

2020 REACH CODE  
COST-EFFECTIVENESS ANALYSIS:  
**Detached Accessory Dwelling Units**

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## Acronym List

B/C – Benefit-to-Cost Ratio

CBEECC - California Building Energy Code Compliance

CBSC - California Building Standards Commission

CEC - California Energy Commission

CZ – Climate Zone

GHG - Greenhouse Gas

IOU – Investor-Owned Utility

POU – Publicly Owned Utility

PG&E – Pacific Gas & Electric (utility)

SCE – Southern California Edison (utility)

SCG – Southern California Gas (utility)

SDG&E – San Diego Gas & Electric (utility)

CPAU – City of Palo Alto Utilities

SMUD – Sacramento Municipal Utility District

LADWP – Los Angeles Department of Water and Power

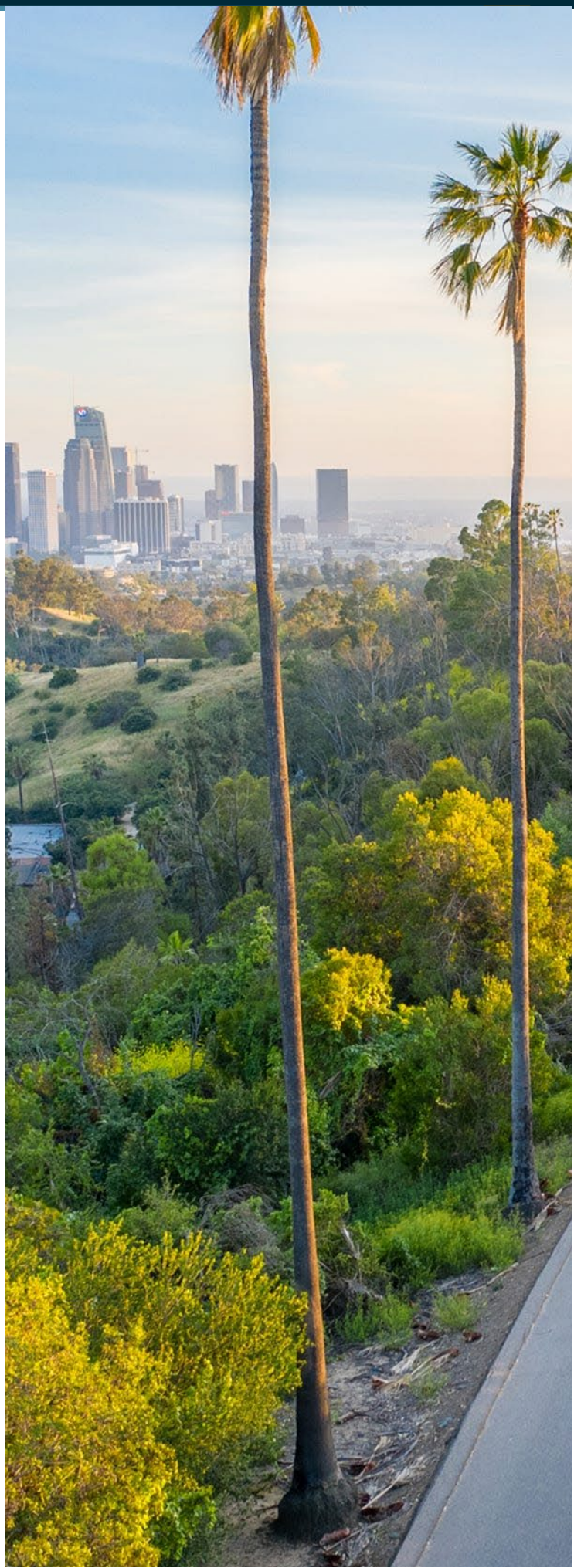
kWh – Kilowatt Hour

NPV – Net Present Value

PV - Solar Photovoltaic

TDV - Time Dependent Valuation

Title 24 – California Code of Regulations Title 24, Part 6



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**TABLE OF CONTENTS**

**1 Introduction..... 1**

**2 Methodology and Assumptions ..... 2**

    2.1 Reach Codes ..... 2

        2.1.1 Benefits ..... 2

        2.1.2 Costs ..... 2

        2.1.3 Metrics ..... 2

        2.1.4 Utility Rates ..... 3

    2.2 Greenhouse Gas Emissions ..... 4

**3 Prototypes, Measure Packages, and Costs ..... 5**

    3.3 Measure Definitions and Costs ..... 6

        3.3.1 All-Electric ..... 6

        3.3.2 Efficiency and Solar PV ..... 7

    3.4 Measure Packages ..... 8

**4 Results ..... 10**

    4.1 All-Electric Prescriptive Minimum Results ..... 11

    4.2 All Electric Plus Efficiency and PV Results ..... 13

**5 Summary ..... 15**

**6 References ..... 17**

**7 Appendices ..... 18**

    7.1 Map of California Climate Zones ..... 18

    7.2 Mixed Fuel Baseline Energy Figures ..... 19

    7.3 All-Electric Energy Efficiency Only Results ..... 20

    7.4 Utility Rate Schedules ..... 23

        7.4.1 Pacific Gas & Electric ..... 23

        7.4.2 Southern California Edison ..... 27

        7.4.3 Southern California Gas ..... 29

        7.4.4 San Diego Gas & Electric ..... 30

        7.4.5 City of Palo Alto Utilities ..... 32

        7.4.6 Sacramento Municipal Utilities District (Electric Only) ..... 34

        7.4.7 Los Angeles Department of Water and Power (Electric Only) ..... 36

        7.4.8 Fuel Escalation Rates ..... 36

**LIST OF TABLES**

Table 1. Utility Tariffs Used Based on Climate Zone ..... 3

Table 2. Detached ADU Baseline Mixed-fuel Prototype Characteristics ..... 6

Table 3. New Construction Detached ADU Construction Costs, All CZs ..... 7

Table 4. Measures for Detached ADU ..... 7

Table 5. Solar PV Measure Cost Breakdown ..... 8

Table 6. Heat Pump Water Heater Location, All-Electric Prescriptive Baseline ..... 9

Table 7. Cost-Effectiveness for ADU: All-Electric Prescriptive Minimum, 2019 TDV ..... 11

Table 8. Cost-Effectiveness for ADU: All-Electric Prescriptive Minimum, 2022 TDV ..... 12

Table 9. Cost-Effectiveness for ADU: All-Electric Energy Efficiency + Additional PV, 2019 TDV ..... 13

Table 10. Cost-Effectiveness for ADU: All-Electric Energy Efficiency + Additional PV, 2022 TDV Results ..... 14

Table 11. Detached ADU Summary of EDR Margin and Cost-Effectiveness..... 16

Table 12. Detached ADU Mixed Fuel Baseline..... 19

Table 13. Cost-Effectiveness for ADU: All-Electric Energy Efficiency Without PV, 2019 TDV ..... 21

Table 14. Cost-Effectiveness for ADU: All-Electric Energy Efficiency Without PV, 2022 TDV ..... 22

Table 15. Real Utility Rate Escalation Rate Assumptions..... 37

**LIST OF FIGURES**

Figure 1. Map of California climate zones..... 18



# 1 Introduction

The California Building Energy Efficiency Standards Title 24, Part 6 (Title 24) (CEC, 2019) is maintained and updated every three years by two state agencies: the California Energy Commission (the Energy Commission) and the Building Standards Commission (BSC). In addition to enforcing the code, local jurisdictions have the authority to adopt local energy efficiency ordinances—or reach codes—that exceed the minimum standards defined by Title 24 (as established by Public Resources Code Section 25402.1(h)2 and Section 10-106 of the Building Energy Efficiency Standards). Local jurisdictions must demonstrate that the requirements of the proposed ordinance are cost-effective and do not result in buildings consuming more 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.

This report documents cost-effective combinations of measures that exceed the minimum state requirements, the 2019 Building Energy Efficiency Standards, effective January 1, 2020, for newly constructed detached Accessory Dwelling Unit (ADU) buildings. This report was developed in coordination with the California Statewide Investor-Owned Utilities (CA IOUs) Codes and Standards Program, key consultants, and engaged cities—collectively known as the Reach Code Team.

The Reach Code Team published a residential new construction report in 2019 that documented the cost-effectiveness of energy measure packages of single family and low-rise multifamily prototypes (Statewide Reach Code Team, 2019). Based on stakeholder requests, this report extends that analysis to Residential Detached Accessory Dwelling Units (ADUs). Measures include energy efficiency, electrification, solar photovoltaics (PV), and battery storage.

The Department of Energy (DOE) sets minimum efficiency standards for equipment and appliances that are federally regulated under the National Appliance Energy Conservation Act, including heating, cooling, and water heating equipment (E-CFR, 2020). Since state and local governments are prohibited from adopting higher minimum efficiencies than the federal standards require, the focus of this study is to identify and evaluate cost-effective packages that do not include high efficiency heating, cooling, and water heating equipment. High efficiency appliances are often the easiest and most affordable measures to increase energy performance. While federal preemption limits reach code mandatory requirements for covered appliances, in practice, builders may install any package of compliant measures to achieve the performance requirements.

## 2 Methodology and Assumptions

The Reach Codes Team analyzed one prototype design to represent a detached ADU building using the cost-effectiveness methodology detailed in this section below. The general methodology is consistent with analyses of other prototypes, whereas some specifics such as utility rate selection are customized for the residential detached ADU prototype.

### 2.1 Reach Codes

This section describes the approach to calculating cost-effectiveness including benefits, costs, metrics, and utility rate selection.

#### 2.1.1 Benefits

This analysis used both on-bill and time dependent valuation (TDV) of energy-based approaches to evaluate cost-effectiveness. Both on-bill and TDV require estimating and quantifying the energy savings and costs associated with energy measures. The primary difference between on-bill and TDV is how energy is valued:

- On-Bill: Customer-based lifecycle cost approach that values energy based upon estimated site energy usage and customer on-bill savings using electricity and natural gas utility rate schedules over a 30-year duration for the detached ADU accounting for a three percent discount rate and energy cost inflation per Appendix 7.4 .
- TDV: TDV was developed by the Energy Commission to reflect the time dependent value of energy including long-term projected costs of energy such as the cost of providing energy during peak periods of demand and other societal costs including projected costs for carbon emissions and grid transmission impacts. This metric values energy use differently depending on the fuel source (gas, electricity, and propane), time of day, and season. Electricity used (or saved) during peak periods has a much higher value than electricity used (or saved) during off-peak periods.

The Reach Code Team performed energy simulations using the most recent software available for 2019 Title 24 code compliance analysis, CBECC-Res 2019.1.3. The Team also used CBECC-Res 2022.0.1 RV for testing the impacts of updated weather files and 2022 TDV multipliers on cost-effectiveness. 2022 weather files have more cooling loads and less heating loads, and 2022 TDV multipliers increased significantly for fossil-fuel sources to reflect CO2 price forecasts and emissions abatement, while comparatively reducing for electricity to reflect increased renewable generation penetration (California Energy Commission, 2019).

#### 2.1.2 Costs

The Reach Code Team assessed the incremental costs and savings of the energy packages over the lifecycle of 30 years. Incremental costs represent the equipment, installation, replacements, and maintenance costs of the proposed measure relative to the 2019 Title 24 Standards minimum requirements or standard industry practices. The Reach Code Team obtained measure costs from manufacturer distributors, contractors, literature review, and online sources such as Home Depot and RS Means. Taxes and contractor markups were added as appropriate. Maintenance and replacement costs are included.

#### 2.1.3 Metrics

Cost-effectiveness is presented using net present value (NPV) and benefit-to-cost (B/C) ratio metrics.

- NPV: The Reach Code Team uses net savings (NPV benefits minus NPV costs) as the cost-effectiveness metric. If the net savings of a measure or package is positive, it is considered cost effective. Negative net savings represent net costs to the consumer. A measure that has negative energy cost benefits (energy cost increase) can still be cost effective if the costs to implement the measure are even more negative (i.e., construction and maintenance cost savings).



- B/C Ratio: Ratio of the present value of all benefits to the present value of all costs over 30 years (NPV benefits divided by NPV costs). The criteria for cost-effectiveness is a B/C greater than 1.0. A value of one indicates the savings over the life of the measure are equivalent to the incremental cost of that measure. A value greater than one represents a positive return on investment.

Improving the energy performance of a building often requires an initial investment. In most cases the benefit is represented by annual on-bill utility or TDV savings, and the cost by incremental first cost and replacement costs. However, some packages result in initial construction cost savings (negative incremental cost), and either energy cost savings (positive benefits), or increased energy costs (negative benefits). In cases where both construction costs and energy-related savings are negative, the construction cost savings are treated as the benefit while the increased energy costs are the cost. In cases where a measure or package is cost-effective immediately (i.e., upfront construction cost savings and lifetime energy cost savings), B/C ratio cost-effectiveness is represented by “>1”. Because of these situations, NPV savings are also reported, which, in these cases, are positive values.

### 2.1.4 Utility Rates

In coordination with the CA IOU rate team, and the publicly available information for several Publicly-Owned-Utilities (POUs), the Reach Code Team determined appropriate utility rates for each climate zone and package. The utility tariffs, summarized in Table 1, were determined based on the annual load profile of the prototype and the corresponding package, the most prevalent rate in each territory, and information assuring that the rates were not getting phased out.

TRC assumed that the ADU would have a separate electric and gas meter. A time-of-use (TOU) rate was applied to all cases. For cases with PV generation, the approved NEM tariffs were applied along with minimum daily use billing and mandatory non-bypassable charges. For the PV cases annual electric production was always less than annual electricity consumption; and therefore, no credits for surplus generation were necessary. For a more detailed breakdown of the rates selected refer to Appendix 7.2 - Utility Rate Schedules.

**Table 1. Utility Tariffs Used Based on Climate Zone**

Climate Zones	Electric / Gas Utility	Electricity	Natural Gas
<b>IOUs</b>			
1-5,11-13,16	PG&E	E-TOU Option C	G-1
6, 8-10, 14, 15	SCE / Southern California Gas Company	TOU-D Option 4-9	GM
7, 10, 14	San Diego Gas and Electric Company (SDG&E)	TOU-DR-1	GM
<b>POUs</b>			
4	City of Palo Alto (CPAU)	E-1	G-1
12	Sacramento Municipal Utility District (SMUD) / PG&E	R TOD Option 5-8	G-1
6, 8, 9	Los Angeles Department of Water and Power (LADWP) / SCG	R-1	GM (GM-E)
16	Los Angeles Department of Water and Power (LADWP) / PG&E	R-1	G-1

Utility rates are assumed to escalate over time, using assumptions from research conducted by Energy and Environmental Economics (E3) in the 2019 study Residential Building Electrification in California (Energy & Environmental Economics, 2019). Escalation of natural gas rates between 2020 and 2022 is based on the currently

filed General Rate Cases for PG&E, SoCalGas and SDG&E. From 2023 through 2025, gas rates are assumed to escalate at four percent per year above inflation, which reflects historical rate increases between 2013 and 2018. Escalation of electricity rates from 2020 through 2025 is assumed to be four percent per year above inflation, based on electric utility estimates. After 2025, escalation rates for both natural gas and electric rates are assumed to drop to a more conservative one percent escalation per year above inflation for long-term rate trajectories beginning in 2026 through 2050. See Appendix 7.4 - **Utility Rate Schedules** for additional details.

## 2.2 Greenhouse Gas Emissions

The analysis uses the greenhouse gas (GHG) emissions estimates built-in to CBECC-Res. There are 8760 hourly multipliers accounting for time dependent energy use and carbon emissions based on source emissions, including renewable portfolio standard projections. Natural gas fugitive emissions, which are shown to be substantial, are not included. There are two strings of multipliers—one for Northern California climate zones, and another for Southern California climate zones.<sup>1</sup>

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<sup>1</sup> CBECC-Res multipliers are the same for CZs 1-5 and 11-13 (presumed to be Northern California), while there is another set of multipliers for CZs 6-10 and 14-16 (assumed to be Southern California).

### 3 Prototypes, Measure Packages, and Costs

This section describes the prototype and the scope of analysis drawing from previous 2019 Reach Code research where necessary.

A customized detached ADU prototype was built to reflect California construction. TRC designed the baseline prototype to be mixed fuel and have total EDR margins as close to zero as possible to reflect a prescriptively compliant new construction building in each climate zone.

ADUs are additional dwelling units typically built on the property of an existing single-family parcel. 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 attached to the primary dwelling. The Reach Code Team leveraged prior research and performed interviews to help define the detached ADU baseline and measure packages, primarily to include infrastructural costs.

#### 3.1 Prior Reach Code Research

In 2019, the Statewide CA IOU Reach Codes Team analyzed the cost-effectiveness of residential new construction projects for mixed-fuel plus efficiency, all-electric plus efficiency, and demand flexibility packages (Statewide Reach Codes Team 2019a). Using this analysis, several cities and counties in California adopted local energy code amendments encouraging or requiring that low-rise residential new construction to be all-electric. However, many jurisdictions exempted ADUs from these requirements due to uncertainties around how infrastructural and operational costs may be different between mixed-fuel and all-electric detached ADUs, and to avoid potentially stifling ADU development.

Because the mixed-fuel packages plus efficiency ADUs are not subject to jurisdictional exemptions, this study focuses on a new construction all-electric detached ADU and discerns how infrastructural costs and operational costs may impact the cost-effectiveness compared to a mixed-fuel baseline.

#### 3.2 Prototype Characteristics

To determine a typical set of ADU characteristics, the Reach Code team contacted over twenty ADU builders and city staff members from regions representing Sacramento, the San Francisco Bay Area, the Los Angeles area, and the San Diego area. Ultimately, four builders with construction experience with multiple projects and two city staff members with experience reviewing and approving ADU project plans were interviewed. Respondents indicated that there are not particular determinants for siting and sizing detached ADUs other than the site conditions—maximizing available space is the key consideration. Responses varied greatly on detached ADU size, as client preference, location, and avoidance of impact fees were expressed as considerations. Sizes can range from roughly 300 ft<sup>2</sup> for a studio to over 1200 ft<sup>2</sup> for a two-bedroom unit. The Reach Code team selected an average size of 750 ft<sup>2</sup> as a typical size for a detached ADU. 750 ft<sup>2</sup> also relates to a threshold for state regulation over which impact fees and discretionary approval would be applied. Some other findings include:

- **Setback requirements** follow the four-foot setback requirements of state Assembly Bill 881. Mechanical equipment may not reside in the setbacks, however, interviewees indicated that there is always one side of the ADU that isn't against a setback. Mechanical equipment can usually be placed along those sides and be hidden by a shed or fence.
- Mechanical **equipment footprints** may be too big to include inside an ADU with limited floor area, so clients tend to want to locate the mechanical equipment outside. This is reflected in the all-electric Package 2 (see [Section 3.4](#)).
- Some cities have **noise ordinances** that limit maximum decibels at the property line, which may pose issues for exterior heat pump water heaters or heating, ventilation, and air-conditioning (HVAC) equipment. These maximum noise requirements range from 50-66 decibels (dBs), and exterior heat pump equipment commonly ranges between 45-60 decibels at the equipment. Interviewees did not express significant concerns about

noise ordinances because manufacturers can provide sound blankets to reduce the decibel rating by five or more decibels, or developers can locate equipment in an insulated shed to reduce noise.

- When adding a detached ADU the primary dwelling’s **electrical panel and service connection** nearly always needs to be upgraded at least to a 125-amp panel, and at least a 200-amp panel where solar PV is being installed. A 225-amp panel is also common. Electrical upgrades cost roughly \$3500, for most common existing panel sizes or upgraded panel sizes.
- The **distance** between the detached ADU and primary dwelling can range widely due to lot size and location of meter and other infrastructure, from as little as five feet to over 100 feet. Based on respondent feedback, the Reach Code Team used an average distance of 50 feet as the length for both the natural gas and electrical line extensions for costing purposes.
- Cities do not impose a differing **fee structure** between all-electric or mixed-fuel ADU design. Fees range from \$4,000 - \$6,000 including inspections.

Table 2 summarizes the ADU prototype characteristics, based on prescriptive Title 24 new construction requirements.

**Table 2. Detached ADU Baseline Mixed-fuel Prototype Characteristics**

<b>Conditioned floor area (ft<sup>2</sup>)</b>	750
<b>Number of stories</b>	1
<b>Distance from primary dwelling (ft)</b>	50
<b>Wall U-factor</b>	0.048 (CZ 1-5, 8-16), 0.065 (CZ 6,7)
<b>Roof Assembly</b>	Option B in Table 150.1-A of Title 24 2019
<b>Window-to-floor area ratio</b>	20%
<b>Solar PV size</b>	Each climate zone sized as ‘Specific PV System Scaling’ = 1 offsetting 100% of electricity load

### 3.3 Measure Definitions and Costs

ADU measures fall into two categories: those associated with building all-electric, and those associated with general efficiency and demand flexibility.

#### 3.3.1 All-Electric

For HVAC and water heating appliance-related costs, the Reach Code Team primarily leveraged measure definitions and costs from the 2019 Residential New Construction Reach Code Cost-Effectiveness Study. For HVAC system, air-conditioning is included in both baseline and proposed models. For in-house and site infrastructure the Reach Code Team developed new data based on interviews and RS Means.

The Reach Code Team found that a new detached ADU would require that the building owner upgrade the service connection to the lot in both the mixed-fuel ADU design and the all-electric design. The most common size for this upgrade is 225A, which would not represent an incremental cost from the mixed-fuel project to the all-electric project. Feeder wiring to the ADU and the ADU subpanel will need to be slightly upgraded for the all-electric design. Electric vehicle (EV) infrastructure upgrades are excluded from this analysis as ADUs are not required to have dedicated parking – however, a 225-amp panel is likely to be sufficient for some EV infrastructure for a majority of existing homes. The total cost for the all-electric measures is summarized in Table 3.

**Table 3. New Construction Detached ADU Construction Costs, All CZs**

	Mixed-Fuel Cost	All-Electric Measure	All-Electric Cost	All-Electric Incremental Cost	Source
Appliances: Space heater, water heater, clothes dryer, range.				(\$221)	Residential New Construction Report (2019) Table 6
In-house gas plumbing	\$540	In-house electrical upgrades for branch circuits	\$600	\$60	RSMeans
Site gas service extension	\$1,998	No site gas service	\$0	(\$1998)	Interviews, RSMeans
Site electrical service connection upgrade 225A	\$3,500	Site electrical service connection upgrade 225A	\$3,500	\$0	
100A Feeder to ADU with breaker	\$933	125A feeder to ADU	\$1,206	\$273	
100A ADU subpanel	\$733	125A ADU subpanel	\$946	\$213	
Outdoor closet	n/a	Heat pump water heater closet*	\$650	\$650	
<b>Total (HPWH outside closet)</b>	<b>\$7,704</b>		<b>\$6,901</b>	<b>(\$1,024)</b>	
<b>Total (HPWH in conditioned space)</b>	<b>\$7,704</b>		<b>\$6,251</b>	<b>(\$1,674)</b>	

\* Additional cost for outdoor closet is required only for climate zones where heat pump water heater is located 'Outside'.

### 3.3.2 Efficiency and Solar PV

The Reach Code team used the efficiency measures and costs developed in the 2019 Residential New Construction report (2019). The measures are summarized below by climate zone, including measure costs, in Table 4.

**Table 4. Measures for Detached ADU**

Measure Name	Applicable Climate Zones	Incremental Cost Description	Cost for ADU Prototype
Verified low leakage ducts in conditioned space (including HERS* verification)	All	\$0.31/ft <sup>2</sup> of floor area + \$110 HERS test	\$343
Low pressure drop ducts - 2% vs 5%	All	\$96/hr labor for installation	\$96
Reduced infiltration: 3ACH50 vs 5ACH50	13, 14, 16	\$0.115/ft <sup>2</sup> + \$100 HERS test	\$186
Exterior wall insulation: R-7.5 vs R-5 (U-0.043)	15	\$0.36/ft <sup>2</sup> of floor area	\$272
High performance attics: R-38 attic floor + R-30 Under Deck	1, 11-16	\$0.34/ft <sup>2</sup> attic floor + \$1.61/ft <sup>2</sup> roof	\$1,563
Cool roof - 0.25 vs 0.20	9-15	\$0.09/ft <sup>2</sup> of roof	\$73
Improved fenestration	1, 2, 16	\$4.23/ft <sup>2</sup> of window	\$381

Measure Name	Applicable Climate Zones	Incremental Cost Description	Cost for ADU Prototype
Slab edge insulation: R-10 vs R-0	1-5, 10-15	\$4/linear foot	\$339
Solar PV to offset 90% of the annual electricity use**	All	\$3.99/Wdc	\$800-\$6,200 depending on climate zone
<b>Total Costs</b>			\$4,500 - \$10,253 depending on climate zone.

\*HERS = Home Energy Rating System

\*\*Incremental cost for added PV over and above the prescriptive PV size in baseline models.

The cost for solar PV is derived from an LBNL study (Barbose, 2019) and Rooftop Solar PV System Measure Study (California Energy Commission, 2017), summarized in Table 5. Solar PV prices have been discounted to reflect the federal solar investment tax credit, by an average of 26% over 2021 and 2022.

**Table 5. Solar PV Measure Cost Breakdown**

	Unit Cost, \$2020 Present Value	Useful Life (yrs.)	Source
Solar PV System	\$3.70 / Wdc	30	LBNL Study
Inverter Replacement, year 11	\$0.15 / Wdc	10	E3 Rooftop Solar PV System Report (CEC 2017) <sup>2</sup>
Inverter Replacement, year 21	\$0.12 / Wdc	10	
Annual Maintenance Costs	\$0.02 / Wdc	1	
<b>Total</b>	<b>\$3.99 / Wdc</b>		

### 3.4 Measure Packages

The Reach Code Team examined the two electrification packages against a baseline mixed-fuel prescriptive package:

- Detached ADU Baseline Package: Mixed-fuel prescriptively built, including gas utility extension from primarily dwelling to detached ADU.
- All-Electric Prescriptive Minimum: All-electric prescriptively built, including heat pump water heater location per Residential Alternate Calculation Method (ACM), shown in Table 6. Includes electric utility extension upgrade from the primary dwelling to the detached ADU and avoided cost of gas utility extension. This package has the same PV size as mixed-fuel prescriptive baseline model, offsetting 100 percent of annual electricity demand.
- All-Electric Energy Efficiency + PV: All-electric prescriptively built as above, except water heater location is outside in exterior closet in all climate zones except Climate Zones 14, 15, and 16, plus energy efficiency measures, and additional solar PV (offsetting 90 percent of kWh load) to improve cost-effectiveness based on prior reach code research.

<sup>2</sup> Available at: <https://efiling.energy.ca.gov/getdocument.aspx?tn=221366>

**Table 6. Heat Pump Water Heater Location, All-Electric Prescriptive Baseline**

Climate Zone	Single-Family
01	Outside
02	Conditioned
03	Outside
04	Conditioned
05	Outside
06	Outside
07	Outside
08	Conditioned
09	Conditioned
10	Conditioned
11	Conditioned
12	Conditioned
13	Conditioned
14	Conditioned
15	Conditioned
16	Conditioned

Source: California Energy Commission, Residential ACM

The Reach Code Team analyzed some additional measure packages:

- 2022 TDV: Both electrification packages, ‘Prescriptive Minimum’ and ‘Energy Efficiency + PV’ are analyzed against the mixed-fuel baseline package using 2022 TDV multipliers and weather files in CBECC-Res 2022 software.
- Efficiency-Only: The All-Electric Energy Efficiency + PV package is analyzed using CBECC-Res 2019 without solar PV measure to evaluate the impact of efficiency measures alone, in the case that solar PV cannot be installed due to shading.

## 4 Results

Results are presented as per the prototype-specific Measure Packages described in Section 3.

There are several overarching factors to keep in mind when reviewing the results include:

- What constitutes a **'benefit'** or a **'cost'** varies with the scenarios because both energy savings, and incremental construction costs may be negative depending on the package. Typically, utility bill savings are categorized as a 'benefit' while incremental construction costs are treated as 'costs.' In cases where both construction costs are negative and utility bill savings are negative, the construction cost savings are treated as the 'benefit' while the utility bill negative savings are the 'cost.'
- All-electric packages will have lower **GHG emissions** than mixed-fuel packages in all cases, due to the clean power sources currently available from California's power providers.
- Since January 2020, compliance of low-rise residential building is analyzed using **Energy Design Rating (EDR)**. This rating scales from 1 to 100 with 100 being the performance equivalent of a 2006 International Energy Conservation Code (IECC). This study uses 'Total EDR Margin' as a compliance metric that accounts for all compliant loads along with renewable energy and battery storage. 'Total EDR Margin' of 0 represents a prescriptively compliant building that exactly matches the minimum energy budget prescribed by the 2019 T24 code.
- To receive the Energy Commission's approval, local reach codes that amend the energy code must **both be cost effective** compared to the mixed-fuel baseline package **and exceed the energy performance budget** using 'Total EDR Margin' metric (i.e., have a positive compliance margin) compared to the standard model in the compliance software. To emphasize these two important factors, the figures in this Section highlight in green the modeling results that have a positive compliance margin and/or are cost effective. This will allow readers to identify whether a scenario is fully or partially supportive of a reach code, and the opportunities/challenges that the scenario presents. Conversely, *Section 5* only highlights results that have **both** a positive compliance margin and are cost effective, to allow readers to identify reach code-ready scenarios.
- When performance modeling residential buildings of three stories or less (such as the Detached ADU), the Standard Design is electric if the Proposed Design is electric, which removes TDV-related penalties and associated negative compliance margins. This essentially allows for a **compliance pathway for all-electric residential buildings**.
- As mentioned in *Section 2.1.4*, the Reach Code Team coordinated with utilities to select tariffs for each prototype given the annual energy demand profile and the most prevalent rates in each utility territory. The Reach Code Team **did not compare a variety of tariffs** to determine their impact on cost-effectiveness although utility rate changes or updates can affect on-bill cost-effectiveness results.
- As a point of comparison, **mixed-fuel baseline** energy figures are provided in *Appendix 7.2*.
- The cost-effectiveness results for 2022 analysis differs from 2019 mainly in \$TDV savings, but also differs slightly in energy consumption which translates in minor difference in on-bill energy savings. The Reach Code Team has not reported the software outputs for 2022 EDR margins as the 2022 Title 24 Part 6 code is still being developed.



### 4.1 All-Electric Prescriptive Minimum Results

Table 7 shows results of the ADU all-electric prescriptive minimum compared to a mixed-fuel baseline using 2019 TDV, with heat pump water heater location as per Residential ACM manual (reference Table 6). With federal-minimum efficiencies for mechanical equipment, the all-electric prescriptive pathway is not cost effective in any climate zone using IOU rates with 2019 TDV. However, with relatively lower electric prices and higher gas prices of POUs, the package is on-bill cost effective in some climate zones.

**Table 7. Cost-Effectiveness for ADU: All-Electric Prescriptive Minimum, 2019 TDV**

CZ	Utility	Annual Elec Savings (kWh)	Annual Gas Savings (therms)	Annual GHG Reductions (mtons)	Total EDR Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	Lifecycle \$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
CZ01	PG&E	(3,600)	259	0.1	0.00	(\$1,024)	(\$7,213)	(\$6,951)	0.1	0.1	(\$6,190)	(\$5,927)
CZ02	PG&E	(2,646)	198	0.3	0.00	(\$1,674)	(\$3,753)	(\$3,897)	0.4	0.4	(\$2,079)	(\$2,223)
CZ03	PG&E	(2,397)	174	0.3	0.00	(\$1,024)	(\$3,518)	(\$4,366)	0.3	0.2	(\$2,495)	(\$3,342)
CZ04	PG&E	(2,263)	170	0.3	0.00	(\$1,674)	(\$2,996)	(\$2,765)	0.6	0.6	(\$1,322)	(\$1,092)
CZ04-2	CPAU	(2,263)	170	0.3	0.00	(\$1,674)	\$1,389	(\$2,765)	>1	0.6	\$3,062	(\$1,092)
CZ05	PG&E	(2,524)	170	0.2	0.00	(\$1,024)	(\$4,969)	(\$4,883)	0.2	0.2	(\$3,945)	(\$3,860)
CZ05-2	SCG	(2,524)	170	0.2	0.00	(\$1,024)	(\$4,842)	(\$4,883)	0.2	0.2	(\$3,818)	(\$3,860)
CZ06	SCE	(1,853)	136	0.3	0.00	(\$1,024)	(\$2,943)	(\$3,154)	0.3	0.3	(\$1,920)	(\$2,131)
CZ06-2	LA	(1,853)	136	0.3	0.00	(\$1,024)	\$1,357	(\$3,154)	>1	0.3	\$2,381	(\$2,131)
CZ07	SDG&E	(1,604)	121	0.3	0.00	(\$1,024)	(\$3,993)	(\$3,035)	0.3	0.3	(\$2,970)	(\$2,012)
CZ08	SCE	(1,594)	122	0.4	0.00	(\$1,674)	(\$2,282)	(\$2,279)	0.7	0.7	(\$609)	(\$605)
CZ08-2	LA	(1,594)	122	0.4	0.00	(\$1,674)	\$1,477	(\$2,279)	>1	0.7	\$3,151	(\$605)
CZ09	SCE	(1,669)	128	0.6	0.00	(\$1,674)	(\$2,403)	(\$2,476)	0.7	0.7	(\$729)	(\$803)
CZ09-2	LA	(1,669)	128	0.6	0.00	(\$1,674)	\$1,509	(\$2,476)	>1	0.7	\$3,183	(\$803)
CZ10	SDG&E	(1,714)	130	0.5	0.00	(\$1,674)	(\$5,035)	(\$2,544)	0.3	0.7	(\$3,362)	(\$871)
CZ10-2	SCE	(1,714)	130	0.5	0.00	(\$1,674)	(\$2,549)	(\$2,544)	0.7	0.7	(\$876)	(\$871)
CZ11	PG&E	(2,333)	177	0.4	0.00	(\$1,674)	(\$3,533)	(\$3,676)	0.5	0.5	(\$1,859)	(\$2,003)
CZ12	PG&E	(2,319)	182	0.5	0.00	(\$1,674)	(\$2,695)	(\$3,257)	0.6	0.5	(\$1,022)	(\$1,584)
CZ12-2	SMUD	(2,319)	182	0.5	0.00	(\$1,674)	\$627	(\$3,257)	>1	0.5	\$2,301	(\$1,584)
CZ13	PG&E	(2,158)	167	0.3	0.00	(\$1,674)	(\$2,683)	(\$3,334)	0.6	0.5	(\$1,009)	(\$1,661)
CZ14	SDG&E	(2,388)	175	0.7	0.00	(\$1,674)	(\$7,894)	(\$3,378)	0.2	0.5	(\$6,220)	(\$1,705)
CZ14-2	SCE	(2,388)	175	0.7	0.00	(\$1,674)	(\$4,476)	(\$3,378)	0.4	0.5	(\$2,803)	(\$1,705)
CZ15	SCE	(1,330)	99	(0.2)	0.00	(\$1,674)	(\$1,766)	(\$2,398)	0.9	0.7	(\$92)	(\$724)
CZ16	PG&E	(3,439)	274	(0.3)	0.00	(\$1,674)	(\$5,558)	(\$6,187)	0.3	0.3	(\$3,885)	(\$4,514)
CZ16-2	LA	(3,439)	274	(0.3)	0.00	(\$1,674)	\$2,821	(\$6,187)	>1	0.3	\$4,495	(\$4,514)

As shown in Table 8 below, the all-electric prescriptive minimum detached ADU is cost effective on TDV basis in all climate zones except 1 and 16 when using 2022 TDV and weather files, in contrast with results using 2019 TDV.

**Table 8. Cost-Effectiveness for ADU: All-Electric Prescriptive Minimum, 2022 TDV**

CZ	Utility	Annual Elec Savings (kWh)	Annual Gas Savings (therms)	Annual GHG Reductions (mtons)	Total EDR Margin	Upfront Incremental Package Cost	Lifecycle Utility Cost Savings	Lifecycle \$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
CZ01	PG&E	(3,353)	242	0.7	0.00	(\$1,024)	(\$6,533)	(\$1,656)	0.2	0.6	(\$5,509)	(\$632)
CZ02	PG&E	(2,445)	180	0.7	0.00	(\$1,674)	(\$3,617)	\$219	0.5	>1	(\$1,944)	\$1,893
CZ03	PG&E	(2,111)	153	0.6	0.00	(\$1,024)	(\$3,192)	(\$7)	0.3	137.2	(\$2,168)	\$1,016
CZ04	PG&E	(1,880)	142	0.6	0.00	(\$1,674)	(\$2,437)	(\$167)	0.7	10.0	(\$763)	\$1,507
CZ04-2	CPAU	(1,880)	142	0.6	0.00	(\$1,674)	\$2,513	(\$167)	>1	10.0	\$4,186	\$1,507
CZ05	PG&E	(2,113)	145	0.6	0.00	(\$1,024)	(\$3,904)	(\$811)	0.3	1.3	(\$2,880)	\$212
CZ05-2	SCG	(2,113)	145	0.6	0.00	(\$1,024)	(\$3,564)	(\$811)	0.3	1.3	(\$2,541)	\$212
CZ06	SCE	(1,623)	121	0.4	0.00	(\$1,024)	(\$2,545)	\$62	0.4	>1	(\$1,521)	\$1,086
CZ06-2	LA	(1,623)	121	0.4	0.00	(\$1,024)	\$1,381	\$62	>1	>1	\$2,405	\$1,086
CZ07	SDG&E	(1,563)	117	0.4	0.00	(\$1,024)	(\$4,231)	\$98	0.2	>1	(\$3,207)	\$1,122
CZ08	SCE	(1,426)	114	0.4	0.00	(\$1,674)	(\$1,738)	\$606	1.0	>1	(\$64)	\$2,279
CZ08-2	LA	(1,426)	114	0.4	0.00	(\$1,674)	\$1,598	\$606	>1	>1	\$3,271	\$2,279
CZ09	SCE	(1,517)	119	0.4	0.00	(\$1,674)	(\$1,986)	\$239	0.8	>1	(\$312)	\$1,912
CZ09-2	LA	(1,517)	119	0.4	0.00	(\$1,674)	\$1,556	\$239	>1	>1	\$3,229	\$1,912
CZ10	SDG&E	(1,631)	125	0.4	0.00	(\$1,674)	(\$4,978)	\$537	0.3	>1	(\$3,304)	\$2,210
CZ10-2	SCE	(1,631)	125	0.4	0.00	(\$1,674)	(\$2,363)	\$537	0.7	>1	(\$689)	\$2,210
CZ11	PG&E	(2,155)	163	0.7	0.00	(\$1,674)	(\$3,472)	\$192	0.5	>1	(\$1,798)	\$1,865
CZ12	PG&E	(2,108)	163	0.7	0.00	(\$1,674)	(\$2,788)	\$244	0.6	>1	(\$1,114)	\$1,917
CZ12-2	SMUD	(2,108)	163	0.7	0.00	(\$1,674)	\$464	\$244	>1	>1	\$2,138	\$1,917
CZ13	PG&E	(1,887)	143	0.7	0.00	(\$1,674)	(\$2,765)	(\$93)	0.6	18.0	(\$1,092)	\$1,581
CZ14	SDG&E	(2,187)	158	0.4	0.00	(\$1,674)	(\$7,311)	(\$321)	0.2	5.2	(\$5,638)	\$1,353
CZ14-2	SCE	(2,187)	158	0.4	0.00	(\$1,674)	(\$4,058)	(\$321)	0.4	5.2	(\$2,385)	\$1,353
CZ15	SCE	(1,286)	97	0.5	0.00	(\$1,674)	(\$1,636)	(\$112)	1.0	15.0	\$38	\$1,562
CZ16	PG&E	(3,137)	249	0.5	0.00	(\$1,674)	(\$4,873)	(\$2,248)	0.3	0.7	(\$3,200)	(\$575)
CZ16-2	LA	(3,137)	249	0.5	0.00	(\$1,674)	\$2,502	(\$2,248)	>1	0.7	\$4,175	(\$575)

### 4.2 All Electric Plus Efficiency and PV Results

Table 9 shows results of the all-electric prescriptive minimum using 2019 TDV with 1) heat pump water heater location is outside in exterior closet in all climate zones except Climate Zones 14, 15, and 16, 2) energy efficiency measures, and 3) additional solar PV capacity. The all-electric detached ADU is cost effective using either the on-bill or TDV approach in several climate zones. Also, similar to the package above, it is always on-bill cost effective using POU rates.

**Table 9. Cost-Effectiveness for ADU: All-Electric Energy Efficiency + Additional PV, 2019 TDV**

CZ	Utility	Annual Elec Savings (kWh)	Annual Gas Savings (therms)	Annual GHG Reductions (mtons)	Total EDR Margin	Upfront Incremental Package Cost	Lifecycle Utility Cost Savings	Lifecycle \$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
CZ01	PG&E	(524)	259	0.8	29.30	\$5,794	\$4,323	\$4,123	0.7	0.7	(\$1,472)	(\$1,671)
CZ02	PG&E	(497)	198	0.8	18.70	\$3,207	\$2,159	\$3,333	0.7	1.0	(\$1,048)	\$126
CZ03	PG&E	(459)	174	0.8	19.00	\$2,363	\$2,331	\$2,348	1.0	1.0	(\$32)	(\$15)
CZ04	PG&E	(465)	170	0.7	16.10	\$2,314	\$1,934	\$2,635	0.8	1.1	(\$380)	\$320
CZ04-2	CPAU	(465)	170	0.7	16.10	\$2,314	\$5,434	\$2,635	2.3	1.1	\$3,120	\$320
CZ05	PG&E	(472)	170	0.7	20.00	\$2,339	\$2,538	\$2,206	1.1	0.9	\$199	(\$133)
CZ05-2	SCG	(472)	170	0.7	20.00	\$2,339	\$2,664	\$2,206	1.1	0.9	\$326	(\$133)
CZ06	SCE	(427)	136	0.6	16.10	\$1,512	\$1,836	\$1,898	1.2	1.3	\$324	\$386
CZ06-2	LA	(427)	136	0.6	16.10	\$1,512	\$4,487	\$1,898	3.0	1.3	\$2,975	\$386
CZ07	SDG&E	(404)	121	0.6	14.00	\$1,170	\$2,843	\$1,134	2.4	1.0	\$1,672	(\$36)
CZ08	SCE	(421)	122	0.6	12.20	\$1,244	\$1,503	\$1,618	1.2	1.3	\$260	\$375
CZ08-2	LA	(421)	122	0.6	12.20	\$1,244	\$4,058	\$1,618	3.3	1.3	\$2,814	\$375
CZ09	SCE	(439)	128	0.8	12.90	\$1,317	\$1,641	\$2,170	1.2	1.6	\$324	\$853
CZ09-2	LA	(439)	128	0.8	12.90	\$1,317	\$4,227	\$2,170	3.2	1.6	\$2,910	\$853
CZ10	SDG&E	(449)	130	0.8	12.20	\$1,680	\$2,168	\$2,065	1.3	1.2	\$488	\$385
CZ10-2	SCE	(449)	130	0.8	12.20	\$1,680	\$1,632	\$2,065	1.0	1.2	(\$49)	\$385
CZ11	PG&E	(535)	177	0.9	15.00	\$3,975	\$1,994	\$3,433	0.5	0.9	(\$1,980)	(\$542)
CZ12	PG&E	(494)	182	0.9	15.60	\$4,121	\$1,508	\$3,510	0.4	0.9	(\$2,613)	(\$611)
CZ12-2	SMUD	(494)	182	0.9	15.60	\$4,121	\$4,685	\$3,510	1.1	0.9	\$564	(\$611)
CZ13	PG&E	(525)	167	0.7	13.30	\$3,991	\$1,917	\$3,109	0.5	0.8	(\$2,074)	(\$881)
CZ14	SDG&E	(515)	175	1.1	15.90	\$3,316	\$3,257	\$3,874	1.0	1.2	(\$59)	\$558
CZ14-2	SCE	(515)	175	1.1	15.90	\$3,316	\$2,363	\$3,874	0.7	1.2	(\$953)	\$558
CZ15	SCE	(544)	99	0.2	7.40	\$1,744	\$1,630	\$1,534	0.9	0.9	(\$115)	(\$210)
CZ16	PG&E	(547)	274	0.4	23.10	\$4,091	\$3,785	\$3,801	0.9	0.9	(\$306)	(\$290)
CZ16-2	LA	(547)	274	0.4	23.10	\$4,091	\$9,042	\$3,801	2.2	0.9	\$4,951	(\$290)

Table 10 shows that All-Electric detached ADUs are TDV cost effective in all climate zones using 2022 TDV when including efficiency measures and additional solar PV. Note that the EDR margins have been removed since the 2022 Title 24 Part 6 code has not yet completed rulemaking at the time of the draft, but preliminary results indicate that all EDR margins will be positive.

**Table 10. Cost-Effectiveness for ADU: All-Electric Energy Efficiency + Additional PV, 2022 TDV Results**

CZ	Utility	Annual Elec Savings (kWh)	Annual Gas Savings (therms)	Annual GHG Reductions (mtons)	Total EDR Margin	Upfront Incremental Package Cost	Lifecycle Utility Cost Savings	Lifecycle \$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
CZ01	PG&E	(512)	242	0.3	>0	\$5,648	\$3,588	\$7,903	0.6	1.4	(\$2,060)	\$2,255
CZ02	PG&E	(479)	180	0.4	>0	\$3,012	\$1,936	\$6,490	0.6	2.2	(\$1,076)	\$3,478
CZ03	PG&E	(441)	153	0.3	>0	\$2,070	\$2,119	\$5,235	1.0	2.5	\$49	\$3,165
CZ04	PG&E	(444)	142	0.4	>0	\$1,875	\$1,780	\$4,473	0.9	2.4	(\$95)	\$2,597
CZ04-2	CPAU	(444)	142	0.4	>0	\$1,875	\$5,210	\$4,473	2.8	2.4	\$3,335	\$2,597
CZ05	PG&E	(443)	145	0.4	>0	\$1,949	\$2,121	\$4,416	1.1	2.3	\$173	\$2,468
CZ05-2	SCG	(443)	145	0.4	>0	\$1,949	\$2,461	\$4,416	1.3	2.3	\$513	\$2,468
CZ06	SCE	(413)	121	0.3	>0	\$1,049	\$1,550	\$4,256	1.5	4.1	\$501	\$3,208
CZ06-2	LA	(413)	121	0.3	>0	\$1,049	\$4,067	\$4,256	3.9	4.1	\$3,018	\$3,208
CZ07	SDG&E	(409)	117	0.3	>0	\$1,073	\$2,480	\$3,899	2.3	3.6	\$1,407	\$2,826
CZ08	SCE	(431)	114	0.3	>0	\$975	\$1,458	\$4,086	1.5	4.2	\$483	\$3,110
CZ08-2	LA	(431)	114	0.3	>0	\$975	\$3,825	\$4,086	3.9	4.2	\$2,850	\$3,110
CZ09	SCE	(434)	119	0.3	>0	\$1,049	\$1,608	\$4,002	1.5	3.8	\$560	\$2,954
CZ09-2	LA	(434)	119	0.3	>0	\$1,049	\$3,960	\$4,002	3.8	3.8	\$2,912	\$2,954
CZ10	SDG&E	(457)	125	0.3	>0	\$1,485	\$1,760	\$4,404	1.2	3.0	\$274	\$2,919
CZ10-2	SCE	(457)	125	0.3	>0	\$1,485	\$1,525	\$4,404	1.0	3.0	\$40	\$2,919
CZ11	PG&E	(524)	163	0.4	>0	\$3,853	\$1,517	\$5,752	0.4	1.5	(\$2,336)	\$1,899
CZ12	PG&E	(481)	163	0.4	>0	\$3,829	\$1,293	\$5,448	0.3	1.4	(\$2,535)	\$1,619
CZ12-2	SMUD	(481)	163	0.4	>0	\$3,829	\$4,066	\$5,448	1.1	1.4	\$237	\$1,619
CZ13	PG&E	(514)	143	0.4	>0	\$3,503	\$2,400	\$4,852	0.7	1.4	(\$1,103)	\$1,349
CZ14	SDG&E	(496)	158	0.3	>0	\$2,731	\$2,772	\$5,873	1.0	2.2	\$41	\$3,142
CZ14-2	SCE	(496)	158	0.3	>0	\$2,731	\$2,090	\$5,873	0.8	2.2	(\$641)	\$3,142
CZ15	SCE	(539)	97	0.5	>0	\$1,549	\$1,608	\$3,383	1.0	2.2	\$58	\$1,834
CZ16	PG&E	(526)	249	0.3	>0	\$3,871	\$3,173	\$6,689	0.8	1.7	(\$698)	\$2,818
CZ16-2	LA	(526)	249	0.8	>0	\$3,871	\$8,099	\$6,689	2.1	1.7	\$4,227	\$2,818

## 5 Summary

The Reach Codes Team developed packages of energy efficiency measures as well as packages combining energy efficiency with solar PV generation, simulated them in building modeling software, and gathered costs to determine the cost-effectiveness of multiple scenarios. The Reach Codes Team coordinated assumptions with multiple utilities, cities, and building community experts to develop a set of assumptions considered reasonable in the current market. Changing assumptions, such as the period of analysis, measure selection, cost assumptions, energy escalation rates, or utility tariffs are likely to change results.

Table 11 summarizes results for each prototype and depicts the compliance margins achieved for each climate zone and package. Because local reach codes must both exceed the Energy Commission performance budget (i.e., have a positive compliance margin) and be cost-effective, the Reach Code Team highlighted cells meeting these two requirements to help clarify the upper boundary for potential reach code policies:

- Cells highlighted in **green** depict a positive compliance margin and cost-effective results using both On-Bill and TDV approaches.
- Cells highlighted in **yellow** depict a positive compliance and cost-effective results using either the On-Bill or TDV approach.
- Cells **not highlighted** either depict a negative compliance margin or a package that was not cost effective using either the On-Bill or TDV approach.

The Reach Code Team found that all-electric detached ADUs can have positive compliance margins and are cost effective in all climate zones through either the utility bill or TDV metrics when compared to a mixed fuel baseline. This is true for either prescriptive minimum or efficiency + PV packages. To promote decarbonization, local jurisdictions may choose to include new construction detached ADUs in all-electric requirements.

**Table 11. Detached ADU Summary of EDR Margin and Cost-Effectiveness**

CZ	Utility	All Electric, 2019 EDR		All Electric, 2022 EDR	
		Code Minimum	EE+PV	Code Minimum	EE+PV
CZ01	PG&E	0.0	29.3	0.0	>0
CZ02	PG&E	0.0	18.7	0.0	>0
CZ03	PG&E	0.0	19.0	0.0	>0
CZ04	PG&E	0.0	16.1	0.0	>0
CZ04-2	CPAU	0.0	16.1	0.0	>0
CZ05	PG&E	0.0	20.0	0.0	>0
CZ05-2	SCG	0.0	20.0	0.0	>0
CZ06	SCE	0.0	16.1	0.0	>0
CZ06-2	LADWP	0.0	16.1	0.0	>0
CZ07	SDG&E	0.0	14.0	0.0	>0
CZ08	SCE	0.0	12.2	0.0	>0
CZ08-2	LADWP	0.0	12.2	0.0	>0
CZ09	SCE	0.0	12.9	0.0	>0
CZ09-2	LADWP	0.0	12.9	0.0	>0
CZ10	SDG&E	0.0	12.2	0.0	>0
CZ10-2	SCE	0.0	12.2	0.0	>0
CZ11	PG&E	0.0	15.0	0.0	>0
CZ12	PG&E	0.0	15.6	0.0	>0
CZ12-2	SMUD	0.0	15.6	0.0	>0
CZ13	PG&E	0.0	13.3	0.0	>0
CZ14	SDG&E	0.0	15.9	0.0	>0
CZ14-2	SCE	0.0	15.9	0.0	>0
CZ15	SCE	0.0	7.4	0.0	>0
CZ16	PG&E	0.0	23.1	0.0	>0
CZ16-2	LADWP	0.0	23.1	0.0	>0

## 6 References

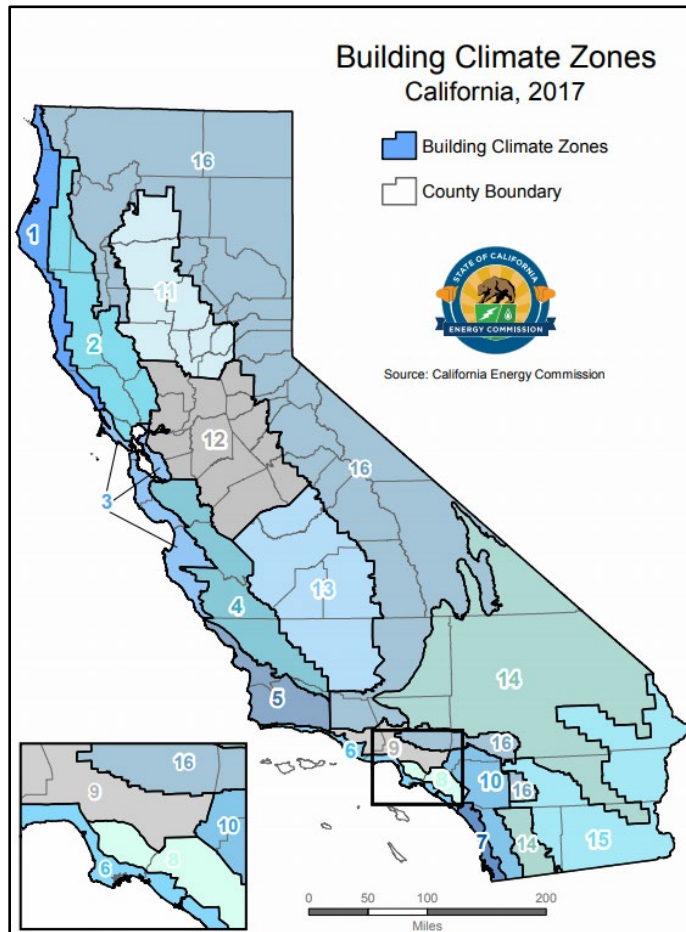
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## 7 Appendices

### 7.1 Map of California Climate Zones

Climate zone geographical boundaries are depicted in Figure 1. The map in Figure 1 along with a zip-code search directory is available at: [https://ww2.energy.ca.gov/maps/renewable/building\\_climate\\_zones.html](https://ww2.energy.ca.gov/maps/renewable/building_climate_zones.html)

Figure 1. Map of California climate zones.





## 7.2 Mixed Fuel Baseline Energy Figures

Table 12 show the annual electricity and natural gas consumption and on-bill cost, total EDR margin, and GHG emissions for each prototype under the mixed-fuel design baseline. The non-zero EDR margins are largely a result of compliance software complexities, and they are not expected to significantly impact the proposed case results or nature of recommendations. The annual kWh usage is 0 since code requires that PV offset 100 percent of kWh usage.

**Table 12. Detached ADU Mixed Fuel Baseline**

CZ	Utility	Annual Electricity Consumption (kWh)	Annual Natural Gas Consumption (Therms)	Annual Electricity Cost	Annual Natural Gas Cost	Total Annual Utility Cost	Annual GHG Emissions (mtons)
CZ01	PG&E	0	259	\$194	\$358	\$552	1.0
CZ02	PG&E	0	198	\$194	\$269	\$463	0.9
CZ03	PG&E	0	174	\$189	\$237	\$425	0.9
CZ04	PG&E	0	170	\$185	\$231	\$416	0.8
CZ04-2	CPAU	0	170	\$131	\$297	\$429	0.8
CZ05	PG&E	0	170	\$167	\$232	\$399	0.8
CZ05-2	SCG	0	170	\$167	\$237	\$404	0.8
CZ06	SCE	0	136	\$156	\$202	\$358	0.8
CZ06-2	LA	0	136	\$124	\$202	\$326	0.8
CZ07	SDG&E	0	121	\$160	\$200	\$359	0.8
CZ08	SCE	0	122	\$161	\$187	\$348	0.9
CZ08-2	LA	0	122	\$124	\$187	\$311	0.9
CZ09	SCE	0	128	\$172	\$193	\$366	1.1
CZ09-2	LA	0	128	\$125	\$193	\$318	1.1
CZ10	SDG&E	0	130	\$166	\$215	\$381	1.0
CZ10-2	SCE	0	130	\$183	\$195	\$379	1.0
CZ11	PG&E	0	177	\$205	\$244	\$450	1.0
CZ12	PG&E	0	182	\$197	\$250	\$447	1.0
CZ12-2	SMUD	0	182	\$293	\$250	\$542	1.0
CZ13	PG&E	0	167	\$224	\$231	\$454	0.9
CZ14	SDG&E	0	175	\$178	\$290	\$468	1.4
CZ14-2	SCE	0	175	\$212	\$243	\$455	1.4
CZ15	SCE	0	99	\$333	\$163	\$496	0.5
CZ16	PG&E	0	274	\$181	\$379	\$560	0.6
CZ16-2	LA	0	274	\$123	\$379	\$502	0.6

### 7.3 All-Electric Energy Efficiency Only Results

Table 13 and Table 14 show the cost-effectiveness results for the all-electric energy efficiency package without PV compared to the mixed-fuel baseline without PV, in scenarios where PV cannot be installed. Without PV, the efficiency packages selected are cost effective under 2022 TDV in most Climate Zones. It is likely that a different set of efficiency measures can improve cost effectiveness, given that the all-electric prescriptive minimum is TDV cost-effective (reference Table 8), though optimization of efficiency measure packages have not been examined in this study.

Note that the 2022 EDR margins have been removed since the 2022 Title 24 Part 6 code has not yet completed rulemaking at the time of the draft, but preliminary results indicate that all EDR margins will be positive.

**Table 13. Cost-Effectiveness for ADU: All-Electric Energy Efficiency Without PV, 2019 TDV**

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Total EDR Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	\$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
CZ01	PG&E	(2,760)	259	0.8	9.30	\$1,698	(\$7,485)	(\$3,679)	-4.4	-2.2	(\$9,183)	(\$5,377)
CZ02	PG&E	(2,492)	198	0.6	1.00	\$135	(\$7,004)	(\$3,739)	-51.9	-27.7	(\$7,139)	(\$3,874)
CZ03	PG&E	(2,151)	174	0.5	2.80	(\$246)	(\$6,522)	(\$3,578)	0.0	0.1	(\$6,276)	(\$3,332)
CZ04	PG&E	(2,171)	170	0.5	0.30	(\$246)	(\$6,890)	(\$3,428)	0.0	0.1	(\$6,644)	(\$3,182)
CZ04-2	CPAU	(2,171)	170	0.5	0.30	(\$246)	(\$3,483)	(\$3,428)	0.1	0.1	(\$3,237)	(\$3,182)
CZ05	PG&E	(2,284)	170	0.5	2.70	(\$246)	(\$7,393)	(\$4,140)	0.0	0.1	(\$7,147)	(\$3,894)
CZ05-2	SCG	(2,284)	170	0.5	2.70	(\$246)	(\$7,266)	(\$4,140)	0.0	0.1	(\$7,021)	(\$3,894)
CZ06	SCE	(1,790)	136	0.4	1.70	(\$585)	(\$3,428)	(\$2,823)	0.2	0.2	(\$2,843)	(\$2,238)
CZ06-2	LA	(1,790)	136	0.4	1.70	(\$585)	\$1,475	(\$2,823)	>1	0.2	\$2,060	(\$2,238)
CZ07	SDG&E	(1,592)	121	0.4	0.70	(\$585)	(\$5,304)	(\$3,042)	0.1	0.2	(\$4,719)	(\$2,457)
CZ08	SCE	(1,622)	122	0.4	0	(\$585)	(\$2,987)	(\$2,644)	0.2	0.2	(\$2,402)	(\$2,059)
CZ08-2	LA	(1,622)	122	0.4	0	(\$585)	\$1,405	(\$2,644)	>1	0.2	\$1,990	(\$2,059)
CZ09	SCE	(1,685)	128	0.4	1.50	(\$512)	(\$2,763)	(\$2,198)	0.2	0.2	(\$2,251)	(\$1,686)
CZ09-2	LA	(1,685)	128	0.4	1.50	(\$512)	\$1,481	(\$2,198)	>1	0.2	\$1,993	(\$1,686)
CZ10	SDG&E	(1,714)	130	0.4	1.60	(\$173)	(\$6,070)	(\$2,211)	0.0	0.1	(\$5,897)	(\$2,038)
CZ10-2	SCE	(1,714)	130	0.4	1.60	(\$173)	(\$2,821)	(\$2,211)	0.1	0.1	(\$2,649)	(\$2,038)
CZ11	PG&E	(2,255)	177	0.5	2.60	\$1,390	(\$5,976)	(\$2,879)	-4.3	-2.1	(\$7,366)	(\$4,270)
CZ12	PG&E	(2,282)	182	0.5	1.20	\$1,390	(\$6,151)	(\$3,012)	-4.4	-2.2	(\$7,541)	(\$4,403)
CZ12-2	SMUD	(2,282)	182	0.5	1.20	\$1,390	\$730	(\$3,012)	0.5	-2.2	(\$661)	(\$4,403)
CZ13	PG&E	(2,084)	167	0.5	2.40	\$1,577	(\$5,407)	(\$2,465)	-3.4	-1.6	(\$6,983)	(\$4,041)
CZ14	SDG&E	(2,066)	175	0.6	4.50	\$927	(\$5,783)	(\$1,635)	-6.2	-1.8	(\$6,710)	(\$2,562)
CZ14-2	SCE	(2,066)	175	0.6	4.50	\$927	(\$3,804)	(\$1,635)	-4.1	-1.8	(\$4,731)	(\$2,562)
CZ15	SCE	(949)	99	0.4	4.80	\$1,013	(\$413)	(\$10)	-0.4	0.0	(\$1,426)	(\$1,023)
CZ16	PG&E	(2,872)	274	0.9	5.10	\$799	(\$6,367)	(\$4,021)	-8.0	-5.0	(\$7,166)	(\$4,820)
CZ16-2	LA	(2,872)	274	0.9	5.10	\$799	\$3,889	(\$4,021)	4.9	-5.0	\$3,090	(\$4,820)

**Table 14. Cost-Effectiveness for ADU: All-Electric Energy Efficiency Without PV, 2022 TDV**

CZ	Utility	Elec Savings (kWh)	Gas Savings (therms)	GHG Reductions (mtons)	Total EDR Margin	Incremental Package Cost	Lifecycle Utility Cost Savings	\$TDV Savings	B/C Ratio (On-bill)	B/C Ratio (TDV)	NPV (On-bill)	NPV (TDV)
CZ01	PG&E	(2,629)	242	0.7	>0	\$1,698	(\$7,361)	\$1,769	-4.3	1.0	(\$9,059)	\$71
CZ02	PG&E	(2,279)	180	0.5	>0	\$135	(\$6,500)	\$1,060	-48.2	7.9	(\$6,635)	\$925
CZ03	PG&E	(1,958)	153	0.4	>0	(\$246)	(\$6,269)	\$764	0.0	>1	(\$6,023)	\$1,009
CZ04	PG&E	(1,852)	142	0.4	>0	(\$246)	(\$6,124)	\$57	0.0	>1	(\$5,879)	\$303
CZ04-2	CPAU	(1,852)	142	0.4	>0	(\$246)	(\$3,703)	\$57	0.1	>1	(\$3,457)	\$303
CZ05	PG&E	(1,984)	145	0.4	>0	(\$246)	(\$6,680)	(\$167)	0.0	1.5	(\$6,434)	\$78
CZ05-2	SCG	(1,984)	145	0.4	>0	(\$246)	(\$6,340)	(\$167)	0.0	1.5	(\$6,095)	\$78
CZ06	SCE	(1,585)	121	0.4	>0	(\$585)	(\$2,706)	\$615	0.2	>1	(\$2,121)	\$1,200
CZ06-2	LA	(1,585)	121	0.4	>0	(\$585)	\$1,466	\$615	>1	>1	\$2,051	\$1,200
CZ07	SDG&E	(1,520)	117	0.4	>0	(\$585)	(\$5,017)	\$528	0.1	>1	(\$4,432)	\$1,113
CZ08	SCE	(1,499)	114	0.3	>0	(\$585)	(\$2,627)	\$493	0.2	>1	(\$2,042)	\$1,078
CZ08-2	LA	(1,499)	114	0.3	>0	(\$585)	\$1,456	\$493	>1	>1	\$2,041	\$1,078
CZ09	SCE	(1,545)	119	0.3	>0	(\$512)	(\$2,351)	\$421	0.2	>1	(\$1,839)	\$933
CZ09-2	LA	(1,545)	119	0.3	>0	(\$512)	\$1,511	\$421	>1	>1	\$2,023	\$933
CZ10	SDG&E	(1,641)	125	0.4	>0	(\$173)	(\$5,824)	\$674	0.0	>1	(\$5,651)	\$847
CZ10-2	SCE	(1,641)	125	0.4	>0	(\$173)	(\$2,814)	\$674	0.1	>1	(\$2,641)	\$847
CZ11	PG&E	(2,087)	163	0.4	>0	\$1,390	(\$5,602)	\$1,063	-4.0	0.8	(\$6,993)	(\$328)
CZ12	PG&E	(2,094)	163	0.4	>0	\$1,390	(\$5,856)	\$634	-4.2	0.5	(\$7,246)	(\$757)
CZ12-2	SMUD	(2,094)	163	0.4	>0	\$1,390	\$500	\$634	0.4	0.5	(\$890)	(\$757)
CZ13	PG&E	(1,786)	143	0.4	>0	\$1,577	(\$4,659)	\$995	-3.0	0.6	(\$6,236)	(\$582)
CZ14	SDG&E	(1,887)	158	0.5	>0	\$927	(\$5,466)	\$1,460	-5.9	1.6	(\$6,393)	\$534
CZ14-2	SCE	(1,887)	158	0.5	>0	\$927	(\$3,266)	\$1,460	-3.5	1.6	(\$4,193)	\$534
CZ15	SCE	(917)	97	0.3	>0	\$1,013	(\$361)	\$2,200	-0.4	2.2	(\$1,374)	\$1,187
CZ16	PG&E	(2,642)	249	0.8	>0	\$799	(\$6,054)	\$354	-7.6	0.4	(\$6,853)	(\$445)
CZ16-2	LA	(2,642)	249	0.8	>0	\$799	\$3,419	\$354	4.3	0.4	\$2,620	(\$445)

## 7.4 Utility Rate Schedules

The Reach Codes Team used the CA IOU and POU rate tariffs detailed below to determine the On-Bill savings for each package.

### 7.4.1 Pacific Gas & Electric

<b>ELECTRIC SCHEDULE E-TOU-C</b>		Sheet 2		
RESIDENTIAL TIME-OF-USE (PEAK PRICING 4 - 9 p.m. EVERY DAY)				
RATES: (Cont'd.)	<b>E-TOU-C TOTAL RATES</b>			
Total Energy Rates (\$ per kWh)	PEAK		OFF-PEAK	
<i>Summer</i>				
Total Usage	\$0.41333	(I)	\$0.34989	(I)
Baseline Credit (Applied to Baseline Usage Only)	(\$0.08633)	(R)	(\$0.08633)	(R)
<i>Winter</i>				
Total Usage	\$0.31624	(I)	\$0.29891	(I)
Baseline Credit (Applied to Baseline Usage Only)	(\$0.08633)	(R)	(\$0.08633)	(R)
Delivery Minimum Bill Amount (\$ per meter per day)	\$0.32854			
California Climate Credit (per household, per semi-annual payment occurring in the April and October bill cycles) <sup>†</sup>	(\$35.73)			

**ELECTRIC SCHEDULE E-TOU-C**  
RESIDENTIAL TIME-OF-USE (PEAK PRICING 4 - 9 p.m. EVERY DAY)

Sheet 4

- SPECIAL CONDITIONS:** 1. **BASELINE (TIER 1) QUANTITIES:** The following quantities of electricity are to be used to define usage eligible for the baseline credit (also see Rule 19 for additional allowances for medical needs):

**BASELINE QUANTITIES (kWh PER DAY)**

Baseline Territory*	Code B - Basic Quantities		Code H - All-Electric Quantities	
	Summer	Winter	Summer	Winter
	Tier I	Tier I	Tier I	Tier I
P	14.2	12.0	16.0	27.4
Q	10.3	12.0	8.9	27.4
R	18.6	11.3	20.9	28.1
S	15.8	11.1	18.7	24.9
T	6.8	8.2	7.5	13.6
V	7.5	8.8	10.9	16.9
W	20.2	10.7	23.6	20.0
X	10.3	10.5	8.9	15.4
Y	11.0	12.1	12.6	25.3
Z	6.2	8.1	7.0	16.5

2. **TIME PERIODS FOR E-TOU-C:** Times of the year and times of the day are defined as follows:

Summer (service from June 1 through September 30):

Peak: 4:00 p.m. to 9:00 p.m. All days

Off-Peak: All other times

Winter (service from October 1 through May 31):

Peak: 4:00 p.m. to 9:00 p.m. All days

Off-Peak: All other times



**Pacific Gas and Electric Company**

U 39

San Francisco, California

Cancelling Revised Cal. P.U.C. Sheet No. 35808-G  
 Revised Cal. P.U.C. Sheet No. 35753-G

**GAS SCHEDULE G-1  
 RESIDENTIAL SERVICE**

Sheet 1

**APPLICABILITY:** This rate schedule<sup>1</sup> applies to natural gas service to Core End-Use Customers on PG&E's Transmission and/or Distribution Systems. To qualify, service must be to individually-metered single family premises for residential use, including those in a multifamily complex, and to separately-metered common areas in a multifamily complex where Schedules GM, GS, or GT are not applicable. 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.<sup>2</sup> A "Cap-and-Trade Cost Exemption" credit for these costs will be shown as a line item on exempt customers' bills.<sup>3, 4</sup>

**TERRITORY:** Schedule G-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, as shown below. The Transportation Charge will be no less than the Minimum Transportation Charge, as follows:

	<u>Minimum Transportation Charge:</u> <sup>5</sup>			<u>Per Day</u>	
				\$0.13151	
				<u>Per Therm</u>	
			<u>Baseline</u>		<u>Excess</u>
<u>Procurement:</u>	\$0.23187	(R)	\$0.23187		(R)
<u>Transportation Charge:</u>	\$1.13126		\$1.64861		
<b>Total:</b>	\$1.36313	(R)	\$1.88048		(R)
California Natural Gas Climate Credit (per Household, annual payment occurring in the April bill cycle)	(\$27.18)				

**GAS SCHEDULE G-1  
RESIDENTIAL SERVICE**

Sheet 2

**BASELINE  
QUANTITIES:**

The delivered quantities of gas shown below are billed at the rates for baseline use.


<u>Baseline Territories</u>	BASELINE QUANTITIES (Therms Per Day Per Dwelling Unit)					
	Summer (April-October)		Winter Off-Peak (Nov, Feb, Mar)		Winter On-Peak (Dec, Jan)	
	Effective Apr. 1, 2020		Effective Nov. 1, 2019		Effective Dec. 1, 2019	
***						
P	0.39	(R)	1.88	(R)	2.16	(I)
Q	0.59	(R)	1.55	(R)	2.16	(I)
R	0.36	(R)	1.28	(R)	1.97	(I)
S	0.39	(R)	1.38	(R)	2.06	(I)
T	0.59	(R)	1.38	(R)	1.81	(I)
V	0.62	(R)	1.51	(R)	1.84	(I)
W	0.39	(R)	1.18	(R)	1.84	(I)
X	0.49	(R)	1.55	(R)	2.16	(I)
Y	0.69	(R)	2.15	(R)	2.65	(I)

**SEASONAL  
CHANGES:**

The summer season is April-October, the winter off-peak season is November, February and March, and the winter on-peak season is December and January. Baseline quantities for bills that include the April 1, November 1 and December 1 seasonal changeover dates will be calculated by multiplying the applicable daily baseline quantity for each season by the number of days in each season for the billing period.



### 7.4.2 Southern California Edison



**Southern California Edison**  
Rosemead, California (U 338-E)

Revised  
Cancelling Revised

Cal. PUC Sheet No. 68632-E  
Cal. PUC Sheet No. 68640-E

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

Sheet 2

**RATES**

Customers receiving service under this Schedule will be charged the applicable rates under Option 4-9 PM, Option 4-9 PM-CPP, Option 5-8 PM, Option 5-8 PM-CPP, Option PRIME, Option PRIME-CPP Option A, Option A-CPP, Option B, or Option B-CPP, as listed below. CPP Event Charges will apply to all energy usage during CPP Event Energy Charge periods and CPP Non-Event Energy Credits will apply as a reduction on CPP Non-Event Energy Credit Periods during Summer Season weekdays, 4:00 p.m. to 9:00 p.m., as described in Special Conditions 1 and 3, below:

	Delivery Service		
	Total <sup>1</sup>	UG <sup>2,3</sup>	DWREC <sup>4</sup>
<b>Option 4-9 PM / Option 4-9 PM-CPP</b>			
Energy Charge - \$/kWh			
Summer Season - On-Peak	0.21574 (I)	0.17870 (I)	(0.00007)
Mid-Peak	0.21574 (I)	0.10434 (R)	(0.00007)
Off-Peak	0.17099 (I)	0.07584 (R)	(0.00007)
Winter Season - Mid-Peak	0.21574 (I)	0.12676 (R)	(0.00007)
Off-Peak	0.17099 (I)	0.08874 (R)	(0.00007)
Super-Off-Peak	0.16567 (I)	0.07025 (R)	(0.00007)
Baseline Credit <sup>****</sup> - \$/kWh	(0.07456) (R)	0.00000	
Basic Charge - \$/day			
Single-Family Residence	0.031		
Multi-Family Residence	0.024		
Minimum Charge <sup>**</sup> - \$/day			
Single Family Residence	0.346		
Multi-Family Residence	0.346		
Minimum Charge (Medical Baseline) <sup>**</sup> - \$/day			
Single Family Residence	0.173		
Multi-Family Residence	0.173		
California Climate Credit <sup>4</sup>	(37.00) (I)		
California Alternate Rates for Energy Discount - %	100.00 <sup>*</sup>		
Family Electric Rate Assistance Discount - %	100.00		
<b>Option 4-9 PM-CPP</b>			
CPP Event Energy Charge - \$/kWh		0.80000	
Summer CPP Non-Event Credit			(0.15170)
On-Peak Energy Credit - \$/kWh			(0.15170)
Maximum Available Credit - \$/kWh <sup>*****</sup>			
Summer Season		(0.58504) (R)	

<sup>\*</sup> Represents 100% of the discount percentage as shown in the applicable Special Condition of this Schedule.

<sup>\*\*</sup> The Minimum Charge is applicable when the Delivery Service Energy Charge, plus the applicable Basic Charge is less than the Minimum Charge.

<sup>\*\*\*</sup> The ongoing Competition Transition Charge CTC of \$0.00089 per kWh is recovered in the UG component of Generation.

<sup>\*\*\*\*</sup> The Baseline Credit applies up to 100% of the Baseline Allocation, regardless of Time of Use. The Baseline Allocation is set forth in Preliminary Statement, Part H.

<sup>\*\*\*\*\*</sup> 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.

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.

(Continued)

(To be inserted by utility)

Advice 4172-E-A

Decision \_\_\_\_\_

2012

Issued by  
Carla Peterman  
Senior Vice President

(To be inserted by Cal. PUC)

Date Submitted Mar 13, 2020

Effective Apr 13, 2020

Resolution \_\_\_\_\_

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

Sheet 12

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 :

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

7.4.3 Southern California Gas

SOUTHERN CALIFORNIA GAS COMPANY		Revised	CAL. P.U.C. SHEET NO.	57658-G
LOS ANGELES, CALIFORNIA		CANCELING	Revised	CAL. P.U.C. SHEET NO. 57573-G

Schedule No. GM			Sheet 2	
<b>MULTI-FAMILY SERVICE</b>				
(Includes GM-E, GM-C, GM-EC, GM-CC, GT-ME, GT-MC and all GMB Rates)				
(Continued)				
<u>APPLICABILITY</u> (Continued)				
Multi-family Accommodations built prior to December 15, 1981 and currently served under this schedule may also be eligible for service under Schedule No. GS. If an eligible Multi-family Accommodation served under this schedule converts to an applicable submetered tariff, the tenant rental charges shall be revised for the duration of the lease to reflect removal of the energy related charges.				
Eligibility for service hereunder is subject to verification by the Utility.				
<u>TERRITORY</u>				
Applicable throughout the service territory.				
<u>RATES</u>				
	<u>GM/GT-M</u>	<u>GMB/GT-MB</u>		
Customer Charge, per meter, per day: .....	16.438¢	\$16.357		
For "Space Heating Only" customers, a daily Customer Charge applies during the winter period from November 1 through April 30 <sup>1/</sup> : .....				
	33.149¢			
<u>GM</u>				
	<u>GM-E</u>	<u>GM-EC<sup>1/</sup></u>	<u>GT-ME</u>	
Baseline Rate, per therm (baseline usage defined per Special Conditions 3 and 4):				
Procurement Charge: <sup>2/</sup> .....	27.580¢	25.654¢	N/A	
Transmission Charge: .....	77.909¢	77.909¢	77.909¢	
Total Baseline Charge (all usage): .....	105.489¢	103.563¢	77.909¢	
Non-Baseline Rate, per therm (usage in excess of baseline usage):				
Procurement Charge: <sup>2/</sup> .....	27.580¢	25.654¢	N/A	
Transmission Charge: .....	114.709¢	114.709¢	114.709¢	
Total Non Baseline Charge (all usage): .....	142.289¢	140.363¢	114.709¢	
	<u>GM-C</u>	<u>GM-CC<sup>1/</sup></u>	<u>GT-MC</u>	
Non-Baseline Rate, per therm (usage in excess of baseline usage):				
Procurement Charge: <sup>2/</sup> .....	27.580¢	25.654¢	N/A	
Transmission Charge: .....	114.709¢	114.709¢	114.709¢	
Total Non Baseline Charge (all usage): .....	142.289¢	140.363¢	114.709¢	
<sup>1/</sup> For the summer period beginning May 1 through October 31, with some exceptions, usage will be accumulated to at least 20 Ccf (100 cubic feet) before billing, or it will be included with the first bill of the heating season which may cover the entire duration since a last bill was generated for the current calendar year. (Footnotes continue next page.)				
(Continued)				
(TO BE INSERTED BY UTILITY)		ISSUED BY	(TO BE INSERTED BY CAL. PUC)	
ADVICE LETTER NO.	5636	<b>Dan Skopec</b>	SUBMITTED	May 29, 2020
DECISION NO.	98-07-068	Vice President	EFFECTIVE	Jun 1, 2020
208		Regulatory Affairs	RESOLUTION NO.	

3. Baseline Usage: The following usage is to be billed at the Baseline rate for Multi-family Accommodation units. Usage in excess of applicable Baseline allowances will be billed at the Non-Baseline rate.

Per Residence	Daily Therm Allowance for Climate Zones*		
	1	2	3
Summer (May 1-Oct.31)	0.473	0.473	0.473
Winter (Nov. 1-Apr.30)	1.691	1.823	2.950

\* Climate Zones are described in the Preliminary Statement.

### 7.4.4 San Diego Gas & Electric

<b>SCHEDULE TOU-DR1</b>				
<u>RESIDENTIAL TIME-OF-USE</u>				
<u>RATES</u>				
<u>Total Rates:</u>				
Description – TOU DR1	UDC Total Rate	DWR-BC Rate	EECC Rate + DWR Credit	Total Rate
<b>Summer:</b>				
On-Peak	0.20577	0.00580	0.29042	0.50199
Off-Peak	0.20577	0.00580	0.09305	0.30462
Super Off-Peak	0.20577	0.00580	0.04743	0.25900
<b>Winter:</b>				
On-Peak	0.27206	0.00580	0.07844	0.35630
Off-Peak	0.27206	0.00580	0.06961	0.34747
Super Off-Peak	0.27206	0.00580	0.05981	0.33767
Summer Baseline Adjustment Credit up to 130% of Baseline	(0.07136)			(0.07136)
Winter Baseline Adjustment Credit up to 130% of Baseline	(0.07136)			(0.07136)
Minimum Bill (\$/day)	0.338			0.338



San Diego Gas & Electric Company  
San Diego, California

Revised Cal. P.U.C. Sheet No. 24762-G

Canceling Revised Cal. P.U.C. Sheet No. 24749-G

**SCHEDULE GM**

Sheet 2

**MULTI-FAMILY NATURAL GAS SERVICE**  
**(Includes Rates for GM, GM-C and GTC/GTCA)**

**RATES**

	GM	GM-C	GTC/GTCA <sup>1</sup>
<b>Baseline Rate, per therm (baseline usage defined in Special Condition 4)</b>			
Procurement Charge <sup>2</sup> .....	\$0.26263	\$0.26263	R N/A
Transmission Charge.....	\$1.39202	\$1.39202	\$1.40414
Total Baseline Charge.....	\$1.65465	\$1.65465	R \$1.40414
<b>Non-Baseline Rate (usage in excess of baseline usage)</b>			
Procurement Charge <sup>2</sup> .....	\$0.26263	\$0.26263	R N/A
Transmission Charge.....	\$1.62888	\$1.62888	\$1.64100
Total Non-Baseline Charge.....	\$1.89151	\$1.89151	R \$1.64100
<b>Minimum Bill, per day<sup>3</sup></b>			
Non-CARE customers.....	\$0.13151	\$0.13151	\$0.13151
CARE customers.....	\$0.10521	\$0.10521	\$0.10521

**Franchise Fee Differential:**

A Franchise Fee Differential of 1.03% will be applied to the monthly billings calculated under this schedule for all customers within the corporate limits of the City of San Diego. Such Franchise Fee Differential shall be so indicated and added as a separate item to bills rendered to such customers.

**Additional Charges**

Rates may be adjusted to reflect any applicable taxes, franchise fees or other fees, regulatory surcharges, and interstate or intrastate pipeline charges that may occur.

**SPECIAL CONDITIONS**

- Definitions.** The definitions of principal terms used in this schedule are found either herein or in Rule 1, Definitions.
- Number of Therms.** The number of therms to be billed shall be determined in accordance with Rule 2. The daily therm allowance in the Baseline Usage, shown in Special Condition 4, shall be multiplied by the number of qualified residential units. It is the responsibility of the customer to advise the Utility within 15 days following any change in the submetering arrangements or the number of dwelling units or Mobilehome Park spaces provided gas service. The number of qualifying units is subject to verification by the Utility.
- Exclusions.** Gas service for non-domestic enterprises such as rooming houses, boarding houses, dormitories, rest homes, military barracks, transient trailer parks, stores, restaurants, service stations, and other similar establishments will be separately metered and billed under the applicable schedules.

<sup>1</sup> The rates for core transportation-only customers, with the exception of customers taking service under Schedule GT-NGV, include any FERC Settlement Proceeds Memorandum Account (FSPMA) credit adjustments.  
<sup>2</sup> This charge is applicable to Utility Procurement Customers and includes the GPC and GPC-A Procurement Charges shown in Schedule GPC which are subject to change monthly as set forth in Special Condition 7.  
<sup>3</sup> Effective starting May 1, 2020, the minimum bill is calculated as the minimum bill charge of \$0.13151 per day times the number of days in the billing cycle (approximately \$4 per month) with a 20% discount applied for CARE customer resulting in a minimum bill charge of \$0.10521 per day (approximately \$3.20 per month).

(Continued)

2C6 Issued by Submitted Aug 7, 2020  
 Advice Ltr. No. 2889-G **Dan Skopec** Effective Aug 10, 2020  
 Decision No. \_\_\_\_\_ Vice President  
 Regulatory Affairs Resolution No. \_\_\_\_\_

7.4.5 City of Palo Alto Utilities

**RESIDENTIAL ELECTRIC SERVICE**

UTILITY RATE SCHEDULE E-1

**A. APPLICABILITY:**

This Rate Schedule applies to separately metered single-family residential dwellings receiving Electric Service from the City of Palo Alto Utilities.

**B. TERRITORY:**

This rate schedule applies everywhere the City of Palo Alto provides Electric Service.

**C. UNBUNDLED RATES:**

<u>Per kilowatt-hour (kWh)</u>	<u>Commodity</u>	<u>Distribution</u>	<u>Public Benefits</u>	<u>Total</u>
Tier 1 usage	\$0.08339	\$0.04971	\$0.00447	\$0.13757
Tier 2 usage Any usage over Tier 1	0.11569	0.07351	0.00447	0.19367
<u>Minimum Bill (\$/day)</u>				0.3283

**D. SPECIAL NOTES:**

**1. Calculation of Cost Components**

The actual bill amount is calculated based on the applicable rates in Section C above and adjusted for any applicable discounts, surcharges and/or taxes. On a Customer's bill statement, the bill amount may be broken down into appropriate components as calculated under Section C.

**2. Calculation of Usage Tiers**

Tier 1 Electricity usage shall be calculated and billed based upon a level of 11 kWh per day, prorated by Meter reading days of Service. As an example, for a 30-day bill, the Tier 1 level would be 330 kWh. For further discussion of bill calculation and proration, refer to Rule and Regulation 11.

*{End}*

**CITY OF PALO ALTO UTILITIES**

Issued by the City Council

*Supersedes Sheet No E-1-1  
dated 7-1-2018*



Sheet No **E-1-1**  
Effective 7-1-2019

**RESIDENTIAL GAS SERVICE**

**UTILITY RATE SCHEDULE G-1**

**A. APPLICABILITY:**

This schedule applies to the following Customers receiving Gas Service from City of Palo Alto Utilities:

1. Separately-metered single-family residential Customers.
2. Separately-metered multi-family residential Customers in multi-family residential facilities.

**B. TERRITORY:**

This schedule applies anywhere the City of Palo Alto provides Gas Service.

**C. UNBUNDLED RATES:**

Per Service

Monthly Service Charge: .....\$10.37

Tier 1 Rates:

Per Therm

Supply Charges:

- |  |               |
|--|---------------|
| 1. Commodity (Monthly Market Based)..... | \$0.10-\$2.00 |
| 2. Cap and Trade Compliance Charge ..... | \$0.00-\$0.25 |
| 3. Transportation Charge .....           | \$0.00-\$0.15 |
| 4. Carbon Offset Charge .....            | \$0.00-\$0.10 |

Distribution Charge:..... \$0.5038

Tier 2 Rates: (All usage over 100% of Tier 1)

Supply Charges:

- |  |               |
|--|---------------|
| 1. Commodity (Monthly Market Based)..... | \$0.10-2.00   |
| 2. Cap and Trade Compliance Charge ..... | \$0.00-\$0.25 |
| 3. Transportation Charge .....           | \$0.00-\$0.15 |
| 4. Carbon Offset Charge .....            | \$0.00-\$0.10 |

Distribution Charge:..... \$1.2882

**D. SPECIAL NOTES:**

1. Calculation of Cost Components

---

**CITY OF PALO ALTO UTILITIES**

Issued by the City Council

Supersedes Sheet No G-1-1  
 dated 7-1-2019



Sheet No G-1-1  
 Effective 7-1-2020

The ‘Commodity and Volumetric Rates’ are selected for the latest available month of December 2020.<sup>3</sup>

### 7.4.6 Sacramento Municipal Utilities District (Electric Only)

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

**Applicability**

This Rate Schedule R-TOD applies to single- and three-phase service for the following types of residential premises:

1. Individual or dual metered residences with digital communicating meter installed, including single-family homes, duplexes, apartments, and condominiums; and
2. General farm service where the meter also serves the residence or additional meters on a farm where the electricity consumed is solely for domestic purposes.

Master-metered service to a qualifying multifamily accommodation or mobile home parks are not eligible for Time-of-Day rates under rate schedule R-TOD.

For the purposes of this schedule a “month” is considered to be a single billing period of 27 to 34 days.

**A. Time-of-Day (5-8 p.m.) Rate (rate category RT02)**

1. The TOD (5-8 p.m.) Rate is the standard rate for SMUD’s residential customers. Eligible customers can elect the Fixed Rate under Rate Schedule R as an alternative rate.
2. Customers who have an eligible renewable electrical generation facility under Rate Schedule NEM1 that was approved for installation by SMUD after December 31, 2017, must be on the TOD (5-8 p.m.) Rate.
3. Customers who have an eligible renewable electrical generation facility under Rate Schedule NEM2 must be on the TOD (5-8 p.m.) Rate.
4. This rate has five kilowatt-hour (kWh) prices, depending on the time-of-day and season as shown below. Holidays are detailed in Section V. Conditions of Service.

<b>Summer (Jun 1 - Sept 30)</b>	<b>Peak</b>	Weekdays between 5:00 p.m. and 8:00 p.m.
	<b>Mid-Peak</b>	Weekdays between noon and midnight except during the Peak hours.
	<b>Off-Peak</b>	All other hours, including weekends and holidays <sup>1</sup> .
<b>Non-Summer (Oct 1 - May 31)</b>	<b>Peak</b>	Weekdays between 5:00 p.m. and 8:00 p.m.
	<b>Off-Peak</b>	All other hours, including weekends and holidays <sup>1</sup> .

<sup>1</sup> See Section V. Conditions of Service

<sup>3</sup> <https://www.cityofpaloalto.org/civicax/filebank/documents/30399>



<b>II. Firm Service Rates</b>		
<b>A. Time-of-Day (5-8 p.m.) Rate</b>		<b>Rate Category RT02</b>
<b>Non-Summer Prices* – January 1 through May 31</b>		
System Infrastructure Fixed Charge per month		\$21.05
Electricity Usage Charge		
Peak \$/kWh		\$0.1388
Off-Peak \$/kWh		\$0.1006
<b>Summer Prices - June 1 through September 30</b>		
System Infrastructure Fixed Charge per month		\$21.05
Electricity Usage Charge		
Peak \$/kWh		\$0.2941
Mid-Peak \$/kWh		\$0.1671
Off-Peak \$/kWh		\$0.1209
<b>Non-Summer Prices* – October 1 through December 31</b>		
System Infrastructure Fixed Charge per month		\$21.70
Electricity Usage Charge		
Peak \$/kWh		\$0.1430
Off-Peak \$/kWh		\$0.1035
* Non-Summer Season includes Fall (Oct 1 – Nov 30), Winter (Dec 1 – Mar 31) and Spring (Apr 1 – May 31) periods.		

### 7.4.7 Los Angeles Department of Water and Power (Electric Only)

Residential Service Rate Summary Time of Use R-1(B)						
Eligibility						
Applicable to service to single-family, single-family with guest house, individually metered accommodations, as well as to separately metered common areas of condominiums and cooperatives devoted primarily to residential uses and whose energy and capacity requirements do not exceed those for Small General Service Schedule A-1. Battery chargers, motors and appliances, which conform in capacities to applicable electrical codes, and meet requirements of the Department's Rules, may be served under this schedule. Not applicable to single-family residential customers with an on-site transformer dedicated solely to that individual customer.						
The Department requires mandatory service under Rate B for customers whose annual monthly average consumption reach or exceed 3000 kWh during the preceding 12 month period. If a customer's annual monthly average consumption does not reach or exceed 3,000 kWh in a year's period, a customer may choose to receive service either under Rate A or B. However, when a customer served under Rate B requests a change to Rate A, that customer may not revert to Rate B before 12 months have elapsed.						
Monthly rates beginning July 1, 2019	High Season June - Sep.			Low Season Oct. - May		
Residential R-1(B)	Capped	Incremental	Total	Capped	Incremental	Total
Rate B - Time of Use						
Service Charge \$ per month	\$8.00	\$4.00	\$12.00	\$8.00	\$4.00	\$12.00
Energy Charge - \$ per kWh						
High Peak Period	\$0.16061	-\$0.00203	\$0.15858	\$0.06515	\$0.03503	\$0.10018
Low Peak Period	\$0.08144	\$0.01874	\$0.10018	\$0.06515	\$0.03503	\$0.10018
Base Period	\$0.04655	\$0.02619	\$0.07274	\$0.05045	\$0.02619	\$0.07664
Electric Vehicle Discount \$ (1)	-\$0.02500	\$0.00000	-\$0.02500	-\$0.02500	\$0.00000	-\$0.02500
Rates below are in addition to above Charges						
<b>Elements Only in Capped Ordinance</b>						
ECA - per kWh	\$0.05690	\$0.00000	\$0.05690	\$0.05690	\$0.00000	\$0.05690
ESA - per kWh	\$0.00147	\$0.00000	\$0.00147	\$0.00147	\$0.00000	\$0.00147
RCA - per kWh	\$0.00300	\$0.00000	\$0.00300	\$0.00300	\$0.00000	\$0.00300
<b>Elements Only in Incremental Ordinance</b>						
VEA - per kWh*	Refer to <a href="http://www.LADWP.com">www.LADWP.com</a> >About Us >Power Rates >Variable Energy Factors and Reliability Cost Adjustment Factor for current Quarterly Electric Adjustment Factors					
CRPSEA - per kWh*						
VRPSEA - per kWh*						
IRCA - per kWh						

ECA- Energy Cost Adjustment  
 ESA - Electric Subsidy Adjustment  
 RCA - Reliability Cost Adjustment  
 VEA - Variable Energy Adjustment  
 CRPSEA - Capped Renewable Portfolio Standard Energy Adjustment  
 VRPSEA - Variable Renewable Portfolio Standard Energy Adjustment  
 IRCA - Incremental Reliability Cost Adjustment  
 High Peak Period : 1:00 p.m. – 5:00 p.m., Monday through Friday  
 Low Peak Period: 10:00 a.m. – 1:00 p.m., Monday through Friday, and 5:00 p.m. – 8:00 p.m., Monday through Friday.  
 Base Period: 8:00 p.m. – 10:00 a.m., Monday through Friday, all day Saturday and Sunday.  
 (1) Conditions for this element set in the capped ordinance.  
 \*This value will be computed quarterly in accordance with the incremental electric rate ordinance.

### 7.4.8 Fuel Escalation Rates

Escalation of natural gas rates between 2020 and 2022 is based on the currently filed General Rate Cases for PG&E, SoCalGas, and SDG&E. From 2023 through 2025, gas rates are assumed to escalate at 4 percent per year above inflation, which reflects historical rate increases between 2013 and 2018. Escalation of electricity rates from 2020 through 2025 is assumed to be 2 percent per year above inflation, based on electric utility estimates. After 2025, escalation rates for both natural gas and electric rates are assumed to drop to a more conservative 1 percent escalation per year above inflation for long-term rate trajectories beginning in 2026 through 2050.

Table 15 below demonstrate the escalation rates used for residential (detached ADU) buildings.

**Table 15. Real Utility Rate Escalation Rate Assumptions**

	Statewide Electric Residential Average Rate (%/year, real)	Natural Gas Residential Core Rate (%/yr escalation, real)		
		<u>PG&amp;E</u>	<u>SoCalGas</u>	<u>SDG&amp;E</u>
2020	2.0%	1.48%	6.37%	5.00%
2021	2.0%	5.69%	4.12%	3.14%
2022	2.0%	1.11%	4.12%	2.94%
2023	2.0%	4.0%	4.0%	4.0%
2024	2.0%	4.0%	4.0%	4.0%
2025	2.0%	4.0%	4.0%	4.0%
2026	1.0%	1.0%	1.0%	1.0%
2027	1.0%	1.0%	1.0%	1.0%
2028	1.0%	1.0%	1.0%	1.0%
2029	1.0%	1.0%	1.0%	1.0%
2030	1.0%	1.0%	1.0%	1.0%
2031	1.0%	1.0%	1.0%	1.0%
2032	1.0%	1.0%	1.0%	1.0%
2033	1.0%	1.0%	1.0%	1.0%
2034	1.0%	1.0%	1.0%	1.0%
2035	1.0%	1.0%	1.0%	1.0%
2036	1.0%	1.0%	1.0%	1.0%
2037	1.0%	1.0%	1.0%	1.0%
2038	1.0%	1.0%	1.0%	1.0%
2039	1.0%	1.0%	1.0%	1.0%
2040	1.0%	1.0%	1.0%	1.0%
2041	1.0%	1.0%	1.0%	1.0%
2042	1.0%	1.0%	1.0%	1.0%
2043	1.0%	1.0%	1.0%	1.0%
2044	1.0%	1.0%	1.0%	1.0%
2045	1.0%	1.0%	1.0%	1.0%
2046	1.0%	1.0%	1.0%	1.0%
2047	1.0%	1.0%	1.0%	1.0%
2048	1.0%	1.0%	1.0%	1.0%
2049	1.0%	1.0%	1.0%	1.0%

Source: Energy & Environmental Economics, 2019, Reach Code Team

## Get In Touch

The adoption of reach codes can differentiate jurisdictions as efficiency leaders and help accelerate the adoption of new equipment, technologies, code compliance, and energy savings strategies.

As part of the Statewide Codes & Standards Program, the Reach Codes Subprogram is a resource available to any local jurisdiction located throughout the state of California.

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.

If you are interested in finding out more about local energy reach codes, the Reach Codes Team stands ready to assist jurisdictions at any stage of a reach code project.



Visit [LocalEnergyCodes.com](https://LocalEnergyCodes.com) to access our resources and sign up for newsletters



Contact [info@localenergycodes.com](mailto:info@localenergycodes.com) for no-charge assistance from expert Reach Code advisors



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