect the minimum efficiencies mandated at the federal level[3]. Federally mandated efficiency minimums cannot be surpassed by state or local regulations – this is referred to as federal preemption.

Another notable change in the 2025 standards is the retirement of the Energy Design Rating (EDR) metrics used in the 2022 code cycle. Two of the three components of EDR – Efficiency and Total – were replaced by the Long-term System Cost (LSC) metric, which is further explained in Section 3.3.1. The third component, Source EDR, has been replaced by Source Energy (or just "Source"). The EDR metric was a unitless, zero-to-100 scoring system that compared a proposed design against a reference design which complied with the 2006 International Energy Conservation Code (IECC). The intention was to provide a clear side-by-side comparison of building energy performance, much like the mile-per-gallon metric is used to compare fuel efficiency in cars. Under the 2025 standards, Source Energy is reported as a standalone metric with revised units and methodology.

Another change to compliance metrics under the 2025 code is the addition of a "peak cooling" metric, which sets a maximum peak energy use, relative to peak demand, for

[3] The Department of Energy (DOE) establishes minimum energy conservation standards for consumer products, as directed in the National Appliance Energy Conservation Act (an amended version of the Energy Policy and Conservation Act or EPCA). See https://www.ecfr.gov/current/title-10/chapter-II/subchapter-D/part-430/subpart-C/section-430.32.

certain climate zones. Peak cooling is not addressed in this report as all the analyzed measures met the associated requirement.

Despite the removal of EDR, the underlying objectives of the compliance metrics remain the same. These revisions only impact how energy performance is expressed for compliance purposes, as defined by the Energy Commission; they do not reflect or impact site energy use. The changes to 2025 compliance metrics support Energy Commission projections of an increasingly electrified future. For example, the Energy Commission's recently published utility rate forecasts assume high escalation for natural gas retail rates, which favors electric buildings. Utility rate escalation is addressed in Section 7.3.

The following metrics are used to evaluate single family compliance with the Energy Code, each of which must be met for a project to be compliant.

- Source Energy (Source) can be used as a proxy for greenhouse gas emissions and is calculated on an hourly basis. It incorporates envelope measures, other building components, and on-site renewable energy systems. In addition to on-site fuel source(s), it accounts for the energy source used to generate electricity, which varies by hour (see Section 3.2 for more information).
- Efficiency LSC (LSCe) captures the long-term energy system cost impacts of end-uses, such as envelope measures and appliances/equipment, which reduce energy use compared to their standard counterparts. This metric partially incorporates batteries but does not incorporate PV (solar photovoltaics).
- Total LSC (LSCt) reflects the combined impacts of efficiency, on-site renewables, and "flexibility" measures, like batteries and pre-cooling, which enable load-shifting.

Efficiency LSC, Total LSC, and Source Energy are metrics that quantify the statewide cost and emissions implications of building energy systems, as defined by the California Energy Commission. These metrics incorporate:

- The costs associated with energy generation, transmission and distribution, fuel, capacity, losses, and cap-and-trade-based CO2 emissions (California Energy Commission, 2023).
- Time-dependent valuation, which reflects variations in cost (or value) of energy by hour and season.
- The duration of energy savings. For example, envelope measures such as wall insulation, which typically remain unchanged for decades, are more heavily weighted than appliances which are often replaced more frequently.

Perhaps the most significant impact to reach code development is the unprecedented legislative decision to place a moratorium on changes to California's residential Energy Codes under Assembly Bill 130 (California Assembly, 2025). Intended to enable the rebuilding of homes lost to wildfires, the swiftness of the bill's adoption created challenges for jurisdictions that had sought to implement reach codes. As of the writing of this report,

those challenges continue as entities attempt to interpret the bill's language and real-world implications. The Reach Codes Team continues to support jurisdictions by providing the cost-effective analyses presented in this report. However, considerations regarding how to apply the results are outside the scope of the Reach Codes Team's expertise; this should be done in coordination with appointed legal counsel.

3 Methodology and Assumptions

The methodology and assumptions outlined in this section were applied in this analysis to evaluate energy performance and cost-effectiveness of various energy efficiency upgrade measures.

3.1 Modeling

Prospective measures were modeled using the software and prototypes described in this section. Modeling results include projected site energy use, compliance metrics, greenhouse gas (GHG) emissions, and long-term systemwide cost (LSC) impacts. Modeling is an iterative process used to identify, calculate, adjust, and re-calculate energy impacts of various measures to present a set of cost-effective measures representing viable pathways to exceed the code.

3.1.1 Analysis Tools

The Reach Codes Team performed energy simulations using the approved version[4] of the California Building Energy Code Compliance for Residential Building Software (CBECC-Res) at the time of publication.

While CBECC-Res is commonly used by practitioners for individual projects, the Reach Codes Team evaluates many measures, and their iterations, across multiple climate zones and prototypes. To optimize analysis efficiency and quality control, a Python-based parametric (or multi-parameter) tool was used to automate and manage the generation of CBECC-Res input files. The files were then simulated using the software's batch process functionality, which processes large groups of input files at once. Model outputs provide hourly data over a full year, capturing temporal variation in energy use and its value. This hourly data was used to assess energy performance and cost-effectiveness.

3.1.2 Prototypes

The prototypes utilized in this analysis are defined by the Energy Commission. For the 2025 code cycle, three single family prototypes were employed, two "standard" sized homes, and a newer prototype, introduced in the 2022 code cycle, representing a detached small home or ADU (accessory/additional dwelling unit), reflecting contemporary trends in California home construction. ADUs are defined as new construction in the energy code when they are ground-up developments, do not convert an existing space to livable space, and are not

[4] CBECC-Res version 2025.1.0 was used in this analysis, except for the VCHP measure which used version 2025.2.0 because it was updated to include the latest VCHP modeling methodology. See Section 3.4.2 for more information.

attached to the primary dwelling. This study used a modified version of the Energy Commission's small home prototype which reflects a slightly larger 625 square foot ADU[5].

Table 2 summarizes the basic characteristics of each prototype. To ensure orientation neutrality, the prototypes have equal geometry on all walls, windows, and roof surfaces. Additional characteristics are described in the next section, and further details can be found in the Alternative Calculation Method (ACM) Approval Manual (California Energy Commission, 2025)

Table 2. Prototypes

Characteristic	Single Family One-Story	Single Family Two-Story	ADU
Existing Conditioned Floor Area	2,100 ft^2	2,700 ft^2	625 ft^2
Number of Stories	1	2	1
Number of Bedrooms	3	4	1
Window-to-Floor Area Ratio	20%	20%	19.2%

In this report, simulation results for the two single family (non-ADU) prototypes are aggregated and presented as a single 2,400 square foot (ft^2) prototype. This approach follows the Energy Commission's protocol, which weighs simulated energy impacts based on the statewide distribution of newly constructed single-story and two-story homes. Consistent with this protocol, the study assumed 43 percent single-story and 57 percent two-story construction[6]. ADU results are presented separately.

3.1.3 Prototype Characteristics

This analysis begins with a design that meets the minimum 2025 prescriptive requirements with zero compliance margins, referred to as the Standard Design. Table 150.1-A in the 2025 standards (California Energy Commission, 2025) lists the prescriptive measures that determine this baseline design in each climate zone. All other features are consistent with the Standard Design as described in the ACM Reference Manual (California Energy Commission, 2025), and are designed to meet, but not exceed, the minimum requirements. These characteristics are summarized in Table 3. They reflect the 2025 dual heat pump baseline, under which all climate zones prescriptively require a heat pump for both space conditioning and water heating (see Section 2). This approach

[5] The small home prototype used by the Energy Commission is 500 square feet; this report analyzes a 625 square foot ADU mainly for consistency with other analyses such as the 2022 version of this report. The design of the 625 square foot prototype was based on prior research conducted via a survey by UC Berkeley's Center for Community Innovation (UC Berkeley Center for Community Innovation, 2021).Specifically, it found that the average square footage for new ADUs statewide was 615 square feet and that the majority (61 percent) of new ADUs have one bedroom.

[6] In the previous cost-effectiveness study (Statewide Reach Codes Team, 2024), the prototypes were each weighted at 50 percent. These updated weighting factors were sourced from recent analyses by the Statewide CASE Team in their measure proposal reports for the 2025 code cycle (Statewide CASE Team, 2023).

creates 48 base case files for measure analysis – one for each climate zone and prototype.

Table 3. Base Case Characteristics of the Prototypes

Characteristic	Single Family	ADU
Space Heating/Cooling[7,8]	Split heat pump – 7.5 HSPF2, 14.3 SEER2, 11.7 EER2	Same as single family
Air Distribution	Ductwork located in vented attic	Same as single family
Water Heater[9,10]	Heat pump water heater (HPWH) – UEF = 2.0, located in the garage	Same as single family except HPWH is located inside the conditioned space with the supply air ducted from outside and exhaust air ducted to outside[9]
Hot Water Distribution	CZs 1, 16: Basic compact distribution credit	Same as single family
Cooking	Natural Gas	Same as single family
Clothes Drying	Natural Gas	Same as single family
PV System	Sized to meet the prescriptive requirements by climate zone, which is designed to offset 100% of electricity use for space cooling, ventilation, lighting, appliance, & other miscellaneous electric loads. Size differs by climate zone ranging from 2.49 kW to 5.28 kW.	PV is not required when the PV system size required based on the prescriptive calculations is less than 1.8 kW, as is the case in Climate Zones 1-9, 12, 14, and 16. In the other climate zones the PV size ranges from 1.80 kW to 2.45 kW.
Foundation	Slab-on-grade	Same as single family

3.2 Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions are calculated by CBECC-Res based on the modeled building's fuel use, onsite renewable energy generation, and load shifting strategies. As none of the measures analyzed impact natural gas consumption or change prescriptive PV requirements, all GHG reductions presented in this study are attributable solely to changes in electricity use.

Because electricity generation sources and associated emissions vary by region and hour, CBECC-Res applies hourly emissions factors to modeled electricity use to estimate associated GHG emissions. To account for the regional dependency, two distinct hourly profiles are applied based on the climate zone: one for Northern California (Climate Zones 1

[7] Equipment efficiencies are equal to minimum federal appliance efficiency standards.
[8] SEER = seasonal energy efficiency ratio. EER = energy efficiency ratio. HSPF = heating seasonal performance factor. UEF = uniform energy factor. The "2" at the end of each denotes the updated metric introduced by the DOE in 2023.
[9] The version of CBECC-Res used in this analysis did not have the capability to directly model ducted HPWHs even though this configuration is called out as the Standard Design in the 2025 ACM (California Energy Commission, 2025). This was modeled by indicating that the tank is located within the conditioned space with the compressor unit located outside.

through 5 and 11 through 13) and another for Southern California (Climate Zones 6 through 10 and 14 through 16).

Resulting GHG emissions and reductions are reported as average annual metric tons of CO_2 equivalent emissions[10] and are calculated over the 30-year measure analysis period. The analysis period incorporates projected changes in California's Renewable Portfolio Standards – the state's requirements for renewable energy generation over time.

3.3 Cost-Effectiveness

This section describes the different approaches to evaluating benefits and costs and describes how they are incorporated into the two cost-effectiveness metrics used in this analysis: LSC and On-Bill. Each approach estimates the incremental costs and energy impacts of individual measures but differs in how electricity costs and corresponding savings are valued.

3.3.1 Benefits

Typically, benefits are the cost savings from reduced energy use due to a measure. Benefits are reflected in the numerator of benefit-to-cost (B/C) ratio calculations (see Section 3.3.3). Note that some measures can increase energy use and associated costs. In these cases, the "benefit" is expressed as a negative number in the B/C ratio numerator.

Utility Bill Impacts (On-Bill): This approach estimates changes in utility bills experienced by single family homeowners/occupants, or utility customers, due to measure-induced changes in site energy use. Utility bill changes are impacted by the customer's particular utility rate, which is estimated by using applicable utility tariffs in effect at the time of this analysis (see Section 3.3.4). On-bill savings are calculated for the first year of measure implementation as well as the lifecycle cost (LCC) over a 30-year duration – the standard analysis period used to assess code change impacts. Total LCC savings estimates include both assumed energy cost escalation over time (see Section **Error! Reference source not found.**) and discounting of future utility costs. On-bill assessments are included in this analysis to inform local jurisdictional considerations but are not used to satisfy Title 24 cost-effectiveness requirements.

Long-term Systemwide Cost (LSC): LSC reflects the Energy Commission's current LCC methodology, which estimates how a measure's impact on energy use changes total statewide energy system costs. LSC accounts for the hourly cost of marginal generation, transmission and distribution, fuel, capacity, losses, and cap-and-trade-based CO2 emissions (California Energy Commission, 2023). This is the methodology required by the Energy Commission to establish cost-effectiveness of proposed reach code measures. Prior to LSC, the CEC employed Time Dependent Valuation (TDV) to evaluate energy savings. Local jurisdictions may rely on either metric.

[10] CO_2 equivalency expresses emissions from various greenhouse gases in one comparable metric.

3.3.2 Costs

The Reach Codes Team assessed the incremental costs of all measures both at first purchase (up-front costs) and over the 30-year analysis period. Incremental costs represent the difference in cost of the proposed measure relative to the 2025 Title 24 minimum requirements or standard industry practices. In both calculations, costs account for materials, labor, contractor markup/overhead, and other costs such as permitting. Additional details on measure-specific assumptions are provided in Section 3.4.

Lifetime (or lifecycle) incremental costs account for initial costs as well as homeowner-incurred costs over the 30-year analysis period, such as maintenance and equipment replacement. For measures with expected lifetimes shorter than 30 years, replacement costs are included; for those exceeding 30 years, a residual value credit is applied based on remaining useful life. Lifetime costs are therefore presented as the sum of the first cost and the present value of future costs, expressed as 2026 PV$.

Under the On-Bill approach, which reflects homeowner impacts, first costs are assumed to be financed through a mortgage or loan at a six percent interest rate over a 30-year loan term. Future costs, including maintenance or replacement, are not assumed to be financed. These assumptions do not apply to LSC cost-effectiveness, which reflects costs borne by the statewide energy system rather than individual homeowners.

3.3.3 Metrics

Cost-effectiveness is evaluated using the benefits and costs described in the preceding sections. The metrics used to express cost-effectiveness include net present value (NPV) and the benefit-to-cost (B/C) ratio.

NPV: The lifetime NPV represents the present value of lifetime benefits minus the present value of lifetime costs (see Equation 1). A positive NPV indicates that a measure (or measure package) is cost-effective over the 30-year analysis period, while a negative value indicates a net increase in costs.

Equation 1

$$NPV = present\ value\ of\ lifetime\ benefit - present\ value\ of\ lifetime\ cost$$

B/C Ratio: The B/C ratio is the ratio of the present value of lifetime benefits to the present value of lifetime costs. A value of one indicates that the NPV of the savings over the life of the measure is equivalent to the NPV of the lifetime incremental cost of that measure. A value greater than one indicates that benefits exceed costs and represents a positive return on investment; a value less than one indicates the opposite. The benefit-to-cost (B/C) ratio is calculated according to Equation 2.

Equation 2

$$Benefit - to - Cost\ Ratio = \frac{present\ value\ of\ lifetime\ benefit}{present\ value\ of\ lifetime\ cost}$$

Improving the efficiency of a project often requires an initial incremental investment. In most cases, the benefit is represented by annual On-Bill utility or LSC savings, and the cost is represented by incremental first cost and future replacement costs. In cases where a measure reduces upfront construction costs, the savings are treated as benefits and expressed as a negative cost value. If both construction costs and energy savings are negative, construction savings are treated as benefits and increased energy costs as costs. In cases where a measure or package is cost-effective immediately (i.e., upfront construction cost savings and lifetime energy cost savings), benefit-to-cost (B/C) ratio cost-effectiveness is represented by ">1".

The lifetime costs or benefits are calculated according to Equation 3.

Equation 3

$$Present\ value\ (PV)\ of\ lifetime\ cost\ or\ benefit = \frac{Future\ Value\ (FV)}{(1+r)^n}$$

An alternate version of Equation 3 is shown below. This equation more clearly reflects the fact that PV is based on the sum of FVs for each year that costs/benefits are incurred.

$$\sum_{t=0}^{n} \frac{(Annual\ cost\ or\ benefit)_t}{(1+r)^t}$$

Where:

1. *n* = analysis term in years
2. *r* = discount rate
3. *t = the number of time increments assessed (in this case, years)*

In this study, an analysis term (n) of 30 years and a real discount rate (r) of three percent are applied in both methodologies.

3.3.4 Utility Rates and Escalation

In coordination with the CA IOU rate team (comprised of representatives from Pacific Gas and Electric (PG&E), Southern California Edison (SCE) and San Diego Gas and Electric (SDG&E)) and two Publicly-Owned-Utilities (POUs) (Sacramento Municipal Utility District (SMUD) and City of Palo Alto Utilities (CPAU)), the Reach Codes Team determined appropriate utility rates for each climate zone to calculate utility costs and determine On-Bill cost-effectiveness for the proposed measures and packages. The utility tariffs[11],

[11] Utility rates are a component of utility tariffs. Tariffs represent all requirements imposed by the California Public Utilities Commission (CPUC); rates are the utility-specific, fluctuating charge per unit energy based on the CPUC requirements.

summarized in Table 4 (and detailed in Appendix 7.2), were determined based on the appropriate rate in each territory, and resulting utility rates were applied to each climate zone based on the predominant IOU/POU serving its population.

Table 4. Utility Tariffs Used Based on Climate Zone

Utility Type	Climate Zones	Electric / Gas Utility	Electricity Tariff	Natural Gas Tariff
IOU	1-5,11-13,16	PG&E / PG&E	E-ELEC	G1
	5	PG&E / SoCalGas	E-ELEC	GR
	6, 8-10, 14, 15	SCE / SoCalGas	TOU-D-PRIME	GR
	7, 10, 14	SDG&E / SDG&E	EV-TOU-5 (TOU-ELEC for ADU cases without PV systems[12])	GR
POU	4	CPAU / CPAU	E-1	G1
	12	SMUD / PG&E	R-TOD	G1

For climate zones served by multiple utilities, separate analyses were conducted using the applicable tariffs for each service territory. Climate Zones 10 and 14 were evaluated using both SCE/SoCalGas and SDG&E tariffs, while Climate Zone 5 included both PG&E and SoCalGas natural gas rates. Two POU or municipal utility rates were also evaluated: SMUD in Climate Zone 12 and CPAU in Climate Zone 4.

For cases with onsite generation (i.e., solar photovoltaics or PV), the approved Net Billing Tariff (NBT)[13] was applied along with monthly service fees and hourly export 2025 compensation rates for PG&E[14], SCE[15] and SDG&E[16]. ADU analyses assume separate electric and gas meters from the primary dwelling.

An alternate set of utility rates was utilized in a separate sensitivity analysis. The analysis evaluates measure cost-effectiveness under the California Alternate Rates for Energy (CARE) tariffs, which offer discounted utility bills for income-qualified households. Results of this analysis are presented in see Section 4.4.

Many community choice aggregators (CCAs) have utility rates that are similar to IOU rates, often within $0.02 per kWh. Results are generally applicable to CCA customers whose rates closely track IOU tariffs but may not be representative of CCAs or municipal utilities with materially different rate structures.

[12] See Table 3 for a description of ADU cases that don't require solar PV prescriptively.
[13] NBT is the successor of NEM 2.0. It was adopted by the California Public Utilities Commission in December 2022 and was effective as of April 2023. https://www.cpuc.ca.gov/nemrevisit.
[14] Solar Billing Plan | PG&E
[15] EEC Factors_Upload File - Pacific Time Zone - FINAL.xlsx
[16] Solar Billing Plan Export Pricing | San Diego Gas & Electric

Electricity tariff structures are expected to evolve over time. In 2024, the CPUC approved a base services charge intended to support electrification measures.[17] In response, IOUs that provide electricity developed tariffs that comply with this CPUC directive. While these tariffs are available as of the initial publication of this report[18], they were not available across all IOUs when this analysis was conducted and therefore were not incorporated into this report. The incorporation of these tariffs will be revisited in future cost-effectiveness studies. A preliminary assessment of base services charges indicates that incorporating them into this analysis would not change results significantly; however, non-CARE/FERA households with relatively low electricity consumption would likely experience higher electricity costs. Newly constructed single-family homes typically have low electricity usage due to updated energy code requirements including the installation of solar PV in most cases.

Utility rates are assumed to escalate over time, although the magnitude and direction of future changes are very difficult to predict. Generally, assumptions of increasing electrification over time introduce greater uncertainty and volatility in natural gas rate escalation relative to electricity rates. This dynamic is reflected in the escalation assumptions used by the Energy Commission in their development of the LSC factors for the 2025 code cycle, which were utilized in this analysis. The 2025 LSC escalation assumptions (which replace the TDV factors used in the 2022 code cycle), project only modest increases in electricity rates over time. Because the measures analyzed in this report do not produce natural gas savings, escalation assumptions do not significantly impact results. Additional details, including annual escalation rates from 2026 through 2055, are provided in Appendix 7.3.

3.4 Measures

This section describes the measures presented in this study and their associated incremental costs. All measures meet two primary criteria: 1) they exceed prescriptive requirements based on Efficiency LSC, and 2) they are cost-effective based on 2025 LSC. Local jurisdictions can adopt a reach code based on other compliance metrics and/or based on On-Bill cost-effectiveness but must still comply with statewide requirements regarding 1) compliance, where all three metrics scores must be positive values, and 2) 2025 LSC cost-effectiveness.

3.4.1 Metric Selection

The Efficiency LSC compliance metric is the focus of this single family analysis for the 2025 code cycle. The 2025 baseline for newly constructed homes assumes heat pump space and

[17] See the California Assembly Bill 205 Fact Sheet here: https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/demand-response/demand-flexibility-oir/ab205_factsheet_050824.pdf

[18] Base services charges vary by utility; more information can be seen on utility-specific webpages: PG&E (https://www.pge.com/en/account/billing-and-assistance/base-services-charge.html), SCE (https://www.sce.com/save-money/rates-financing/residential-rate-plans/bsc), and SDG&E (https://www.sdge.com/electric-billing)

water heating in all climate zones. In past cycles, switching from gas-based heating equipment to heat pumps produced a substantial improvement in performance. With the current baseline, improving the efficiency of other building components presents the most viable options to cost-effectively exceed the state code. The Efficiency LSC metric is the most effective way to pursue this approach. The metric also partially credits on-site renewable generation and battery storage, further supporting comprehensive energy performance improvements. All measures were evaluated in relation to the Energy Code's prescriptive requirements, and incremental impacts are calculated only where measures exceed those requirements. For example, the buried ducts measure includes R-8 duct insulation. Incremental energy and cost impacts associated with this measure component are included only in climate zones where R-6 duct insulation is prescriptively required (Climate Zones 3 and 5-7). In climate zones where R-8 insulation is already prescriptively required, no incremental savings are attributed.

3.4.2 Measure Details

Measures selected for analysis were informed by prior Reach Codes Team studies, insights from recent projects, a general understanding of consumer acceptance of many measures, and input received through decades of experience with residential architects, builders, and engineers. Measures included those shown to be cost-effective under the previous code cycle (Statewide Reach Codes Team, 2024) and select measures that had been considered for the next code cycle (2031).

Not all measures analyzed are presented in this report. Measures that showed low Efficiency LSC margins (such as cool roofs) or a lack of cost-effectiveness (such as slab perimeter insulation) were excluded from further analysis. Some measures are included only for climate zones with favorable results.

Each measure, and how it compares to the 2025 prescriptive baseline, is described below.

High Efficiency Windows: U-factor: Reduce window U-factor[19] across all climate zones to 0.24. Current prescriptive requirements are 0.27 in Climate Zones 1-5, 11-14, and 16[20] and 0.30 in all other climate zones (6-10 and 15). A U-factor of 0.24 is typically met with triple-paned windows; however, there are commercially available dual paned products that reach U-factors as low as 0.22 using a low-E[21] coating on select glass pane surfaces. Such products are incorporated into measure cost estimates.

[19] U-factor is a measure of heat loss through a window to the outside. The higher the U-factor, the more heat is lost to the outside. Lower U-factors are beneficial in heating-dominated climate zones.

[20] These prescriptively required U-factors are new as of 2025. In the previous code cycle, the prescriptive U-factor was 0.3 in all climate zones.

[21] The "E" in "low-E" refers to emissivity, which is a measure of how effective a surface emits thermal radiation.

High Efficiency Windows: SHGC: Increase SHGC[22] across all climate zones to 0.50. The current prescriptive requirements are: 0.35[23] in climate zones 1, 3, 5, and 16; 0.20[2] in Climate Zone 15; and 0.23 in all other climate zones (2, 4, and 6-14). Many of these prescriptive values reflect changes from the previous code cycle (2022).

Reduced Infiltration (ACH50): Reduce infiltration of outside air into the home from five ACH50[24] (the default assumption in CBECC-Res) by 40 percent to three (3) ACH50. This measure requires ECC[25] rater field verification and diagnostic testing of building air leakage according to the procedures outlined in the 2025 Reference Appendices RA3.8 (California Energy Commission, 2025).

Buried Radial Ducts: Bury all ductwork in ceiling insulation by laying the ducts across the ceiling joists or between ceiling joists directly on the ceiling drywall. In addition, increase duct insulation to R-8 in climate zones 3 and 5-7 where R-8 is not already prescriptively required. Utilize a "radial" duct design where individual ducts are run directly from the air handling unit to each supply register. This allows for smaller duct diameters, which reduces duct losses and improves the ability to meet fully or deeply buried duct conditions[26]. Duct burial and duct system design must be verified by an ECC rater according to the procedures outlined in the 2025 Reference Appendices RA3.1.4.1.5 and RA3.1.4.1.6 (California Energy Commission, 2025). In this analysis, this measure is paired with increased ceiling insulation for all climate zones.

Increased Ceiling Insulation: Increase ceiling insulation in vented attics to R-49 in climate zones 3 and 5-7 (where R-30 is prescriptively required) and to R-60 in all other climate zones (where R-38 is prescriptively required). In this analysis, this measure is paired with buried radial ducts for all climate zones.

Compact Hot Water Distribution: Design the hot water distribution system to meet the minimum requirements for the basic compact hot water distribution credit according to the procedures outlined in the 2025 Reference Appendices RA4.4.6 (California Energy Commission, 2025). In many single family homes this may require moving the water heater from an exterior location, such as a closet, to an interior garage wall and locating use points closer together. CBECC-Res software assumes a 30 percent reduction in distribution losses for the basic credit. This measure was not analyzed for Climate Zones 1 and 16 because it is prescriptively required.

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[22] SHGC, or Solar Heat Gain Coefficient, is a measure of a window's ability to transmit heat from the sun into the home. The higher the SHGC, the higher the heat gain is within the home. Higher SHGCs are beneficial in heating-dominated climate zones.

[23] These prescriptively required SHGC values are new as of 2025. In the previous code cycle, 1) there was no prescriptive SHGC value for climate zones 1, 3, 5, and 16; there was only a default within CBECC-Res of 0.35 in all of these climate zones, and 2) the prescriptive SHGC value for Climate Zone 15 was 0.23.

[24] Whole house leakage tested at a pressure difference of 50 Pascals between indoors and outdoors.

[25] Energy Code Compliance, formerly HERS (Home Energy Rating System).

[26] The duct systems in the Central Valley Research Homes Project Final Project Report are illustrative of this approach (Proctor, Wilcox, & Chitwood, 2018).

Ductless VCHP[27]: In the ADU prototype, install a variable capacity heat pump (or VCHP, also referred to as a ductless mini-split) with one indoor head. This measure is non-preempted because it does not require the installation of equipment with efficiencies above federal minimum requirements. Ductless VCHPs were not analyzed in the single family prototypes due to the increased costs of additional indoor heads which would be needed for the larger conditioned area across a larger number of rooms.

The ductless VCHP analysis reflects changes in the VCHP compliance credit from the previous code cycle. CBECC-Res now calculates the credit using an algorithm based on rated efficiency values and standard performance curves. The algorithm is more accurate than the previous assignment of discrete energy savings based on limited product characteristics. The increased accuracy precludes the configuration and field verification requirements under the 2022 VCHP credit. These changes simplify the installation, compliance, and cost of the VCHP measure.

3.4.3 Measure Packages

As the analysis structure is performance-based, single family (non-ADU) measures were combined into one measure package for most climate zones. The resulting package(s) for each climate zone is shown in Table 5. Results including compliance margins for each climate zone are detailed in Section 4.1.

For ADUs, only the VCHP measure is presented. Due to the positive compliance margins and high cost-effectiveness in all climate zones, it is viable as a stand-alone measure.

[27] Variable capacity means that the power draw better matches the heating or cooling demand at the time of operation. Traditional heat pumps are “single-stage” or “two-stage”, meaning they have one or two operational speeds (respectively). VCHPs have a more granular operational range, allowing for more constant operation at a larger fraction of the total capacity. Total capacities are typically specified to meet the most extreme expected temperatures.

Table 5. Measure or Measure Package per Climate Zone

Climate Zone	High Efficiency Windows	Reduced Infiltration	Buried Radial Ducts	Increased Ceiling Insulation	Compact Hot Water Distribution
1			✓	R-60	
2			✓	R-60	✓
3			✓	R-49	✓
4			✓	R-60	✓
5			✓	R-49	✓
6					✓
7					✓
8					✓
9					✓
10					✓
11			✓	R-60	✓
12			✓	R-60	✓
13			✓	R-60	✓
14		✓	✓	R-60	✓
15			✓	R-49	✓
16	✓		✓	R-60	

3.4.4 Measure Costs

This section summarizes the incremental cost for each measure presented in this analysis. Costs are estimated by the Reach Codes Team based on information from distributors and contractors, literature review, and online sources such as Home Depot and RS Means. These values represent best estimates of average costs. Statewide actual costs may vary by location, inflation, and supply chain conditions. Incremental costs, sources, and any pertinent notes are shown in Table 6 for the 2,400 ft^2 combined single family prototype and in Table 7 for the 625 ft^2 ADU prototype.

In Table 6 and Table 7, the Lifetime Financed Incremental Cost reflects the value used to calculate On-Bill cost-effectiveness. Unfinanced lifetime costs, which are used to calculate 2025 LSC cost-effectiveness, are not shown in this table. See Section 3.3.2 for details regarding these metrics. All measures are assumed to have no incremental maintenance costs. Negative incremental costs indicate that the proposed case is less expensive than the base case.

Table 6. Measure Lifetime Incremental Costs – Single Family

Measure	Performance Level	First Incremental Cost	Lifetime Financed Incremental Cost (2026$)	First Incremental Cost Source & Notes
High Efficiency Windows: U-Factor	0.24 vs. 0.27	$630	$873	$1.29/ft^2 window area, based on analysis conducted for the 2025 CASE Report (Statewide CASE Team, 2023) which utilizes ENERGY STAR® Version 7 data (EPA, 2021).
	0.24 vs. 0.30	$1,060	$1,469	$2.17/ft2 window area, same source as above.
High Efficiency Windows: SHGC	0.50 vs. 0.35	$0	$0	No cost difference for this SHGC range, same source as above.
Reduced Infiltration	3 vs. 5 ACH50	$615	$860	$0.13/ft^2 plus $300 ECC verification fee, based on an inflation-adjusted cost from the 2022 Single Family Cost-Effectiveness Study (Statewide Reach Codes Team, 2024)[28].
Buried Radial Ducts: Duct Design	Buried under insulation vs. resting/hanging above it and radial vs. trunk-and-branch duct design	$300	$423[29]	$300 ECC verification only. No cost for laying ducts on attic floor versus suspending, in some cases there will be cost savings. Neutral cost for radiant design versus trunk and branch design.
Buried Radial Ducts: Duct Insulation	R-8 vs. R-6	$210	$283[31]	$0.49/ft^2 of duct, based on an inflation-adjusted cost from the 2022 Single Family Cost-Effectiveness Study (Statewide Reach Codes Team, 2024).
Increased Ceiling Insulation	R-49 vs. R-30	$911	$1,318	$1.05/ft^3 based on representative product from an online retailer, applied to various depths associated with various R values.
	R-49 vs. R-38	$493	$714	
	R-60 vs. R-30	$1,404	$2,032	
	R-60 vs. R-38	$987	$1,428	
Compact Hot Water Distribution	Basic credit vs. standard piping layout	-$131	-$185	Based on reduced piping by 20 ft, including PEX piping at $1.66/ft and insulation at $4.18/ft based on representative products from online retailers.

[28] The applied inflation multiplier of 1.1206, taken from https://www.bls.gov/data/inflation_calculator.htm, represents inflation between April 2022 (when the 2022 Single Family Cost-Effectiveness Study was published) and October 2025 (the latest available data at the time of preliminary results analysis).

[29] For climate zones in which the buried duct measure was applied, the incremental costs of duct design and duct insulation are added for a total of $706.

Table 7. Measure Lifetime Incremental Costs – ADU

Measure	Performance Level	First Incremental Cost	Lifetime Incremental Cost (2026$)	First Incremental Cost Source & Notes
Ductless Variable Capacity Heat Pump (VCHP)	9 kBtu VCHP vs. heat pump with R-6 ducts	-$5,256	-$9,427	Applies to the ADU analysis only. Based on a 2026 analysis – see below for details. Both systems assume minimum federal efficiency.
	9 kBtu VCHP vs. heat pump with R-8 ducts	-$5,274	-$9,448	
	12 kBtu VCHP vs. heat pump with R-8 ducts	-$5,144	-$9,160	
	18 kBtu VCHP vs. heat pump with R-8 ducts	-$4,693	-$8,237	

The VCHP measure is the only measure that incorporates replacement costs, as its effective useful lifetime (EUL) is less than the 30-year analysis period. Specifically, the EUL is 15 years, consistent with the Database for Energy Efficient Resources (DEER) (California Public Utilities Commission) and with other appliances. All other measures are assumed to have a 30-year EUL, or lifetime, consistent with typical envelope and insulation measures. VCHP replacement costs assume like-for-like replacement and include only the equipment components expected to be replaced, along with associated labor costs.

VCHP incremental cost estimates were informed by a detailed cost breakdown provided by an active California HVAC contractor. Both the base and proposed cases were evaluated using equipment and configurations representative of standard industry practices. Multiple VCHP capacities (9, 12, and 18 kBtu) were assessed, with each climate zone assigned the capacity most closely matching modeled heating and cooling loads based on the CBECC-Res auto-sizing feature. For the base case, only the 18 kBtu capacity was assumed, as this typically the smallest capacity available for conventional split heat pump systems.

Under the 2025 dual heat pump baseline, all heat pump-related costs – such as ECC-verified refrigerant charge verification – apply to both the base and proposed case and thus do not impact incremental costs. In addition, as noted in Section 3.4.2, field verification and other costs related to the previous VCHP compliance credit are no longer applicable. One notable avoided cost is the additional indoor heads formerly required to directly condition each habitable space. The ADU layout evaluated has only one doored wall which separates the bedroom from the other living spaces. For this layout, a single centrally located indoor unit was assumed to provide adequate conditioning, with airflow maintained through door undercuts when doors are closed.

4 Results

The objective of this evaluation was to identify cost-effective energy upgrades for newly constructed homes that may be used to support local reach code ordinances. Impacts regarding compliance, energy, and cost-effectiveness for single family measures and the ADU measure are detailed in Sections 4.1 and 4.2, respectively. Greenhouse gas (GHG) reductions are presented separately in Section 4.3. Section 4.4 presents the results of a sensitivity analysis based on an alternative set of customer utility rates for income-qualified customers (California Alternate Rates for Energy or CARE). The complete dataset is available for download at https://localenergycodes.com/content/resources. Results and policy options can be investigated using the Cost-effectiveness Explorer at https://explorer.localenergycodes.com/.

4.1 Single Family Cost-Effectiveness Results

Table 8 summarizes cost-effectiveness and other key results for climate zone-specific single family measures outlined in Section 3.4.3. In climate zones with multiple analyzed measures, only combined package results are shown. The results show that each measure/package is both On-Bill and 2025 LSC cost-effective in all IOU-served climate zones. In POU-served areas (CPAU and SMUD), measures are not On-Bill cost-effective due to lower electricity rates. These lower rates benefit customers and support electrification but reduce cost-effectiveness, given fixed measure costs. The positive 2025 LSC results, however, are sufficient in meeting state cost-effectiveness requirements.

Resulting Efficiency LSC margins are reported for each climate zone, rounded down to the nearest whole percent. These margins provide illustrative reach code targets that jurisdictions can adopt to support local policy objectives in a practical and cost-effective manner. Excluding Climate Zone 16, target margins range from two to 10 percent, with 13 climate zone–utility combinations exceeding five percent. Climate Zone 16 is an outlier, with an Efficiency LSC target exceeding 15 percent. This is largely driven by combined envelope measures – particularly increased window solar heat gain – which are especially beneficial in this heating-dominated climate.

In Climate Zones 6 through 10, B/C ratios are >1 because the sole measure (compact hot water distribution) is less expensive to install than the prescriptive standard.

Table 8. Single Family Cost-Effectiveness Results

CZ	Electric/ Gas Utility	Efficiency LSC Comp Margin (%)	Source Comp Margin (%)	Annual Electricity Savings (kWh)[30]	First Year Utility Cost Savings	Lifetime Utility Cost Savings (2026$)	Initial Inc.[31] Cost	Inc.[32] Lifetime (30-Year) Cost	On-Bill: B/C Ratio	On-Bill: NPV	2025 LSC: B/C Ratio	2025 LSC: NPV
1	PGE	6.6%	4.4%	320	$108	$2,503	$1,287	$1,814	1.38	$689	1.9	$1,215
2	PGE	8.2%	4.4%	320	$102	$2,365	$1,156	$1,630	1.45	$736	2.0	$1,102
3	PGE	10.2%	4.7%	278	$90	$2,072	$1,290	$1,819	1.14	$253	1.6	$751
4	PGE	7.0%	3.2%	249	$82	$1,885	$1,156	$1,630	1.16	$255	1.5	$546
4	CPAU	7.0%	3.2%	249	$51	$1,169	$1,156	$1,630	0.72	($460)	1.5	$546
5	PGE	9.9%	4.4%	267	$86	$1,977	$1,290	$1,819	1.09	$158	1.4	$511
5	PGE/SCG	9.9%	4.4%	267	$86	$1,977	$1,290	$1,819	1.09	$158	1.4	$511
6	SCE/SCG	4.0%	1.0%	80	$22	$505	($131)	($185)	>1	$690	>1	$515
7	SDGE	4.6%	1.3%	83	$25	$588	($131)	($185)	>1	$772	>1	$638
8	SCE/SCG	3.2%	0.9%	74	$21	$477	($131)	($185)	>1	$661	>1	$539
9	SCE/SCG	2.8%	0.9%	73	$19	$440	($131)	($185)	>1	$624	>1	$508
10	SCE/SCG	2.4%	1.0%	73	$19	$448	($131)	($185)	>1	$632	>1	$494
10	SDGE	2.4%	1.0%	73	$20	$460	($131)	($185)	>1	$645	>1	$494
11	PGE	6.0%	3.3%	282	$98	$2,273	$1,156	$1,630	1.39	$644	1.6	$687
12	PGE	6.3%	3.1%	235	$78	$1,803	$1,156	$1,630	1.11	$174	1.4	$464
12	SMUD/PGE	6.3%	3.1%	235	$33	$761	$1,156	$1,630	0.47	($869)	1.4	$464
13	PGE	5.6%	2.8%	249	$85	$1,964	$1,156	$1,630	1.21	$335	1.4	$423
14	SCE/SCG	8.7%	5.4%	411	$118	$2,731	$1,771	$2,497	1.09	$233	1.5	$883
14	SDGE	8.7%	5.4%	411	$130	$3,012	$1,771	$2,497	1.21	$515	1.5	$883
15	SCE/SCG	3.3%	1.7%	180	$54	$1,244	$662	$934	1.33	$310	1.37	$247
16	PGE	15.2%	9.8%	738	$254	$5,875	$1,917	$2,703	2.17	$3,172	3.2	$4,240

[30]None of the measures in this analysis impacted gas use.
[31] Inc. is an abbreviation for incremental.

4.2 ADU Cost-Effectiveness Results

Table 9 presents the results of the ADU analysis, which evaluated only the variable capacity heat pump (VCHP) measure. Applying this measure in place of the prescriptively required ducted heat pump results in negative incremental costs, yielding net measure cost savings. Consequently, the VCHP measure is highly cost-effective under both the On-Bill and 2025 LSC metrics across all climate zones.

As with single family results, On-Bill cost-effectiveness is achieved only in IOU territories, where higher electricity rates amplify utility cost savings. Calculated Efficiency LSC margins for ADUs range from approximately two to seven percent, depending on the climate zone. Results are generally consistent across all climate zones because the same measure is applied statewide, varying only in selected heating/cooling capacities.

Table 9. ADU Cost-Effectiveness Results

CZ	Electric/ Gas Utility	Efficiency LSC Comp Margin (%)	Source Comp Margin (%)	Annual Electricity Savings (kWh)[23]	1st Year Utility Cost Savings	Lifetime Utility Cost Savings (2026$)	Inc.[32] 1st Cost	Inc. Lifetime (30-Year) Cost	On-Bill: B/C Ratio	On-Bill: NPV	2025 LSC: B/C Ratio	2025 LSC: NPV
1	PGE	7.2%	3.7%	147	$50	$1,161	($5,274)	($9,448)	>1	$10,608	>1	$8,441
2	PGE	5.2%	2.5%	82	$29	$668	($5,274)	($9,448)	>1	$10,116	>1	$7,953
3	PGE	4.4%	1.8%	47	$16	$377	($5,256)	($9,427)	>1	$9,804	>1	$7,684
4	PGE	4.7%	1.8%	70	$29	$678	($5,274)	($9,448)	>1	$10,126	>1	$7,872
4	CPAU	4.7%	1.8%	70	$15	$340	($5,274)	($9,448)	>1	$9,788	>1	$7,872
5	PGE	3.1%	1.3%	33	$11	$260	($5,256)	($9,427)	>1	$9,688	>1	$7,553
5	PGE/SCG	3.1%	1.3%	33	$11	$260	($5,256)	($9,427)	>1	$9,688	>1	$7,553
6	SCE/SCG	2.4%	0.4%	22	$8	$192	($5,256)	($9,427)	>1	$9,619	>1	$7,428
7	SDGE	4.4%	0.4%	34	$19	$438	($5,256)	($9,427)	>1	$9,866	>1	$7,571
8	SCE/SCG	2.8%	0.4%	35	$16	$374	($5,274)	($9,448)	>1	$9,822	>1	$7,509
9	SCE/SCG	3.1%	0.5%	37	$16	$380	($5,274)	($9,448)	>1	$9,828	>1	$7,553
10	SCE/SCG	3.4%	0.7%	47	$17	$388	($5,144)	($9,160)	>1	$9,547	>1	$7,262
10	SDGE	3.4%	0.7%	47	$19	$434	($5,144)	($9,160)	>1	$9,594	>1	$7,262
11	PGE	4.9%	1.9%	93	$35	$819	($5,144)	($9,160)	>1	$9,979	>1	$7,675
12	PGE	4.3%	1.7%	63	$26	$612	($5,274)	($9,448)	>1	$10,060	>1	$7,834
12	SMUD/PGE	4.3%	1.7%	63	$10	$239	($5,274)	($9,448)	>1	$9,687	>1	$7,834
13	PGE	4.4%	1.2%	87	$32	$731	($5,144)	($9,160)	>1	$9,891	>1	$7,550
14	SCE/SCG	4.9%	1.8%	100	$35	$803	($5,144)	($9,160)	>1	$9,963	>1	$7,794
14	SDGE	4.9%	1.8%	100	$43	$992	($5,144)	($9,160)	>1	$10,152	>1	$7,794
15	SCE/SCG	6.0%	1.4%	156	$46	$1,068	($4,693)	($8,237)	>1	$9,305	>1	$6,950
16	PGE	4.4%	2.2%	84	$30	$702	($5,144)	($9,160)	>1	$9,861	>1	$7,744

4.3 Greenhouse Gas Reductions

Table 10 presents greenhouse gas (GHG) emission reductions associated with the single family and ADU measures, expressed as average annual savings over the 30-year analysis period. The analysis period incorporates projected changes in California's Renewable Portfolio Standards – the state's requirements for renewable energy generation over time. All reported GHG reductions result exclusively from reduced electricity use, as none of the measures impact natural gas use, on-site renewable energy, or energy storage. However, due to the methodology of GHG reduction calculations (see Section 3.2), savings are not necessarily proportional to the electricity savings shown in Table 8 and Table 9.

Table 10. Greenhouse Gas Reductions

Climate Zone	Single Family (kg)[32]	Single Family (%)	ADU (kg)	ADU (%)
1	48.6	4.1%	23.8	3.5%
2	44.3	4.2%	14.7	2.3%
3	38.6	4.3%	9.4	1.7%
4	34.3	3.4%	10.3	1.7%
5	34.3	3.4%	6.6	1.7%
6	10.0	4.0%	1.9	1.2%
7	10.0	4.0%	2.1	1.2%
8	4.3	1.4%	1.7	0.4%
9	5.7	1.4%	2.6	0.4%
10	5.7	0.6%	2.6	0.3%
11	30.0	0.7%	9.9	0.5%
12	24.3	0.7%	9.6	0.6%
13	24.3	0.7%	6.3	0.6%
14	55.7	2.8%	10.9	1.7%
15	5.7	2.4%	6.1	1.5%
16	115.7	2.4%	13.9	1.5%

4.4 CARE Rate Comparison

This sensitivity analysis incorporates California Alternate Rates for Energy (CARE) tariffs, which offer discounted utility bills for income-qualified households[33], in place of standard utility rates. The resulting impacts to On-Bill cost-effectiveness are presented in Table 11. Entries shown as "N/A" reflect the absence of CARE tariff offerings by POUs. Note that this analysis does not incorporate rate changes based on base services charges (see Section 3.3.4) for more information).

[32] GHG reductions are typically expressed in metric tons; kilograms (kg) are utilized here to show more granularity – one kg is 1/1,000th of a metric ton.

[33] See https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-costs/care-fera-program

Results show that the ADU measure remains cost-effective across all climate zones when applying CARE rates. NPV savings, however, are moderately reduced for both ADU and single family measures. For single family homes in Climate Zones 1-5 and 11-15, the lower utility cost savings are insufficient to offset the fixed measure costs, resulting in negative cost-effectiveness (see Section 3.3.3 for details). This effect is comparable to the lower cost-effectiveness observed when using standard POU utility rates, which are lower than standard IOU rates.

Table 11. On-Bill Cost-Effectiveness with CARE Tariffs

Climate Zone	Electric /Gas Utility	Single Family Standard		Single Family CARE		ADU Standard		ADU CARE	
		B/C Ratio	NPV	B/C Ratio	NPV	B/C Ratio	NPV	B/C Ratio	NPV
1	PGE	1.38	$689	0.85	($269)	>1	$10,608	>1	$10,162
2	PGE	1.45	$736	0.91	($152)	>1	$10,116	>1	$9,859
3	PGE	1.14	$253	0.71	($524)	>1	$9,804	>1	$9,659
4	PGE	1.16	$255	0.73	($447)	>1	$10,126	>1	$9,865
4	CPAU	0.72	($460)	N/A	N/A	>1	$9,788	N/A	N/A
5	PGE	1.09	$158	0.68	($582)	>1	$9,688	>1	$9,588
5	PGE/SCG	1.09	$158	0.68	($582)	>1	$9,688	>1	$9,588
6	SCE/SCG	>1	$690	>1	$541	>1	$9,619	>1	$9,557
7	SDGE	>1	$772	>1	$566	>1	$9,866	>1	$9,712
8	SCE/SCG	>1	$661	>1	$519	>1	$9,822	>1	$9,700
9	SCE	>1	$624	>1	$496	>1	$9,828	>1	$9,704
10	SCE/SCG	>1	$632	>1	$500	>1	$9,547	>1	$9,442
10	SDGE	>1	$645	>1	$484	>1	$9,594	>1	$9,442
11	PGE	1.39	$644	0.88	($200)	>1	$9,979	>1	$9,684
12	PGE	1.11	$174	0.69	($501)	>1	$10,060	>1	$9,824
12	SMUD/PGE	0.47	($869)	N/A	N/A	>1	$9,687	N/A	N/A
13	PGE	1.21	$335	0.76	($384)	>1	$9,891	>1	$9,637
14	SCE/SCG	1.09	$233	0.76	($604)	>1	$9,963	>1	$9,702
14	SDGE	1.21	$515	0.78	($540)	>1	$10,152	>1	$9,805
15	SCE/SCG	1.33	$310	0.95	($47)	>1	$9,305	>1	$9,016
16	PG&E	2.17	$3,172	1.31	$850	>1	$9,861	>1	$9,592

5 Key Takeaways

As described in Section 2, changes to the 2025 code cycle, including the dual heat pump baseline and redefined compliance metrics have significantly narrowed the field of cost-effective measure options available. As in prior code cycles, measure selection is also limited by federal preemption, which prohibits state and local governments from adopting higher minimum efficiencies for certain equipment than federal standards require. Accordingly, this analysis excludes high efficiency heating, cooling, and water heating equipment, even though they are often the easiest and most affordable measures to improve building performance and compliance.

For these reasons, the information presented in this report is more limited and simplified compared to the previous Single Family Cost-Effectiveness Study (Statewide Reach Codes Team, 2024) completed under the 2022 standards. For example, with space and water heating electrification now embedded in the prescriptive baseline, all new projects will benefit from the improved performance. Similarly, the dual heat pump baseline and changes to the Source Energy metric reduce the relative compliance impact of on-site solar generation and battery storage compared to previous code cycles.

Given these constraints, this analysis presents *only* cost-effective measures compliant in terms of Efficiency LSC. While this approach limits the number of viable measure options, it also simplifies the context and discussion. A summary of key take-aways is provided below.

For clarity, the term “measures” refers to either 1) the single measure applied in a given climate zone, such as the VCHP measure for ADUs statewide or the compact hot water distribution measure in single family homes in Climate Zones 6 through 10 and 15, or 2) the package of measures presented for single family homes in Climate Zones 1 through 5, 11 through 14, and 16.

Summary of key take-aways:

- All measures are cost-effective under the 2025 LSC framework.
- All measures are On-Bill cost-effective except for single family measures in POU territories (CPAU in Climate Zone 4 and SMUD in Climate Zone 12).
- The VCHP measure (applied only to ADUs) has cost savings in all climate zones, due primarily to cost savings associated with avoided ducts and indoor heads as well as changes to the VCHP compliance credit relative to the previous code cycle. As a result, the measure was On-Bill cost-effective in all climate zones.
- All measures had positive utility cost savings, on both a first-year and lifetime basis.
- The compact hot water distribution and VCHP measures had negative incremental costs, meaning “costs” were in fact net savings.
- CARE rates lower utility rates, and therefore lower on-bill savings, which results in reduced On-Bill cost-effectiveness when the measure costs stay fixed. This was the case for all measures in all climate zones. In addition, for single family measure(s) in

some climate zones, utility bills were reduced enough to make the measure(s) no longer On-Bill cost-effective.

- All measures result in positive Efficiency LSC compliance margins in all climate zones. The associated Efficiency LSC and Source margins are shown in Table 12.

Table 12. Efficiency LSC and Source Results

CZ	Electric/ Gas Utility	Efficiency LSC Margin – Single Family (%)	Efficiency LSC Margin – ADU (%)	Source Margin – Single Family (%)	Source Margin – ADU (%)
1	PGE	6%	7%	4%	3%
2	PGE	8%	5%	4%	2%
3	PGE	10%	4%	4%	1%
4	PGE	7%	5%	3%	1%
4	CPAU	7%	5%	3%	1%
5	PGE	9%	3%	4%	1%
5	PGE/SCG	9%	3%	4%	1%
6	SCE/SCG	4%	2%	1%	N/A
7	SDGE	4%	4%	4%	N/A
8	SCE/SCG	3%	3%	0.5%	N/A
9	SCE/SCG	2%	3%	0.5%	0.5%
10	SCE/SCG	2%	3%	1%	0.5%
10	SDGE	2%	3%	1%	0.5%
11	PGE	6%	5%	3%	1%
12	PGE	6%	4%	3%	1%
12	SMUD/PGE	6%	4%	3%	1%
13	PGE	5%	4%	2%	1%
14	SCE/SCG	8%	5%	5%	1%
14	SDGE	8%	5%	5%	1%
15	SCE/SCG	0.5%	6%	0.5%	1%
16	PGE	15%	4%	9%	2%

Local jurisdictions may adopt ordinances that amend the Energy Code (Part 6), or different Parts of the California Building Standards Code, or may elect to amend other state or municipal codes. The decision regarding which code to amend will determine the specific requirements that must be followed for an ordinance to be legally enforceable. Reach codes that amend Title 24, Part 6 of the CA Building Code and require energy performance beyond state code minimums must demonstrate the proposed changes are cost-effective and obtain approval from the Energy Commission.

This report documents the key results and conclusions from the Reach Codes Team analysis. A full dataset of all results can be downloaded at https://localenergycodes.com/content/resources. Results alongside policy options can also be explored using the Cost-effectiveness Explorer at https://explorer.localenergycodes.com/.

6 References

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7 Appendices

7.1 Map of California Climate Zones

Climate zone geographical boundaries are depicted in Figure 1. This map as well as a zip-code search directory is available at:
https://ww2.energy.ca.gov/maps/renewable/building_climate_zones.html

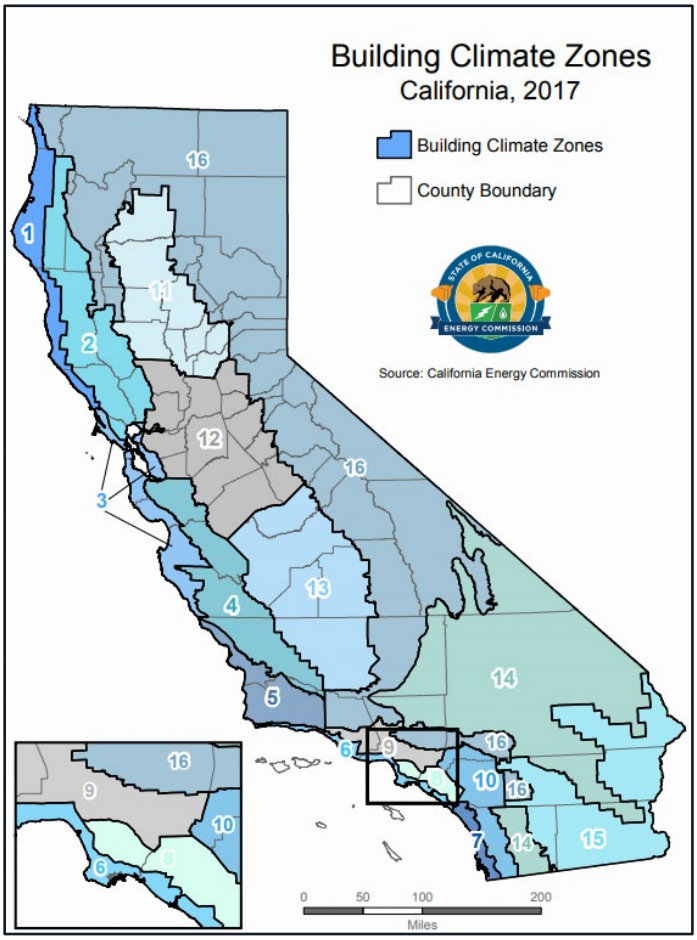

Figure 1. Map of California Climate Zones

7.2 Utility Rate Schedules

7.2.1 Pacific Gas & Electric

The following pages provide details on the PG&E electricity and natural gas tariffs applied in this study. Table 13 describes the baseline territories that represent the geographic groupings used by PG&E to determine the pricing tiers and baseline energy allowances that were assumed for each climate zone. For homes that generated excess electricity at the end of the year, a net surplus compensation rate of $0.02919/ kWh was used when calculating the amount that would be paid back to the homeowner[34]. The net surplus compensation rate was based on a one-year average of the rates between June 2024 and May 2025. Corresponding CARE rate reflects the discount per the D-Care tariff[35].

Table 13. PG&E Baseline Territory by Climate Zone

Climate Zone	Baseline Territory
CZ01	V
CZ02	X
CZ03	T
CZ04	X
CZ05	T
CZ11	R
CZ12	S
CZ13	R
CZ16	Y

[34] Net Surplus Compensation Rates for Energy
[35] Res_Inclu_TOU_240401-240531.xlsx

Pacific Gas and Electric Company
Oakland, California
U 39

Cancelling Revised Original
Cal. P.U.C. Sheet No. 61119-E
Cal. P.U.C. Sheet No. 54738-E

ELECTRIC SCHEDULE E-ELEC Sheet 4
RESIDENTIAL TIME-OF-USE (ELECTRIC HOME)
SERVICE FOR CUSTOMERS WITH QUALIFYING ELECTRIC TECHNOLOGIES

SPECIAL CONDITIONS:

1. TIME PERIODS: Times of the year and times of the day are defined as follows: (L)

   All Year:

   Peak: 4:00 p.m. to 9:00 p.m. every day including weekends and holidays.

   Partial-Peak: 3:00 p.m. to 4:00 p.m. and 9:00 p.m. to 12:00 a.m. every day including weekends and holidays.

   Off-Peak: All other hours.

2. SEASONAL CHANGES: The summer season is June 1 through September 30 and the winter season is October 1 through May 31. When billing includes use in both the summer and winter periods, charges will be prorated based upon the number of days in each period.

3. ADDITIONAL METERS: If a residential dwelling unit is served by more than one electric meter, the customer must designate which meter is the primary meter and which is (are) the additional meter(s).

4. BILLING: A customer's bill is calculated based on the option applicable to the customer.

   Bundled Service Customers receive generation and delivery services solely from PG&E. The customer's bill is based on the Unbundling of Total Rates set forth above.

   Transitional Bundled Service (TBS) Customers take TBS as prescribed in Rules 22.1 and 23.1, or take PG&E bundled service prior to the end of the six (6) month advance notice period required to elect PG&E bundled service as prescribed in Rules 22.1 and 23.1. TBS customers shall pay all charges shown in the Unbundling of Total Rates except for the Bundled Power Charge Indifference Adjustment and the generation charge. TBS customers shall also pay for their applicable Vintaged Power Charge Indifference Adjustment provided in the table below, and the short-term commodity prices as set forth in Schedule TBCC. (L)

ELECTRIC SCHEDULE E-ELEC Sheet 2
RESIDENTIAL TIME-OF-USE (ELECTRIC HOME)
SERVICE FOR CUSTOMERS WITH QUALIFYING ELECTRIC TECHNOLOGIES

RATES:(Cont'd.)

Direct Access (DA) and Community Choice Aggregation (CCA) charges shall be calculated in accordance with the paragraph in this rate schedule titled Billing.

TOTAL BUNDLED RATES

Base Services Charge ($ per meter per day)	$0.49281						
Total Energy Rates ($ per kWh)	PEAK		PART-PEAK		OFF-PEAK		
Summer Usage	$0.61418	(I)	$0.45230	(I)	$0.39562	(I)	
Winter Usage	$0.38266	(I)	$0.36057	(I)	$0.34671	(I)	
California Climate Credit (per household, per semi-annual payment occurring in the April and October bill cycles)	($58.23)						

Total bundled service charges shown on a customer's bills are unbundled according to the component rates shown below.

UNBUNDLING OF TOTAL RATES

Energy Rates by Component ($ per kWh)	PEAK		PART-PEAK		OFF-PEAK	
Generation:						
Summer Usage	$0.31659		$0.21748		$0.17238	
Winter Usage	$0.15446		$0.13449		$0.12114	
Distribution:**						
Summer Usage	$0.23953	(I)	$0.17676	(I)	$0.16518	(I)
Winter Usage	$0.17014	(I)	$0.16802	(I)	$0.16751	(I)
Transmission* (all usage)	$0.05122		$0.05122		$0.05122	
Transmission Rate Adjustments* (all usage)	($0.01213)	(I)	($0.01213)	(I)	($0.01213)	(I)
Reliability Services* (all usage)	$0.00032		$0.00032		$0.00032	
Public Purpose Programs (all usage)	$0.02644		$0.02644		$0.02644	
Nuclear Decommissioning (all usage)	($0.00024)	(R)	($0.00024)	(R)	($0.00024)	(R)
Competition Transition Charges (all usage)	($0.00072)		($0.00072)		($0.00072)	
Energy Cost Recovery Amount (all usage)	$0.00001		$0.00001		$0.00001	
Wildfire Fund Charge (all usage)	$0.00595		$0.00595		$0.00595	
New System Generation Charge (all usage)**	$0.00574		$0.00574		$0.00574	
Wildfire Hardening Charge (all usage)	$0.00474	(R)	$0.00474	(R)	$0.00474	(R)
Recovery Bond Charge (all usage)	$0.00647	(R)	$0.00647	(R)	$0.00647	(R)
Recovery Bond Credit (all usage)	($0.00647)	(I)	($0.00647)	(I)	($0.00647)	(I)
Bundled Power Charge Indifference Adjustment (all usage)***	($0.02327)		($0.02327)		($0.02327)	

* Transmission, Transmission Rate Adjustments and Reliability Service charges are combined for presentation on customer bills.
** Distribution and New System Generation Charges are combined for presentation on customer bills.
*** Direct Access, Community Choice Aggregation and Transitional Bundled Service Customers pay the applicable Vintaged Power Charge Indifference Adjustment. Generation and Bundled PCIA are combined for presentation on bundled customer bills.

(Continued)

Advice	7516-E	*Issued by*	*Submitted*	February 26, 2025
Decision		***Shilpa Ramaiya***	*Effective*	March 1, 2025
		Vice President	*Resolution*	
		Regulatory Proceedings and Rates		

ELECTRIC SCHEDULE D-CARE Sheet 1

LINE-ITEM DISCOUNT FOR CALIFORNIA ALTERNATE RATES FOR ENERGY (CARE) CUSTOMERS

APPLICABILITY: This schedule is applicable to single-phase and polyphase residential service in single-family dwellings and in flats and apartments separately metered by PG&E and domestic submetered tenants residing in multifamily accommodations, mobilehome parks and to qualifying recreational vehicle parks and marinas and to farm service on the premises operated by the person whose residence is supplied through the same meter, where the applicant qualifies for California Alternate Rates for Energy (CARE) under the eligibility and certification criteria set forth in Electric Rule 19.1. CARE service is available on Schedules E-1, E-TOU-B, E-TOU-C, E-TOU-D, EV2, E-ELEC, EM, ES, ESR, ET and EM-TOU.

TERRITORY: This rate schedule applies everywhere PG&E provides electric service.

RATES: Customers taking service on this rate schedule whose otherwise applicable rate schedule has no Delivery Minimum Bill Amount (Schedule E-ELEC) will receive a CARE percentage discount of 38.351% (R) on their total bundled charges (except for the California Climate Credit, which will not be discounted). Customers taking service on this rate schedule whose otherwise applicable rate schedule has a Delivery Minimum Bill Amount (all other schedules) will receive a CARE percentage discount ("A" or "C" below) on their total bundled charges less charges from which they are exempt (Wildfire Fund Charge, Recovery Bond Charge, Recovery Bond Credit, and the CARE surcharge portion of the public purpose program charge used to fund the CARE discount) on their otherwise applicable rate schedule (except for the California Climate Credit, which will not be discounted) and also will receive a percentage discount ("B" or "D" below) on the delivery minimum bill amount, if applicable. The CARE discount will be calculated for direct access and community choice aggregation customers based on the total charges as if they were subject to bundled service rates. Discounts will be applied as a reduction to distribution charges. These conditions also apply to master-metered customers and to qualified sub-metered tenants where the master-meter customer is jointly served under PG&E's Rate Schedule D-CARE and either Schedule EM, ES, ESR, ET, or EM-TOU.

For master-metered customers where one or more of the submetered tenants qualifies for CARE rates under the eligibility and certification criteria set forth in Rule 19.1, 19.2, or 19.3, the CARE discount is equal to a percentage ("C" below) of the total bundled charges, multiplied by the number of CARE units divided by the total number of units. In addition, master-metered customers eligible for D-CARE will receive a percentage discount ("D" below) on the delivery minimum bill amount, if applicable.

It is the responsibility of the master-metered customer to advise PG&E within 15 days following any change in the number of dwelling units and/or any decrease in the number of qualifying CARE applicants that results when such applicants move out of their submetered or non-submetered dwelling unit, or submetered permanent-residence RV or permanent-residence boat.

(Continued)

ELECTRIC SCHEDULE D-CARE Sheet 2

LINE-ITEM DISCOUNT FOR CALIFORNIA ALTERNATE RATES FOR ENERGY (CARE) CUSTOMERS

RATES: (Cont'd)

A.	D-CARE Discount:	35.000	% (Percent)	(I)
B.	Delivery Minimum Bill Discount:	50.000	% (Percent)	
C.	Master-Meter D-CARE Discount:	35.000	% (Percent)	(I)
D.	Master-Meter Delivery Minimum Bill Discount:	50.000	% (Percent)	

SPECIAL CONDITIONS:

1. OTHERWISE APPLICABLE SCHEDULE: The Special Conditions of the Customer's otherwise applicable rate schedule will apply to this schedule.

2. ELIGIBILITY: To be eligible to receive D-CARE the applicant must qualify under the criteria set forth in PG&E's Electric Rules 19.1, 19.2, and 19.3 and meet the certification requirements thereof to the satisfaction of PG&E. Qualifying Direct Access, Community Choice Aggregation Service, and Transitional Bundled Service customers are also eligible to take service on Schedule D-CARE. Applicants may qualify for D-CARE at their primary residence only. Customers or sub-metered tenants participating in the Family Electric Rate Assistance (FERA) program cannot concurrently participate in the CARE program.

The PG&E monthly gas rate in $/therm was applied on a monthly basis according to the baseline and excess rates shown in Table 14. The baseline rate reflects the lower gas price applied to a specified level of natural gas usage for each territory, while the excess gas rate is the higher price applied to any consumption exceeding that baseline allowance. The gas rates were developed based on the latest available gas rate for May 2025 and a curve to reflect how natural gas prices fluctuate with seasonal supply and demand. The seasonal curve was estimated from PG&E's monthly residential tariffs between 2015 and 2024. 12-month curves were created from monthly gas rates for each of the ten years. The ten annual curves were then averaged to arrive at an average normalized annual curve. The baseline and excess transmission charges were found to be consistent over the course of a year and applied for the entire year based on May 2025 rates. The costs presented in Table 14 were then derived by establishing the baseline and excess rates from the latest May 2025 tariff as a reference point and then using the normalized curve to estimate the cost for the remaining months relative to the May rates. Corresponding CARE rate reflects the discount per the GL-1 tariff[36].

Table 14. PG&E Monthly Gas Rate ($/therm)

Month	Total Charge	
	Baseline	Excess
January	2.87	3.36
February	2.88	3.37
March	2.63	3.13
April	2.45	2.96
May	2.41	2.92
June	2.43	2.95
July	2.47	2.98
August	2.57	3.09
September	2.64	3.17
October	2.75	3.27
November	2.87	3.37
December	2.94	3.44

[36] Res_240101-251231.xlsx

Residential
GAS
Baseline Territories and Quantities [1/]
Effective April 1, 2022 - Present

BASELINE QUANTITIES (Therms **Per Day** Per Dwelling Unit)

Individually Metered

Baseline Territories	Summer (April-October) Effective Apr. 1, 2022	Winter Off-Peak (Nov, Feb, Mar) Effective Nov. 1, 2022	Winter On-Peak (Dec, Jan) Effective Dec. 1, 2022
P	0.39	1.88	2.19
Q	0.56	1.48	2.00
R	0.36	1.24	1.81
S	0.39	1.38	1.94
T	0.56	1.31	1.68
V	0.59	1.51	1.71
W	0.39	1.14	1.68
X	0.49	1.48	2.00
Y	0.72	2.22	2.58

Master Metered

Baseline Territories	Summer (April-October) Effective Apr. 1, 2022	Winter Off-Peak (Nov, Feb, Mar) Effective Nov. 1, 2022	Winter On-Peak (Dec, Jan) Effective Dec. 1, 2022
P	0.29	1.01	1.13
Q	0.56	0.67	0.77
R	0.33	0.87	1.16
S	0.29	0.61	0.65
T	0.56	1.01	1.10
V	0.59	1.28	1.32
W	0.26	0.71	0.87
X	0.33	0.67	0.77
Y	0.52	1.01	1.13

Summer Season: Apr-Oct
Winter Off-Peak: Nov, Feb, Mar
Winter On-Peak: Dec, Jan

Advice Letter: 4589-G
Decision 21-11-016
GRC 2020 Ph II [Application 19-11-019]
Filed: Nov 22, 2019

GAS SCHEDULE GL-1 Sheet 1
RESIDENTIAL CARE PROGRAM SERVICE

APPLICABILITY: This rate schedule[1] applies to natural gas service to Core End-Use Customers on PG&E's Transmission and Distribution Systems. To qualify, service must be to individually-metered single family premises for residential use, including those in a multifamily complex, where the applicant qualifies for California Alternate Rates for Energy (CARE) under the eligibility and certification criteria set forth in Rules 19.1, 19.2, or 19.3. Common area accounts that are separately metered by PG&E have an option of switching to a core commercial rate schedule. Common area accounts are those accounts that provide gas service to common use areas as defined in Rule 1.

Per D.15-10-032 and D.18-03-017, transportation rates include GHG Compliance Cost for non-covered entities. Customers who are directly billed by the Air Resources Board (ARB), i.e., covered entities, are exempt from paying AB 32 GHG Compliance Costs through PG&E's rates.[2] A "Cap-and-Trade Cost Exemption" credit for these costs will be shown as a line item on exempt customers' bills.[3, 4]

TERRITORY: Schedule GL-1 applies everywhere within PG&E's natural gas Service Territory.

RATES: Customers on this schedule pay a Procurement Charge and a Transportation Charge, per meter. Qualifying CARE Core End-Use Customers receive a CARE Discount, which applies to both procurement and transportation charges.

	Per Therm			
	Baseline		Excess	
Procurement Charge:	$0.31276	(R)	$0.31276	(R)
Transportation Charge:	$2.01186	(I)	$2.51498	(I)
CSI- Solar Thermal Exemption	($0.00076)		($0.00076)	
CARE Discount:	($0.46477)	(I)	($0.56540)	(I)
Total:	$1.85909	(R)	$2.26158	(R)
California Natural Gas Climate Credit (per Household, annual payment occurring in the April bill cycle)	($46.26)			

Public Purpose Program Surcharge:

Customers served under this schedule are subject to a gas Public Purpose Program (PPP) Surcharge under Schedule G-PPPS.

See Preliminary Statement, Part B for the Default Tariff Rate Components.

The Procurement Charge on this schedule is equivalent to the rate shown on informational Schedule G-CP—Gas Procurement Service to Core End-Use Customers.

7.2.2 Southern California Edison

The following pages provide details on the SCE electricity tariffs applied in this study. Table 15 describes the baseline territories that represent the geographic groupings used by SCE to determine the pricing tiers and baseline energy allowances that were assumed for each climate zone. A net surplus compensation rate of $ 0.0151/ kWh was applied to any net annual electricity generation based on a one-year average of the rates between June 2024 and May 2025[37]. Corresponding CARE rates reflect the discount per the D-CARE tariff[38].

Table 15. SCE Baseline Territory by Climate Zone

Climate Zone	Baseline Territory
CZ06	6
CZ08	8
CZ09	9
CZ10	10
CZ14	14
CZ15	15

Summer Daily Allocations (June through September)

Baseline Region Number	Daily kWh Allocation	All-Electric Allocation
5	17.2	17.9
6	11.4	8.8
8	12.6	9.8
9	16.5	12.4
10	18.9	15.8
13	22.0	24.6
14	18.7	18.3
15	46.4	24.1
16	14.4	13.5

Winter Daily Allocations (October through May)

Baseline Region Number	Daily kWh Allocation	All-Electric Allocation
5	18.7	29.1
6	11.3	13.0
8	10.6	12.7
9	12.3	14.3
10	12.5	17.0
13	12.6	24.3
14	12.0	21.3
15	9.9	18.2
16	12.6	23.1

[37] Net Surplus Compensation Rate | SCE Tariff Books | SCE
[38] TM2 - ELECTRIC_SCHEDULES_TOU-D_2025.pdf - All Documents

Schedule TOU-D
TIME-OF-USE
DOMESTIC
(Continued)

Sheet 12 (T)

SPECIAL CONDITIONS

1. Applicable rate time periods are defined as follows:

Option 4-9 PM, Option 4-9 PM-CPP, Option PRIME, Option PRIME-CPP : (T)

TOU Period	Weekdays		Weekends and Holidays	
	Summer	Winter	Summer	Winter
On-Peak	4 p.m. - 9 p.m.	N/A	N/A	N/A
Mid-Peak	N/A	4 p.m. - 9 p.m.	4 p.m. - 9 p.m.	4 p.m. - 9 p.m.
Off-Peak	All other hours	9 p.m. - 8 a.m.	All other hours	9 p.m. - 8 a.m.
Super-Off-Peak	N/A	8 a.m. - 4 p.m.	N/A	8 a.m. - 4 p.m.
CPP Event Period	4 p.m. - 9 p.m.	4 p.m. - 9 p.m.	N/A	N/A

Schedule TOU-D
TIME-OF-USE
DOMESTIC
(Continued)

Sheet 6

RATES (Continued)

		Delivery Service Total[1]	Generation[2] UG**	Generation[2] DWREC[3]
Option PRIME / Option PRIME-CPP				
Energy Charge - $/kWh/Meter/Day				
Summer Season				
	On-Peak	0.28441 (R)	0.28317	0.00000
	Mid-Peak	0.28441 (R)	0.10077	0.00000
	Off-Peak	0.19835 (R)	0.06728	0.00000
Winter Season				
	Mid-Peak	0.28971 (R)	0.24759	0.00000
	Off-Peak	0.19022 (R)	0.05686	0.00000
	Super-Off-Peak	0.19022 (R)	0.05686	0.00000
Fixed Recovery Charge - $/kWh		0.00198		
MCAM Charge[5] - $/kWh		0.00160		
Basic Charge - $/Meter/Day		0.532 (R)		
EV Meter Credit (Separately Metered EV Option) - $/Meter/Day		(0.403) (I)		
EV Submeter Credit - $/Meter/Day		(0.137) (I)		
California Climate Credit[4]		(56.00)		
California Alternate Rates for				
Energy Discount - %		100.00*		
Family Electric Rate Assistance Discount - %		100.00		
Medical Line Item Discount - %		100.000		
Option PRIME-CPP				
CPP Event Energy Charge - $/kWh			0.80000	
Summer CPP Non-Event Credit				
On-Peak Energy Credit - $/kWh			(0.15170)	
Maximum Available Credit - $/kWh****				
	Summer Season		(0.60444) (R)	

* Represents 100% of the discount percentage as shown in the applicable Special Condition of this Schedule.
** The ongoing Competition Transition Charge (CTC) of ($0.00058) per kWh is recovered in the UG component of Generation.
**** The Maximum Available Credit is the capped credit amount for CPP Customers dual participating in other demand response programs.
1 Total = Total Delivery Service rates are applicable to Bundled Service, Direct Access (DA) and Community Choice Aggregation Service (CCA Service) Customers, except DA and CCA Service Customers are not subject to the DWRBC rate component of this Schedule but instead pay the DWRBC as provided by Schedule DA-CRS or Schedule CCA-CRS.
2 Generation = The Gen rates are applicable only to Bundled Service Customers. See Special Condition below for PCIA recovery.
3 DWREC = Department of Water Resources (DWR) Energy Credit – For more information on the DWR Energy Credit, see the Billing Calculation Special Condition of this Schedule.
4 Applied on an equal basis, per household, semi-annually. See the Special Conditions of this Schedule for more information.
5 The Modified Cost Allocation Mechanism (MCAM) charge recovers the net cost associated with system reliability procurement ordered by the CPUC that SCE has procured on behalf of customers whose generation services are provided by certain Electric Service Providers or Community Choice Aggregators.

(Continued)

(To be inserted by utility)
Advice 5484-E
Decision

Issued by
Michael Backstrom
Vice President

(To be inserted by Cal. PUC)
Date Submitted Feb 26, 2025
Effective Mar 1, 2025
Resolution

6C10

Schedule D-CARE Sheet 1
CALIFORNIA ALTERNATE RATES FOR ENERGY
DOMESTIC SERVICE

APPLICABILITY

Applicable to domestic service to California Alternate Rates for Energy (CARE) households residing in a permanent Single-Family Accommodation or Multifamily Accommodation where the customer meets all the Special Conditions of this Schedule. Customers enrolled in the CARE program are not eligible for the Family Electric Rate Assistance (FERA) program.

Pursuant to Special Condition 11 herein, customers receiving service under this Schedule are eligible to receive the California Climate Credit as shown in the Rates section below.

TERRITORY

Within the entire territory served.

RATES

The applicable charges set forth in Schedules D, TOU-D or TOU-D-T shall apply to Customers served under this Schedule.

CARE Discount:

A 32.5 percent discount is applied to a CARE Customer's bill prior to the application of the Public Utilities Commission Reimbursement Fee (PUCRF) and any applicable user fees, taxes, and late payment charges. CARE Customers are required to pay the PUCRF and any applicable user fees, taxes, and late payment charges in full. In addition, CARE Customers are exempt from paying the CARE Surcharge of $0.208 per meter per day , the Wildfire Fund Non-Bypassable Charge of $0.00591 per kWh, and the Fixed Recovery Charge of $0.00619 per kWh. CARE Customers are exempt from the Base Services Charge Surcharge of $0.064 per meter per day and are provided a Base Services Charge Discount of $(0.155) per meter per day to reduce their Base Services Charge. (R) (I) (I) (I)

7.2.3 Southern California Gas

The following section presents the SoCalGas natural gas tariffs applied in this study. Table 16 describes the baseline territories that were assumed for each climate zone.

Table 16. SoCalGas Baseline Territory by Climate Zone

Climate Zone	Baseline Territory
CZ05	2
CZ06	1
CZ08	1
CZ09	1
CZ10	1
CZ14	2
CZ15	1

The SoCalGas monthly gas rate in $/therm applied in this analysis is shown in Table 17. The baseline rate reflects the lower gas price applied to a specified level of natural gas usage for each territory, while the excess gas rate is the higher price applied to any consumption exceeding that baseline allowance. The gas rates were developed based on the latest available gas rate for May 2025 and a curve to reflect how natural gas prices fluctuate with seasonal supply and demand. The seasonal curve was estimated from SoCalGas's monthly residential tariffs between 2015 and 2024. 12-month curves were created from monthly gas rates for each of the ten years. The ten annual curves were then averaged to arrive at an average normalized annual curve. Long-term historical natural gas rate data was only available for SoCalGas' procurement charges.[39] The baseline and excess transmission charges were found to be consistent over the course of a year and applied for the entire year based on May 2025 rates. The costs presented in Table 17 were then derived by establishing the baseline and excess rates from the latest May 2025 tariff as a reference point, then using the normalized curve to estimate the cost for the remaining months relative to the May rates. The corresponding CARE rate reflects the discount per the GR tariff[40].

[39] The SoCalGas procurement and transmission charges were obtained from the following site: https://www.socalgas.com/for-your-business/energy-market-services/gas-prices RES2023.xlsx (live.com)

[40] SCG_GAS_G-SCHEDS_GR_2025

Table 17. SoCalGas Monthly Gas Rate ($/therm)

Month	Procurement Charge	Transportation Charge		Total Charge	
		Baseline	Excess	Baseline	Excess
January	$0.57	$1.00	$1.49	$1.57	$2.06
February	$0.39	$1.00	$1.49	$1.40	$1.88
March	$0.33	$1.00	$1.49	$1.34	$1.82
April	$0.27	$1.00	$1.49	$1.28	$1.76
May	$0.28	$1.00	$1.49	$1.29	$1.77
June	$0.32	$1.00	$1.49	$1.32	$1.81
July	$0.33	$1.00	$1.49	$1.34	$1.82
August	$0.37	$1.00	$1.49	$1.38	$1.86
September	$0.34	$1.00	$1.49	$1.34	$1.83
October	$0.33	$1.00	$1.49	$1.33	$1.82
November	$0.37	$1.00	$1.49	$1.37	$1.86
December	$0.42	$1.00	$1.49	$1.43	$1.91

Schedule No. GR Sheet 1
RESIDENTIAL SERVICE
(Includes GR, GR-C and GT-R Rates)

APPLICABILITY

The GR rate is applicable to natural gas procurement service to individually metered residential customers.

The GR-C, cross-over rate, is a core procurement option for individually metered residential core transportation customers with annual consumption over 50,000 therms, as set forth in Special Condition 10.

The GT-R rate is applicable to Core Aggregation Transportation (CAT) service to individually metered residential customers, as set forth in Special Condition 11.

The California Alternate Rates for Energy (CARE) discount of 20%, reflected as a separate line item on the bill, is applicable to income-qualified households that meet the requirements for the CARE program as set forth in Schedule No. G-CARE.

7.2.4 San Diego Gas & Electric

The following section presents the SDG&E electricity and natural gas tariffs that were applied in this study. Table 18 describes the baseline territories that were assumed for each climate zone. A net surplus compensation rate of $ 0.01667/ kWh was applied to any net annual electricity generation based on a one-year average of the rates between June 2024 and May 2025[41]. The corresponding CARE rate reflects the discount per the E-CARE tariff[42].

Table 18. SDG&E Baseline Territory by Climate Zone

Climate Zone	Baseline Territory
CZ07	Coastal
CZ10	Inland
CZ14	Mountain

Baseline Usage: The following quantities of electricity are used to calculate the baseline adjustment credit.

	Baseline Allowance For Climatic Zones*			
	Coastal	Inland	Mountain	Desert
Basic Allowance				
Summer (June 1 to October 31)	9.0	10.4	13.6	15.9
Winter (November 1 to May 31)	9.2	9.6	12.9	10.9
All Electric**				
Summer (June 1 to October 31)	6.0	8.7	15,2	17.0
Winter (November 1 to May 31)	8.8	12.2	22.1	17.1

* Climatic Zones are shown on the Territory Served, Map No. 1.
** All Electric allowances are available upon application to those customers who have permanently installed space heating or who have electric water heating and receive no energy from another source.

[41] Excess Generation | San Diego Gas & Electric
[42] Historical Tariffs | San Diego Gas & Electric

SCHEDULE EV-TOU-5

Sheet 1

COST-BASED DOMESTIC TIME-OF-USE FOR HOUSEHOLDS WITH ELECTRIC VEHICLES

APPLICABILITY

Service under this schedule is specifically limited to customers who require service for charging of a currently registered Motor Vehicle, as defined by the California Motor Vehicle Code, which is: 1) a battery electric vehicle (BEV) or plug-in hybrid electric vehicle (PHEV) recharged via a recharging outlet at the customer's premises; or 2) a natural gas vehicle (NGV) refueled via a home refueling appliance (HRA) at the customer's premises. This schedule is not available to customers with a conventional charge sustaining (battery recharged solely from the vehicle's on-board generator) hybrid electric vehicle (HEV).

Residential customers taking service on Schedule NBT, who are required to utilize EV-TOU-5 as their otherwise applicable schedule (OAS) for electric service, do not require a qualifying motor vehicle, as described above to participate on Schedule EV-TOU-5.

Customers on this schedule may also qualify for a semi-annual California Climate Credit $(81.38) per Schedule GHG-ARR. R

TERRITORY

Within the entire territory served by the utility.

RATES

Total Rates:

Description – EV-TOU-5 Rates	UDC Total Rate		DWR BC + WF-NBC		EECC Rate		Total Rate	
Basic Service Fee	16.00						16.00	
Summer								
On-Peak	0.29919	I	0.00595	I	0.40592	I	0.71106	I
Off-Peak	0.29919	I	0.00595	I	0.14946	I	0.45460	I
Super Off-Peak	0.04387	R	0.00595	I	0.07035	I	0.12017	R
Winter								
On-Peak	0.29919	I	0.00595	I	0.17258	I	0.47772	I
Off-Peak	0.29919	I	0.00595	I	0.12379	I	0.42893	I
Super Off-Peak	0.04387	R	0.00595	I	0.06399	I	0.11381	R

(Continued)

1C16 Issued by Submitted Jan 21, 2025

Advice Ltr. No. 4588-E **Dan Skopec** Effective Feb 1, 2025

Senior Vice President

Decision No. Regulatory Affairs Resolution No.

SCHEDULE TOU-ELEC

Sheet 1

DOMESTIC TIME-OF-USE FOR HOUSEHOLDS WITH ELECTRIC VEHICLES, ENERGY STORAGE, OR ELECTRIC HEAT PUMPS

APPLICABILITY

Service under this schedule is available on a voluntary basis for all residential customers who meet one or more of the following criteria: 1) require service for charging of a currently registered Motor Vehicle, as defined by the California Motor Vehicle Code, which is: a) a battery electric vehicle (BEV) or plug-in hybrid electric vehicle (PHEV) recharged via a recharging outlet at the customer's premises; or b) a natural gas vehicle (NGV) refueled via a home refueling appliance (HRA) at the customer's premises; 2) have a behind-the-meter energy storage device that is interconnected through Electric Rule 21; or 3) have an electric heat pump for water heating or climate control. This schedule is not available to customers with a conventional charge sustaining (battery recharged solely from the vehicle's on-board generator) hybrid electric vehicle (HEV).

This schedule is also available to customers who meet the above criteria as well as qualify for the California Alternate Rates for Energy (CARE) Program as outlined in Schedule E-CARE, and/or Medical Baseline as outlined in Special Condition (SC) 5. The rates for CARE customers and/or Medical Baseline are identified in the rate tables below as TOU-ELEC-CARE and TOU-ELEC-MB rates, respectively.

There is a cap of 10,000 customers who may take service on this rate, as defined in SC 10.

Customers on this schedule may also qualify for a semi-annual California Climate Credit $(81.38) per Schedule GHG-ARR. D R

TERRITORY

Within the entire territory served by the utility.

RATES

Total Rates:

Description – TOU-ELEC Rates	UDC Total Rate		DWR BC + WF-NBC		EECC Rate		Total Rate	
Monthly Service Fee	16.00						16.00	
Summer								
On-Peak	0.22390	I	0.00595	I	0.39444	I	0.62429	I
Off-Peak	0.22390	I	0.00595	I	0.11177	I	0.34162	I
Super Off-Peak	0.22390	I	0.00595	I	0.07458	I	0.30443	I
Winter								
On-Peak	0.22390	I	0.00595	I	0.20989	I	0.43974	I
Off-Peak	0.22390	I	0.00595	I	0.10166	I	0.33151	I
Super Off-Peak	0.22390	I	0.00595	I	0.06784	I	0.29769	I

(Continued)

1C13 Issued by Submitted Jan 21, 2025

Advice Ltr. No. 4588-E **Dan Skopec** Effective Feb 1, 2025

Senior Vice President

Decision No. Regulatory Affairs Resolution No.

SCHEDULE E-CARE

Sheet 1

CALIFORNIA ALTERNATE RATES FOR ENERGY

APPLICABILITY

This schedule provides a California Alternate Rates for Energy (CARE) discount to each of the following types of customers listed below that meet the requirements for CARE eligibility as defined in Rule 1, Definitions, and herein, and is taken in conjunction with the customer's otherwise applicable service schedule.

1) Customers residing in a permanent single-family accommodation, separately metered by the Utility.

2) Multi-family dwelling units and mobile home parks supplied through one meter on a single premises where the individual unit is submetered.

3) Non-profit group living facilities.

4) Agricultural employee housing facilities.

TERRITORY

Within the entire territory served by the Utility.

DISCOUNT

1) Residential CARE:

Pursuant to D. 24-05-028, the applicable CARE discount rate is to be between 30% and 35%, with the intended CARE discount rate to be 35% for SDG&E, specifically, applied as a fixed CARE line-item discount.

In addition to the CARE line-item discount, the total effective CARE discount consists of: (a) exemptions from paying the CARE Surcharge, Department of Water Resources Bond Charge (DWR-BC), California Wildfire Fund Charge (WF-NBC), and (b) a 50% minimum bill relative to Non-CARE.

The SDG&E monthly gas rate in $/therm was applied on a monthly basis according to the rates shown in Table 19. The baseline rate reflects the lower gas price applied to a specified level of natural gas usage for each territory, while the excess gas rate is the higher price applied to any consumption exceeding that baseline allowance. The gas rates were developed based on the latest available gas rate for May 2025 and a curve to reflect how natural gas prices fluctuate with seasonal supply and demand. The seasonal curve was estimated from SDG&E's monthly residential tariffs between 2015 and 2024. 12-month curves were created from monthly gas rates for each of the ten years. The ten annual curves were then averaged to arrive at an average normalized annual curve. The baseline and excess transmission charges were found to be consistent over the course of a year and applied for the entire year based on May 2025 rates. The costs presented in Table 19 were then derived by establishing the baseline and excess rates from the latest May 2025 tariff as a reference point and then using the normalized curve to estimate the cost for the remaining months relative to the May rates. The corresponding CARE rate reflects the discount per the G-CARE tariff[43].

Table 19. SDG&E Monthly Gas Rate ($/therm)

Month	Total Charge	
	Baseline	Excess
January	$2.56	$2.36
February	$2.48	$2.50
March	$2.38	$2.41
April	$2.30	$2.34
May	$2.33	$2.36
June	$2.40	$2.42
July	$2.41	$2.44
August	$2.50	$2.51
September	$2.44	$2.46
October	$2.40	$2.42
November	$2.44	$2.46
December	$2.56	$2.57

Baseline Usage: The following quantities of gas used in individually metered residences are to be billed at the baseline rates:

All Customers:	Daily Therm Allowance
Summer (May to Oct)	0.359
Winter On-Peak (Dec, Jan & Feb)	1.233
Winter Off-Peak (Nov, Mar, & Apr)	0.692

[43] SDGE_GAS_GAS-SCHEDS_GR_2025

SCHEDULE G-CARE

Sheet 1

CALIFORNIA ALTERNATE RATES FOR ENERGY (CARE) PROGRAM

APPLICABILITY

This schedule provides a California Alternate Rates for Energy (CARE) discount to each of the following types of customers listed below that meet the requirements for CARE eligibility as defined in Rule 1, Definitions, and herein, and is taken in conjunction with the customer's otherwise applicable service schedule.

1) Customers residing in a permanent single-family accommodation, separately metered by the Utility.

2) Multi-family dwelling units and mobile home parks supplied through one meter on a single premises where the individual unit is submetered.

3) Non-profit group living facilities.

4) Agricultural employee housing facilities.

5) Homekey housing facilities, administered by the California Department of Housing and Community Development (HCD)

TERRITORY

Within the entire territory served natural gas by the Utility.

DISCOUNT

The qualified customer will receive a 20% CARE discount on all customer, commodity, and transportation charges on their otherwise applicable service schedule. In addition, the customer will not pay the CARE portion of the Public Purpose Programs Surcharge as specified in Schedule G-PPPS.

SPECIAL CONDITIONS

ALL CUSTOMERS

1. Applicable Conditions. All special conditions contained in the customer's otherwise applicable schedule are applicable to service under this schedule.

2. Application and Eligibility Declaration.* An application and eligibility declaration, on a form authorized by the Commission, is required for service under the CARE program unless otherwise authorized by the Commission. Renewal of a customer's eligibility declaration, also referred to as recertification, will be required at the request of the Utility.

3. Commencement of CARE Discount. Eligible customers shall begin receiving the CARE discount no later than one billing period after receipt of a completed and approved application by the Utility or as may otherwise be authorized by the Commission.

*Per SDG&E Advice Letter 3516-E-C/2854-G-C, submitted pursuant to Resolution M-4842, certain customer protections will be offered to eligible customers effective March 4, 2020 through April 16, 2021, or as otherwise extended.

7.2.5 City of Palo Alto Utilities

The following section presents the CPAU electricity and natural gas tariffs applied in this study[44]. The CPAU monthly gas rate in $/therm was applied on a monthly basis according to the rates shown in Table 20. The gas rates were developed based on the latest available gas rate for May 2025 and a curve to reflect how natural gas prices fluctuate with seasonal supply and demand. The seasonal curve was estimated from CPAU's monthly residential tariffs between 2018 and 2024. 12-month curves were created from monthly gas rates for each of the seven years. The seven annual curves were then averaged to arrive at an average normalized annual curve. The baseline and excess transmission charges were found to be consistent over the course of a year and applied for the entire year based on May 2025 rates. The costs presented in Table 20 were then derived by establishing the baseline and excess rates from the latest May 2025 tariff as a reference point and then using the normalized curve to estimate the cost for the remaining months relative to the May rates. The monthly service charge applied was $16.93 per month per the May 2025 G-1 tariff[45].

Table 20. CPAU Monthly Gas Rate ($/therm)

Month	G1 Volumetric Total Baseline	G1 Volumetric Total Excess
January	$2.17	$3.53
February	$1.66	$2.95
March	$1.55	$2.83
April	$1.51	$2.79
May	$1.51	$2.79
June	$1.54	$2.83
July	$1.63	$3.08
August	$1.71	$3.16
September	$1.70	$3.16
October	$1.72	$3.18
November	$1.81	$3.27
December	$1.96	$3.45

[44] Utility Rate Schedule E-1 Residential Electric Service
[45] monthly-gas-volumetric-and-service-charges-residential.pdf

CITY OF PALO ALTO UTILITIES

City of Palo Alto
Utility Rate Schedule G-1 – Residential Gas Service
Monthly Gas Volumetric and Service Charges

Effective Date	Commodity Charge	Cap and Trade Compliance Charge	Transportation Charge	Carbon Offset Charge	Total Supply Charge	Distribution Charge		Total Volumetric Charge		Monthly Service Charge
						Tier 1	Tier 2	Tier 1	Tier 2	
	(a)	(b)	(c)	(d)	(a)+(b)+(c)+(d)=(e)	(f)	(g)	(e)+(f)	(e)+(g)	
	$ per Therm									$ per Month
3/1/2026	0.2265	0.1262	0.2640	0.0300	0.6467	1.0456	2.5203	1.6923	3.1670	19.58
2/1/2026	0.3551	0.1262	0.2631	0.0300	0.7744	1.0456	2.5203	1.8200	3.2947	19.58
1/1/2026	0.3928	0.1262	0.2631	0.0300	0.8121	0.8944	2.2873	1.7065	3.0994	18.40
12/1/2025	0.5364	0.1204	0.2672	0.0300	0.9540	0.8944	2.2873	1.8484	3.2413	18.40
11/1/2025	0.4140	0.1204	0.2672	0.0300	0.8316	0.8944	2.2873	1.7260	3.1189	18.40
10/1/2025	0.4109	0.1204	0.2163	0.0300	0.7776	0.8944	2.2873	1.6720	3.0649	18.40
9/1/2025	0.3639	0.1081	0.2163	0.0300	0.7183	0.8944	2.2873	1.6127	3.0056	18.40
8/1/2025	0.3788	0.1081	0.2168	0.0300	0.7337	0.8944	2.2873	1.6281	3.0210	18.40
7/1/2025	0.3705	0.1081	0.2122	0.0700	0.7608	0.8944	2.2873	1.6552	3.0481	18.40
6/1/2025	0.3528	0.1226	0.2122	0.0700	0.7576	0.8229	2.1043	1.5805	2.8619	16.93
5/1/2025	0.2855	0.1226	0.2122	0.0700	0.6903	0.8229	2.1043	1.5132	2.7946	16.93
4/1/2025	0.3361	0.1226	0.2122	0.0700	0.7409	0.8229	2.1043	1.5638	2.8542	16.93
3/1/2025	0.4177	0.1339	0.2122	0.0700	0.8338	0.8229	2.1043	1.6567	2.9381	16.93
2/1/2025	0.4207	0.1339	0.2122	0.0700	0.8368	0.8229	2.1043	1.6597	2.9411	16.93
1/1/2025	0.4911	0.1339	0.2122	0.0700	0.9072	0.8229	2.1043	1.7301	3.0115	16.93
12/1/2024	0.5144	0.1182	0.2715	0.0700	0.9741	0.8229	2.1043	1.7970	3.0784	16.93
11/1/2024	0.4850	0.1182	0.2715	0.0700	0.9447	0.8229	2.1043	1.7676	3.0490	16.93
10/1/2024	0.4450	0.1182	0.2500	0.0700	0.8832	0.8229	2.1043	1.7061	2.9875	16.93
9/1/2024	0.3411	0.1451	0.2500	0.0700	0.8062	0.8229	2.1043	1.6291	2.9105	16.93
8/1/2024	0.5179	0.1451	0.2201	0.0700	0.9531	0.8229	2.1043	1.7760	3.0574	16.93
7/1/2024	0.4197	0.1451	0.2206	0.0700	0.8554	0.8229	2.1043	1.6783	2.9597	16.93
6/1/2024	0.1918	0.1638	0.2206	0.0700	0.6462	0.6807	1.7406	1.3263	2.3868	14.01
5/1/2024	0.2142	0.1638	0.2206	0.0700	0.6686	0.6807	1.7406	1.3493	2.4092	14.01
4/1/2024	0.2388	0.1638	0.2206	0.0700	0.6932	0.6807	1.7406	1.3739	2.4338	14.01

7.2.6 Sacramento Municipal Utilities District (Electric Only)

Following are the SMUD electricity tariffs applied in this study. The rates effective May 2025 were used[46].

[46] SMUD Resolution No. 23-09-09

Residential Time-of-Day Service
Rate Schedule R-TOD

II. Firm Service Rates

A. Time-of-Day (5-8 p.m.) Rate

	Effective as of January 1, 2023	Effective as of January 1, 2024	Effective as of May 1, 2024	Effective as of January 1, 2025	Effective as of May 1, 2025
Time-of-Day (5-8 p.m.) Rate (RT02)					
Non-Summer Season (October - May)					
System Infrastructure Fixed Charge *per month per meter*	$23.50	$24.15	$24.80	$25.50	$26.20
Electricity Usage Charge					
Peak *$/kWh*	$0.1547	$0.1590	$0.1633	$0.1678	$0.1724
Off-Peak *$/kWh*	$0.1120	$0.1151	$0.1183	$0.1215	$0.1248
Summer Season (June - September)					
System Infrastructure Fixed Charge *per month per meter*	$23.50	$24.15	$24.80	$25.50	$26.20
Electricity Usage Charge					
Peak *$/kWh*	$0.3279	$0.3369	$0.3462	$0.3557	$0.3655
Mid-Peak *$/kWh*	$0.1864	$0.1914	$0.1967	$0.2021	$0.2077
Off-Peak *$/kWh*	$0.1350	$0.1387	$0.1425	$0.1464	$0.1505

B. Optional Critical Peak Pricing Rate

1. The CPP Rate base prices per time-of-day period are the same as the prices per time-of-day period for TOD (5-8 p.m.).
2. The CPP Rate provides a discount per kWh on the Mid-Peak and Off-Peak prices during summer months.
3. During CPP Events, customers will be charged for energy used at the applicable time-of-day period rate plus the CPP Rate Event Price per kWh as shown on www.smud.org.
4. During CPP Events, energy exported to the grid will be compensated at the CPP Rate Event Price per kWh as shown on www.smud.org.
5. The CPP Rate Event Price and discount will be updated annually at SMUD's discretion and posted on www.smud.org.

C. Plug-In Electric Vehicle Credit (rate categories RT02 and RTC1)

This credit is for residential customers who have a licensed passenger battery electric plug-in or plug-in hybrid electric vehicle.
Credit applies to all electricity usage charges from midnight to 6:00 a.m. daily.
Electric Vehicle Credit..... -$0.0150/kWh

III. Electricity Usage Surcharges

Refer to the following rate schedules for details on these surcharges.

A. Hydro Generation Adjustment (HGA). Refer to Rate Schedule HGA.

IV. Rate Option Menu

A. Energy Assistance Program Rate. Refer to Rate Schedule EAPR.
B. Medical Equipment Discount Program. Refer to Rate Schedule MED.
C. Joint Participation in Medical Equipment Discount and Energy Assistance Program Rate. Refer to Rate Schedule MED.

SACRAMENTO MUNICIPAL UTILITY DISTRICT
Resolution No. 23-09-09 adopted September 21, 2023

Sheet No. **R-TOD-2**
Effective: **September 22, 2023**

7.3 Utility Rate Escalation

Utility rates are assumed to escalate over time, as described in Section. This analysis utilized the escalation rates that the Energy Commission used in their development of the LSC factors for the 2025 code cycle (which replaces the TDV factors used in the 2022 code cycle). These annual escalation rates from 2026 through 2055 are shown in Table 21. Other escalation rate assumptions are briefly addressed below.

Table 21. Statewide Average Residential Utility Rate Escalation Assumptions

Year	Natural Gas Rate Increase (%/year, real)	Electricity Rate Increase (%/year, real)
2026	4.6%	2.1%
2027	4.2%	0.6%
2028	3.2%	1.9%
2029	3.6%	1.6%
2030	6.6%	1.3%
2031	6.7%	1.0%
2032	7.7%	1.2%
2033	8.2%	1.1%
2034	8.2%	1.1%
2035	8.2%	0.9%
2036	8.2%	1.1%
2037	8.2%	1.1%
2038	8.2%	1.0%
2039	8.2%	1.1%
2040	8.2%	1.1%
2041	8.2%	1.1%
2042	8.2%	1.1%
2043	8.2%	1.1%
2044	8.2%	1.1%
2045	8.2%	1.1%
2046	8.2%	1.1%
2047	3.1%	1.1%
2048	-0.5%	1.1%
2049	-0.6%	1.1%
2050	-0.5%	1.1%
2051	-0.6%	1.1%
2052	-0.6%	1.1%
2053	-0.6%	1.1%
2054	-0.6%	1.1%
2055	-0.6%	1.1%

2025 LSC escalation rates were selected for this analysis as they reflect the current metrics that have replaced TDV. This is a change from the cost-effectiveness analysis performed under the 2022 code cycle, which applied escalation rates adopted by the CPUC during its 2021 En Banc hearings (California Public Utilities Commission, 2021a). Relative to the 2025 LSC escalation assumptions, the CPUC projections reflected more moderate escalation in

natural gas prices, while both sets of assumptions anticipated comparatively modest increases in electricity rates. As none of the measures evaluated in this analysis affect natural gas consumption, gas price escalation does not materially influence the results.

Escalation assumptions used in cost-effectiveness analyses such as this are expected to be updated based on the Energy Commission's latest Integrated Energy Policy Report (IEPR). As of initial publication of this report, the Energy Commission has developed three escalation scenarios but has not officially proposed an approach for cost-effectiveness calculations. The Reach Codes Team is working to understand how to apply the rates to this study.

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Our experts develop robust toolkits as well as provide specific technical assistance to local jurisdictions (cities and counties) considering adopting energy reach codes. These include cost-effectiveness research and analysis, model ordinance language and other code development and implementation tools, and specific technical assistance throughout the code adoption process.

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