

PUBLIC UTILITIES COMMISSION
505 Van Ness Avenue
San Francisco CA 94102-3298



Pacific Gas & Electric Company
ELC (Corp ID 39)
Status of Advice Letter 4571G/6497E
As of January 23, 2023

Subject: Net Electric and Gas Bill Impact Study for Residential Customers Who Switch from Natural Gas Water Heater to Heat Pump Water Heater in Compliance with D.21-11-002

Division Assigned: Energy

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CPUC Contact Information:

edtariffunit@cpuc.ca.gov

AL Certificate Contact Information:

Annie Ho

415-973-8794

PGETariffs@pge.com

PUBLIC UTILITIES COMMISSION
505 Van Ness Avenue
San Francisco CA 94102-3298



To: Energy Company Filing Advice Letter

From: Energy Division PAL Coordinator

Subject: Your Advice Letter Filing

The Energy Division of the California Public Utilities Commission has processed your recent Advice Letter (AL) filing and is returning an AL status certificate for your records.

The AL status certificate indicates:

- Advice Letter Number
- Name of Filer
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All inquiries to the California Public Utilities Commission on the status of your Advice Letter Filing will be answered by Energy Division staff based on the information contained in the Energy Division's PAL database from which the AL status certificate is generated. If you have any questions on this matter please contact the:

Energy Division's Tariff Unit by e-mail to
edtariffunit@cpuc.ca.gov

February 7, 2022

Advice 4571-G/6497-E

(Pacific Gas and Electric Company ID U 39 M)

Public Utilities Commission of the State of California

**Subject: Net Electric and Gas Bill Impact Study for Residential Customers
Who Switch from Natural Gas Water Heater to Heat Pump Water
Heater, in Compliance with D.21-11-002**

Purpose

The purpose of this advice letter is to present the results of Pacific Gas and Electric's (PG&E) study of the net electric and gas bill impacts bill impacts resulting from customers switching from a natural gas water heater to an electric heat pump water heater (HPWH), in compliance with Decision (D.) 21-11-002.

Background

In D.21-11-002¹ the California Public Utilities Commission (CPUC) directed PG&E, Southern California Edison (SCE) and San Diego Gas and Electric (SDG&E) to conduct separate HPWH studies and report their results. Specifically, Subsections (a) and (b) of Ordering Paragraph (OP) 4 required the following:

- (a) The utilities shall each study the net electric and gas bill impacts that result when a residential customer switches from a natural gas water heater to an electric HPWH (fuel switching). The utilities shall submit and file their studies to the Commission through a Tier 3 Advice Letter within 90 days of the issuance of this decision.
- (b) If a utility's study shows a net increase in customers' net energy bills resulting from fuel switching, the utility shall propose a rate adjustment for their residential customers who install electric HPWH in a new Rate Design Window

¹ *Decision on Incentive Layering, the Wildfire and Natural Disaster Resiliency Rebuild Program, Data Sharing, Rate adjustments for Electric Heat Pump Water Heaters, and Propane Usage, in Rulemaking 19-11-011 (Building Decarbonization Phase II).*

application within six months of the issuance of this decision.² The utilities' proposals shall comply with the requirements as set forth in Appendix D in D. 21-11-002.

Moreover, the Commission's requirements for the utility's HPWH rate adjustment proposal, as stated in D.21-11-002, Appendices A through E, required each IOU to "provide the basis for determining the typical industry-prevalent gas and electric HPWHs that were used for calculating additional anticipated electricity use, gas savings, and net energy bill increases."³ PG&E provides this additional information in the attached net bill impact study, titled "Pacific Gas and Electric's Study on Net Bill Impacts for Residential Customers Who Switch from a Natural Gas Water Heater to an Electric Heat Pump Water Heater, in Compliance with D.21-11-002" (PG&E Study or Study), shown in Attachment 1.

PG&E's HPWH Net Bill Impact Study

Based on 2020 natural gas and electricity prices, PG&E's Study shows that an average customer who switches from a gas water heater to an electric HPWH would see net bill savings under PG&E's electrification rate schedule E-ELEC, in part because HPWHs are more energy-efficient than the gas water heaters they are replacing. CARE customers tend to have higher net bill savings than non-CARE customers, due to PG&E's electric CARE discounts (35 percent) significantly exceeding its gas CARE discounts (20 percent).

PG&E's study also calculated the average net bill impacts for three representative baseline territories -- T, X and W. The results shows that customers in territories X and W are likely to see a net bill saving by switching to HPWH. Customers in Territory T, however, may need to adopt slightly more efficient HPWH (with a Uniform Energy Factor, or UEF, of 3.5 or above⁴) and operate it at a tank temperature of 125°F to obtain net bill savings.

In addition, PG&E calculated the net bill savings for an average All-Electric baseline customer who also has gas service with PG&E. The results show that this type of customer may find it more challenging to achieve net bill savings as its electric baseline quantities are already high.⁵ However, an All-Electric customer could still see net bill savings by adopting more efficient HPWH (with a UEF of 3.7 or above) and operating the HPWH at a tank temperature of 120°F. Although the UEFs needed for All-Electric

² [D. 21-11-002](#) was issued on November 4, 2021.

³ [D.21-11-002 Appendix A-E](#) (Phase II), pg. D-1, Section I-C-2.

⁴ The UEF is a measure of the water heater's efficiency.

⁵ All-Electric customers benefit from larger baseline quantities, which permit greater percentages of their usage to be billed at the lower-tier E-TOU-C rates. For these customers, even though adding an HPWH might increase upper-tier usage (and thus their E-TOU-C bills), the bill increases are still lower than the increases they would pay if they switched to non-tiered E-ELEC and forfeited the benefit accorded to them by the larger baseline quantities.

customers are near the higher end of the efficiency level for HPWH, they are possible to achieve. In fact, in PG&E's San Joaquin Valley Disadvantaged Communities' electrification project, 50-gallon capacity HPWHs with a UEF of 3.75 and 60-gallon HPWHs with a UEF of 3.85, are the most common models installed to replace the gas water heaters. Moreover, All-Electric baseline customers can also achieve more net bill savings by participating in PG&E's thermal storage load-shifting program called WatterSaver, which shifts water heater load from on-peak hours to off-peak hours.

Overall, PG&E believes its Study is conservative in estimating the net bill impact (i.e., errs on the side of lower net bill savings), for a number of reasons:

First, PG&E's Study focuses on a single year, examining the one-year bill impact based on 2020 gas and electric rates. The useful life of an HPHW is typically assumed to be 13 to 15 years. Because future gas rates are anticipated to increase faster than electric rates, as California continues its transition to decarbonization through electrification efforts, the annualized lifetime net bill savings of an HPWH would be higher than shown in this one-year bill savings estimate. For example, over the next decade, the consulting firm E3 has forecasted a 50 percent increase in natural gas prices, whereas the expected growth in electric rates is expected to be slower during that same timeframe.⁶ As a result, a customer's actual annual net bill savings from switching to an HPWH would be expected to grow over time.

Second, PG&E's Study used the Commission's DEER Water Heater Calculator⁷ to collect the gas water heater usage data. On average, the annual gas water heater usage is around 175 therms.⁸ However, the 2019 RASS study reported that, "Natural-gas water heating UECs ranged from 258 therms for single-family homes to 246 therms for apartments in buildings with two to four units."⁹ If PG&E had used the RASS gas water heater usage estimate of 258 therms (which is 47% higher than DEER), customers' estimated gas bill savings would have been higher, resulting in greater net bill savings.

⁶https://www.ethree.com/wp-content/uploads/2019/07/CA_Res_Building_Electrification_Final_Presentation.pdf, pg. 25. Utility Rate Escalation Assumptions

⁷ <http://www.deeresources.com/index.php/water-heater-resources>, The DEER (Database for Energy Efficient Resources) Water Heater Calculator v4.2. PG&E notes that a new version 5.0 was issued just recently. However, given the deadline for submitting its report, PG&E did not have time to update its models and results based on this newer version 5.0.

⁸ DEER Water Heater Calculator v.4.2, Single-family, Gas Tank Water Heater, 50-gallon.

⁹ [2019 California Residential Appliance Saturation Study \(RASS\) - Results](#), pg. 27. Table 36, at p. 27, also shows the PG&E specific All Homes UEC for Conventional Gas Water Heating is 258 therms. UEC stands for unit energy consumption, an estimate of the energy usage of a particular appliance or piece of equipment.

Conclusion

Based on the results of its Study, PG&E respectfully requests that the Commission find that PG&E's new electrification rate, Schedule E-ELEC, will provide net bill savings compared to the combined gas and electric bills that customers would pay if they continued using natural gas water heating. The E-ELEC rate was designed specifically for customers who adopt electric vehicles, energy storage, or electric heat pumps for water heating or climate control (space heating and/or cooling), and it is a requirement for eligibility to have one or more of these pro-electrification technologies. Therefore, every customer who installs an HPWH is eligible for the E-ELEC rate option. Because this conservative Study shows Schedule E-ELEC already provides net bill savings for customers adopting HPWHs (even solely using 2020 gas and electric prices), PG&E believes that, under D.21-11-022, it should not be required to propose any further HPWH-specific rate adjustment in a special Rate Design Window application in May 2022. PG&E respectfully requests that CPUC confirm this belief, and clarify that PG&E need not file its next Rate Design Window application until November 2022, as required under the Rate Case Plan.

Finally, PG&E notes that even though HPWH Net Bill Impact Study shows that, based on average gas water heater and HPWH profiles, a customer that replaces its gas water heater with an HPWH and qualifies for Schedule E-ELEC can enjoy increased net bill savings over time, it is important to remember that such rate benefits would arrive for the customer slowly over the life of any HPWH they might purchase. These net bill savings do not directly help customers overcome the potential up-front financial barrier presented when deciding whether they can fit the purchase and installation cost of a new HPWH into their household budget. Such systems typically range in cost from about \$1,300 to \$2,000 for the HPWH itself, and installation costs can add upwards of \$2,000. In addition, sometimes electrical panel upgrades are required that can add another \$4,000, or so. The Energy Division's April 2021 SGIP HPWH Staff Proposal estimates total costs of the average HPWH to be \$4,540 if a panel upgrade is not necessary and \$8,381 if it is.¹⁰

Therefore, PG&E respectfully recommends the CPUC prioritize and continue its focus on ways to address the up-front financial barriers for HPWH adoption. This includes ensuring that the available up-front customer incentives to purchase the HPWH itself are right-sized (both checking that the total dollar amount of incentives for switching to an HPWH are adequate and ensuring that the number of customers who may receive such incentives each year is high enough to spur accelerated HPWH adoption). It also means addressing the up-front costs which are not covered by such incentives and thus would benefit from new efforts to provide financing assistance. For example, the Commission's

¹⁰ See CPUC Energy Division Staff, "SGIP HPWH Staff Proposal," April 19, 2021, pp. 28-31 (Tables 3-1, 3-2 and 3-3). This Staff Proposal is included as Attachment 1 to ALJ Cathleen Fogel's April 16, 2021 "Administrative Law Judge's Ruling Providing Proposal, Requesting Comment, and Updating Procedural Schedule," which can be found at <https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M377/K729/377729072.PDF>,.

Clean Energy Financing Options (CEFO) OIR (R.20-08-022) is exploring development of integrated (multi-technology) customer financing options to further help enable customers to decide to invest in HPWHs and other clean energy technologies. PG&E will continue to wholeheartedly support the Commission's and the state's building electrification and decarbonization efforts, including seeking to help more residential customers overcome any current up-front cost barriers, to spur them to adopt HPWH and other decarbonization technologies to fight climate change.

Protests

Anyone wishing to protest this submittal may do so by letter sent electronically via E-mail, no later than February 28, 2022, which is 21 days¹¹ after the date of this submittal. Protests must be submitted to:

CPUC Energy Division
ED Tariff Unit
E-mail: EDTariffUnit@cpuc.ca.gov

The protest shall also be electronically sent to PG&E via E-mail at the address shown below on the same date it is electronically delivered to the Commission:

Sidney Bob Dietz II
Director, Regulatory Relations
c/o Megan Lawson
E-mail: PGETariffs@pge.com

Any person (including individuals, groups, or organizations) may protest or respond to an advice letter (General Order 96-B, Section 7.4). The protest shall contain the following information: specification of the advice letter protested; grounds for the protest; supporting factual information or legal argument; name and e-mail address of the protestant; and statement that the protest was sent to the utility no later than the day on which the protest was submitted to the reviewing Industry Division (General Order 96-B, Section 3.11).

Effective Date

Pursuant to General Order (GO) 96-B, Rule 5.3, and OP 4 of D. 21-11-002, this advice letter is submitted with a Tier 3 designation. PG&E requests that this Tier 3 advice letter become effective upon Commission approval.

¹¹ The 20-day protest period concludes on a weekend, therefore, PG&E is moving this date to the following business day.

Notice

In accordance with General Order 96-B, Section IV, a copy of this advice letter is being sent electronically and via U.S. mail to parties shown on the attached list and the parties on the service list for Rulemaking (R.)19-01-001. Address changes to the General Order 96-B service list should be directed to PG&E at email address PGETariffs@pge.com. For changes to any other service list, please contact the Commission's Process Office at (415) 703-2021 or at Process_Office@cpuc.ca.gov. Send all electronic approvals to PGETariffs@pge.com. Advice letter submittals can also be accessed electronically at: <http://www.pge.com/tariffs/>.

/S/

Sidney Bob Dietz II
Director, Regulatory Relations

Attachments

cc: Service List R.19-01-001



ADVICE LETTER SUMMARY

ENERGY UTILITY



MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No.: Pacific Gas and Electric Company (ID U39 M)

Utility type:

☒ ELC ☒ GAS ☐ WATER
☐ PLC ☐ HEAT

Contact Person: Annie Ho

Phone #: (415) 973-8794

E-mail: PGETariffs@pge.com

E-mail Disposition Notice to: AMHP@pge.com

EXPLANATION OF UTILITY TYPE

ELC = Electric GAS = Gas WATER = Water
PLC = Pipeline HEAT = Heat

(Date Submitted / Received Stamp by CPUC)

Advice Letter (AL) #: 4571-G/6497-E

Tier Designation: 3

Subject of AL: Net Electric and Gas Bill Impact Study for Residential Customers Who Switch from Natural Gas Water Heater to Heat Pump Water Heater in Compliance with D.21-11-002

Keywords (choose from CPUC listing): Compliance

AL Type: ☐ Monthly ☐ Quarterly ☐ Annual ☒ One-Time ☐ Other:

If AL submitted in compliance with a Commission order, indicate relevant Decision/Resolution #: D.21-11-002

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL:

Summarize differences between the AL and the prior withdrawn or rejected AL:

Confidential treatment requested? ☐ Yes ☒ No

If yes, specification of confidential information:

Confidential information will be made available to appropriate parties who execute a nondisclosure agreement. Name and contact information to request nondisclosure agreement/ access to confidential information:

Resolution required? ☒ Yes ☐ No

Requested effective date:

No. of tariff sheets: N/A

Estimated system annual revenue effect (%): N/A

Estimated system average rate effect (%): N/A

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected: N/A

Service affected and changes proposed¹: N/A

Pending advice letters that revise the same tariff sheets: N/A

¹Discuss in AL if more space is needed.

Protests and correspondence regarding this AL are to be sent via email and are due no later than 20 days after the date of this submittal, unless otherwise authorized by the Commission, and shall be sent to:

California Public Utilities Commission
Energy Division Tariff Unit Email:
EDTariffUnit@cpuc.ca.gov

Contact Name: Sidnev Bob Dietz II. c/o Megan Lawson
Title: Director, Regulatory Relations
Utility/Entity Name: Pacific Gas and Electric Company

Telephone (xxx) xxx-xxxx: (415)973-2093
Facsimile (xxx) xxx-xxxx: (415)973-3582
Email: PGETariffs@pge.com

Contact Name:
Title:
Utility/Entity Name:

Telephone (xxx) xxx-xxxx:
Facsimile (xxx) xxx-xxxx:
Email:

CPUC
Energy Division Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102

Clear Form

Attachment 1

Pacific Gas and Electric's Study on Net Bill Impacts for
Residential Customers Who Switch from a Natural Gas
Water Heater to an Electric Heat Pump Water Heater,
In Compliance with D.21-11-002

Prepared by Sarah Jin, Dennis Keane and Thomas Mertens
Pacific Gas and Electric Company
February 7, 2022

1. Introduction

As described in the California Public Utilities Commission's (CPUC) Decision (D.) 21-11-002, the substitution of electricity for natural gas as a fuel can aid the state's electrification efforts and reduce overall emissions. One way in which this can occur is if residential customers replace their gas water heaters with more energy-efficient electric heat pump water heaters (HPWHs). Such replacements necessarily reduce a customer's gas usage, while at the same time increasing his or her electric usage. In this Study, submitted in compliance with Ordering Paragraph 4 of D.21-11-002, PG&E evaluates and reports on the overall impact on customers' bills from the reductions in their gas usage combined with increases in their electric usage resulting when they replace their household's natural gas water heater with an electric HPWH. PG&E's Study looks at several alternative scenarios to take into account differences among various climate zones, gas and electric rate schedules, and types of water heating equipment.

2. Structure of the Study

As noted above, the basic structure of PG&E's evaluation is to calculate the net dollar effect on a customer's total energy bill (i.e., its combined gas and electric bill) if the customer were to replace its gas water heater with an electric HPWH to support California's decarbonization goals. This Study utilizes the following key input data:

- Residential gas water heater and HPWH usage profiles
- Residential gas and electric rates
- Residential gas total usage by month and electric usage by hour

PG&E then, calculates the net bill impact with the following formula:

$$\text{Net Bill Impact} = \text{Electric Bill Increase} - \text{Gas Bill Saving}$$

where:

$$\text{Electric Bill Increase} = \text{Electric Bill with HPWH} - \text{Electric Bill without HPWH}$$

$$\text{Gas Bill Saving} = \text{Gas Bill with Gas Water Heater} - \text{Gas Bill without Gas Water Heater}$$

When the net bill impact is a positive value, it means a net increase in a customer's total energy bill from replacing the gas water heater with an HPWH; when it is a negative value, it indicates a net bill savings from such fuel switching.

3. Water Heater Usage Profiles

PG&E used the Commission's DEER¹ Water Heater Calculator v4.2 as the source of water heater usage profiles, in therms and kWh. The water heater usage varies mainly with the customer's tank size, the Uniform Energy Factor (UEF; a measure of the heater's efficiency), the tank temperature, and the California Energy Commission (CEC) climate zone. PG&E modeled five different tank temperatures: 120°F, 125°F, 130°F, 135°F and 140°F. Among these temperatures, the 125°F tank temperature is the reference

¹ DEER: The Database for Energy Efficient Resources

temperature used by the CBECC-Res software² when modeling an HPWH, and the 120°F tank temperature is the recommended setting by the Department of Energy's Energy Saver website.³ Each water heater was modeled for a single-family dwelling in each of the nine CEC climate zones in PG&E's service territory.⁴

a. Gas Water Heaters

For gas water heaters, the 50-gallon tank⁵ with a UEF of 0.56 was selected as a representative installed gas water heater. The UEF values were chosen based on the minimum efficiency requirements for such water heaters under Federal Appliance Regulations.⁶ For the 50-gallon with a UEF of 0.56, PG&E's Study uses 45 usage profiles, representing each of the nine CEC climate zones and five different water heater tank temperature settings. These 45 usage profiles were then combined into a single average usage profile for the gas water heater by first averaging the profiles over the five temperature settings and then taking a weighted average over the nine CEC climate zones (using the number of residential customers in each zone as weights).

b. Electric Heat Pump Water Heaters

To analyze the expected usage from the electric HPWH unit, PG&E evaluated a range of different-sized units and efficiencies. Specifically, PG&E not only considered 50-gallon HPWH units to compare like-for-like tank size replacements, but also looked at a scenario in which a household might upsize its HPWH in order to achieve a similar first-hour rating (FHR) as was provided by its previous gas water heater. Specifically, PG&E evaluated the following two replacement scenarios:

- Replacing a 50-gallon gas unit with 50-gallon HPWH (like-for-like tank size); and
- Replacing a 50-gallon gas unit with an 80-gallon HPWH (like-for-like FHR)

² [CBECC-Res](#) is a free computer program developed by the California Energy Commission (CEC) for use in demonstrating compliance with the California Residential Building Energy Efficiency Standards.

³ <https://www.energy.gov/energysaver/do-it-yourself-savings-project-lower-water-heating-temperature#file-1062361>

⁴ PG&E specific Title 24 Climate Zones: CZ01, 02, 03, 04, 05, 11, 12, 13, and 16.

⁵ The 2012 California Lighting and Appliance Saturation Survey (CLASS) study shows 40- and 50-gallon sizes represent 49.8% and 26.4%, respectively, of installed gas water heaters. Based on the DEER Water Heater Calculator v.4.2, a 40-gallon gas water heater with an UEF of 0.58 uses about 166 therms per year, and a 50-gallon gas water heater with an UEF of 0.56 uses about 175 therms per year. These consumption levels are both lower than the result found in the [2019 California Residential Appliance Saturation Study \(RASS\) Report](#) (page 31, Table 36), which shows a Unit Energy Consumption (UEC) for a conventional gas water heater of about 258 therms in PG&E territory, with a saturation rate of 89 percent. Since the 2019 RASS study is more recent than the 2012 CLASS study, and because a 50-gallon water heater's average usage is closer to the 2019 RASS result, PG&E's Net Bill Impact HPWH Study focuses on 50-gallon gas water heaters as being the representative gas water heater.

⁶ The Federal Appliance Regulations gas water heater minimum efficiency requirement has been in effect since 2015. Should a customer replace their current water heater, it is not obligated to get anything more efficient than the code minimum.

For each of the HPWH sizes in the scenarios above (50 and 80 gallons), PG&E also evaluated a range of efficiency levels for that size HPWH – specifically, PG&E looked at UEF values of 3.0, 3.5, and 4.0 – to ensure the data were not skewed to either the lower or higher end of the efficiency spectrum. For each HPWH tank size, there are electric usage profiles for each of: (1) the nine CEC climate zones, (2) the five tank temperature settings, and (3) the three available UEF values. Permutations of each of these three variables result in 135 (9 times 5 times 3) usage profiles. PG&E combined these 135 usage profiles into a single average usage profile by: (a) first averaging the profiles over the 15 temperature/UEF combinations, and then (b) taking a weighted average over the nine CEC climate zones (using the number of customers in each zone as weights).

4. Natural Gas and Electric Rates

For calculating natural gas bills, PG&E used the rates in Schedule G-1, which is PG&E's standard residential gas rate. Schedule G1 is a two-tiered volumetric rate that does not vary by time-of-use period.

For calculating electric bills, PG&E used its default TOU rate, Schedule E-TOU-C, which is a two-tiered, time-of-use rate schedule.⁷ PG&E also calculated electric bills using its recently approved new electrification rate, Schedule E-ELEC which is expected to be available in early 2023 to customers who install HPWH units.⁸

To be conservative (i.e., err on the side of understating net bill savings from replacing gas water heaters with HPWHs), PG&E selected 2020 as the study year. While there was a significant increase in residential average gas rates in the fourth quarter of 2021 (which increased by more than 22% to 24% compared to their levels in the fourth quarter of 2020),⁹ the default E-TOU-C rates increased by just 2% between May 2020 and May 2021. Consequently, the net bill savings estimated in this Study would have been higher had PG&E used 2021 instead of 2020 gas rates.

5. Gas and Electric Customers' Base Usage

Given that most of PG&E's natural gas customers still have conventional gas water heaters¹⁰, this Study calculates average monthly usage from the population of customers whose monthly usage is above a minimum level comparable to the monthly usage of a gas water heater. In this way, vacation homes and residences with electric heating

⁷ After PG&E's TOU Default Transition period has been completed, the majority of PG&E's residential customers will have migrated to Schedule E-TOU-C. As of December 31, 2021, about 1.9 million PG&E residential customers had already migrated, with the remaining waves of default TOU rollout expected to be completed by April 2022.

⁸ Schedule E-ELEC was proposed by PG&E in its 2020 GRC Phase II proceeding, after being directed by the Commission in D.20-03-003 to design a new TOU rate with a fixed charge to encourage electrification efforts by residential customers. See D.20-03-003, Ordering Paragraph 11.

⁹ [Residential.pdf \(pge.com\)](#)

¹⁰ [2019 RASS Study](#) (pg. 31, Table 36) shows that the all-home saturation rate for Conventional Gas Water Heater is 86% in PG&E territory.

sources and little gas usage, who would otherwise skew the results, were excluded from the analysis.

In contrast, since an overwhelming majority of customers have not yet adopted the emerging HPWH technology, PG&E took the average household kWh usage to serve as the “typical electric usage.” PG&E calculated the average separately for the following segments: (1) CARE versus Non-CARE customers, (2) Basic use versus All-Electric space heating customers and (3) three representative PG&E climate zones (PG&E baseline territories X, T and W¹¹).

The average usage for the Basic use customers exceeded their respective baseline quantities. Therefore, 100 percent of the Basic use customer’s additional electric usage caused by installing an HPWH would fall into Tier 2, on average. There were some individual customers with lower usage levels that fell entirely within Tier 1 (and such customers’ additional HPWH usage would result in some of their higher usage falling into Tier 1 and some into Tier 2). However, by instead basing the Study’s calculations on average electric usage, PG&E’s approach resulted in higher estimates of electric bill increases, which therefore yields more conservative net bill impacts (i.e., showing higher electric bill increases, and thus lower net savings than would actually occur).

For All-Electric customers, the Study analyzed only the usage of customers who also take PG&E’s gas service, as these are the All-Electric customers who can fuel switch from natural gas as contemplated by this Study. This group represents about 15% of PG&E’s population of about 1 million All-Electric customers. Including the balance of All-Electric customers (who do not take natural gas service from PG&E and most likely do not have a gas water heater) would skew study results, as these customers generally have higher electric usage than the targeted 15 percent who use PG&E gas service for some of their household energy needs other than space heating and could eliminate such service if they fully electrify.

6. Net Bill Impact Results

Using the inputs described above, PG&E’s Study calculated gas bills both with and without the gas water heater usage -- by first calculating the bill on base usage (i.e., total usage including that of the gas water heater), and then re-calculating the bill after removing the estimated water heater usage from the base gas usage. The difference between these two bills provides the estimated gas bill savings from switching to an HPWH.

On the electric side, PG&E calculated the initial electric bill without HPWH by applying the E-TOU-C rates to the average electric usage by tier and by TOU period. Because installing HPWH technology qualifies any PG&E residential customer to take service on

¹¹ CEC Climate Zone 03 water heater usage profiles were used for Baseline Territory T (San Francisco), Climate Zone 04 water heater usage profiles were used for Baseline Territory X (San Jose), and Climate Zone 13 water heater usage profiles were used for Baseline Territory W (Bakersfield). See Baseline Territory map here: https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_PRELIM_A.pdf.

the new, optional E-ELEC pro-electrification rate, the electric bill with HPWH was calculated by first adding the HPWH load to the average base usage, and then calculating two post-installation bills – one applying the E-TOU-C rates, and the other applying the E-ELEC rates, to the after-adoption usage profile. PG&E then selected the lower of the two bills as the customer’s after-adoption electric bill.

Table 1 shows the results for average Non-CARE and CARE Basic-use customers switching from a 50-gallon gas water heater to a 50-gallon HPWH:

Table 1
Basic Use Customers’ Average Net Bill Impact
Switching from 50-Gallon Gas Water Heater to 50-Gallon HPWH

Gas	Non-CARE	CARE
Gas Rate Schedule	G1	G1L
Gas Annual Usage (therm)	462	394
Gas Bill	\$761	\$495
Gas Water Heater Usage Saved (therm)	175	175
Gas Bill (w/o Gas Water Heater)	\$443	\$264
Gas Bill Savings (after replacing w/HPWH)	\$318	\$231
Electric	Non-CARE	CARE
Electric Rate Schedule (Before)	E-TOU-C	E-TOU-C-L
Electric Rate Schedule (After, Optimal)	E-ELEC	E-ELEC-L
Electric Annual Usage (Before, kWh)	6163	6566
Electric Bill (Before)	\$1,699	\$1,182
Added HPWH Usage (kWh)	1320	1320
Electric Bill (after adding HPWH)	\$1,997	\$1,382
Electric Bill Increase (after adding HPWH)	\$298	\$200
Annual Net Bill Impact from HPWH	-\$20	-\$31

As the results show, both customers would see lower electric bills by opting to take service on PG&E’s new pro-electrification rate, E-ELEC (rather than remain on PG&E’s default TOU rate, E-TOU-C). Moreover, both customers are estimated to see *annual net bill savings* on their combined gas and electric bills when they switch and, at the same time, opt into E-ELEC (for which they become eligible once they install a pro-electrification technology like an HPWH).

Since an HPWH generally needs more time to heat up cold water than an equivalent-sized gas water heater, the First Hour Rating (FHR) for the HPWH will likely be lower than the customer was accustomed to experiencing with the gas water heater being replaced. Thus, to adhere to California Plumbing Code Section 501, such customers would most likely need to upsize their HPWH to meet the minimum FHR and match that of their previous water heater. Such a customer may choose a *larger 80-gallon* HPWH (if they

have the space to do so), to achieve a similar First Hour Rating (FHR) when they replace their existing 50-gallon gas water heater. Also, per the DEER Water Heater Calculator, an 80-gallon HWPW actually uses slightly *less* energy than would a 50-gallon HPWH (likely due to the lower number of times the larger unit uses its backup electric resistance heater, as compared with higher number of times the back-up electric resistance heater is used by a smaller, 50-gallon tank HPWH). The bill impact results for this Scenario are shown in Table 2:

Table 2
Basic Use Customers' Average Net Bill Impact
Switching from 50-Gallon Gas Water Heater to 80-Gallon HPWH

Gas	Non-CARE	CARE
Gas Rate Schedule	G1	G1L
Gas Annual Usage (therm)	462	394
Gas Bill	\$761	\$495
Gas Water Heater Usage Saved (therm)	175	175
Gas Bill (w/o Gas Water Heater)	\$443	\$264
Gas Bill Savings (after replacing w/HPWH)	\$318	\$231
Electric	Non-CARE	CARE
Electric Rate Schedule (Before)	E-TOU-C	E-TOU-C-L
Electric Rate Schedule (After, Optimal)	E-ELEC	E-ELEC-L
Electric Annual Usage (Before, kWh)	6163	6566
Electric Bill (Before)	\$1,699	\$1,182
Added HPWH Usage (kWh)	1298	1298
Electric Bill (after adding HPWH)	\$1,992	\$1,379
Electric Bill Increase (after adding HPWH)	\$293	\$197
Annual Net Bill Impact	-\$25	-\$34

Similar to Table 1, this scenario's results show that both CARE and Non-CARE average Basic use customers would be expected to see an *annual bill savings* (again, by exercising their option to select the E-ELEC rate schedule) if they up-size their tank when switching from a natural gas water heater to an electric HPWH to achieve a comparable FHR.

As noted earlier, PG&E also examined the net bill impact in three separate representative climate zones -- Territories X, T and W -- to determine whether the net bill savings results achieved by the average customers could also be achieved by customers in these specific locations. Table 3 shows the results of this analysis for each geographic region:

Table 3

**Basic Use Customers' Net Bill Impact by Baseline Territory
Switching from 50-Gallon Gas Water Heater to 50-Gallon HPWH**

Basic Use	Territory W (CZ13)		Territory X (CZ4)		Territory T (CZ3)	
Gas	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE
Gas Rate Schedule	G1	G1L	G1	G1L	G1	G1L
Gas Annual Usage (therm)	396	384	490	396	457	393
Gas Bill	\$654	\$494	\$807	\$493	\$744	\$489
Gas Water Heater Usage Saved (therm)	162	162	175	175	183	183
Gas Bill (w/o Gas Water Heater)	\$361	\$267	\$487	\$267	\$421	\$251
Gas Bill Savings (after replacing w/HPWH)	\$293	\$227	\$320	\$226	\$323	\$238
Electric	Non-CARE	CARE	Non-CARE	CARE	Non-CARE	CARE
Electric Rate Schedule (Before)	E-TOU-C	E-TOU-C-L	E-TOU-C	E-TOU-C-L	E-TOU-C	E-TOU-C-L
Electric Rate Schedule (After, Optimal)	E-ELEC	E-ELEC-L	E-ELEC	E-ELEC-L	E-ELEC	E-ELEC-L
Electric Annual Usage (Before, kWh)	8088	8030	6334	5688	4295	4209
Electric Bill (Before)	\$2,292	\$1,482	\$1,747	\$995	\$1,144	\$726
Added HPWH Usage (kWh)	1194	1194	1305	1305	1383	1383
Electric Bill (after adding HPWH)	\$2,530	\$1,640	\$2,025	\$1,210	\$1,514	\$973
Electric Bill Increase (after adding HPWH)	\$238	\$158	\$278	\$215	\$370	\$247
Annual Net Bill Impact	-\$54	-\$69	-\$41	-\$11	\$47	\$9

As Table 3's results show, both CARE and Non-CARE Basic usage customers are expected to see net bill savings in Territories X and W, taking service on optional Schedule E-ELEC. However, an average customer in coastal Territory T may see a slight net bill increase. That said, their projected net bill increase does not factor in projected gas price increases over the 15-year life of the HPWH and, more importantly, the average basic usage CARE and Non-CARE customers in Territory T can still ensure they obtain net bill savings by installing a moderately more efficient HPWH (3.5 UEF or above) and operate it at a tank temperature of 125°F,¹² as shown in Table 4:

¹² As noted earlier, a 125°F tank temperature is the reference temperature used by the CBECC-Res software when modeling an HPWH and is considered hot enough for residential use.

Table 4
Territory T Basic Use Customers' Net Bill Impact
Switching to 50-Gallon HPWH with 3.5 UEF and 125°F Tank Temperature

Gas	Non-CARE	CARE
Gas Rate Schedule	G1	G1L
Gas Annual Usage (therm)	457	393
Gas Bill	\$744	\$489
Gas Water Heater Usage Saved (therm)	183	183
Gas Bill (w/o Gas Water Heater)	\$421	\$251
Gas Bill Savings (after replacing w/HPWH)	\$323	\$238
Electric	Non-CARE	CARE
Electric Rate Schedule (Before)	E-TOU-C	E-TOU-C-L
Electric Rate Schedule (After, Optimal)	E-ELEC	E-ELEC-L
Electric Annual Usage (Before, kWh)	4295	4209
Electric Bill (Before)	\$1,144	\$726
Added HPWH Usage (kWh)	1158	1158
Electric Bill (after adding HPWH)	\$1,462	\$939
Electric Bill Increase (after adding HPWH)	\$318	\$213
Annual Net Bill Impact	-\$4	-\$24

As Table 4 shows, a customer who selects an HPWH model with a UEF value of 3.5 or higher, and operates it at 125°F, would see a further reduction in electric usage that results in net bill savings for both average CARE and Non-CARE customers, even in Territory T (for which Table 3's results had shown bill increases, on average). Thus, PG&E concludes that no rate adjustment is needed, even for Territory T. Bill savings can be achieved in Territory T under PG&E's E-ELEC rate by providing additional education to coastal customers and vendors (such as via rebate programs), that encourages such customers to avoid any potential modest net bill impact by purchasing a more efficient UEF 3.5 or higher HPWH and setting its water temperature to a more efficient 125°F level.

PG&E also examined the net bill impact for All-Electric customers, which PG&E's tariffs define as customers whose *space heating* is all-electric. Given that the focus of this Net Bill Impact Study is on how to get customers that currently use gas water heaters to switch to electric HPWHs, PG&E's Net Impact Study looks only at the subset of All-Electric customers who also take PG&E's natural gas service, as shown in Table 5:

Table 5

**All-Electric Use Customers' Average Net Bill Impact
Switching from 50-Gallon Gas Water Heater to 50-Gallon HPWH**

Gas	Non-CARE	CARE
Gas Rate Schedule	G1	G1L
Gas Annual Usage (therm)	328	303
Gas Bill	\$512	\$373
Gas Water Heater Usage Saved (therm)	175	175
Gas Bill (w/o Gas Water Heater)	\$234	\$154
Gas Bill Savings (after replacing w/HPWH)	\$278	\$219
Electric	Non-CARE	CARE
Electric Rate Schedule (Before)	E-TOU-C	E-TOU-C-L
Electric Rate Schedule (After, Optimal)	E-TOU-C	E-TOU-C-L
Electric Annual Usage (Before, kWh)	6284	7344
Electric Bill (Before)	\$1,571	\$1,205
Added HPWH Usage (kWh)	1320	1320
Electric Bill (after adding HPWH)	\$1,954	\$1,457
Electric Bill Increase (after adding HPWH)	\$383	\$253
Annual Net Bill Impact	\$105	\$33

As Table 5 shows, this small subset of customers, on average would have net bill increases from switching to a *standard* HPWH, as their electric baseline quantities are already high.¹³ This group is comprised of the 15 percent of PG&E's All-Electric customers who have electric space heating but still take PG&E's natural gas services for other appliances (e.g., gas water heater and/or gas stove). For this small subset of All-Electric customers, the move to the non-tiered E-ELEC rate can result in somewhat higher electric bills than if those customers remained on E-TOU-C. For PG&E, there are currently only about 150,000 All-Electric baseline customers who also take PG&E's natural gas service. Still, if such customers are educated, by PG&E and through HPWH vendors, to install a more highly efficient HPWH model (with UEF of 3.7 or above) and operate it at a 120°F tank temperature setting¹⁴, even this subset of All-Electric customers in Territory T can still see net bill savings, as shown below:

¹³ All-Electric customers benefit from larger baseline quantities, which permit greater percentages of their usage to be billed at the lower-tier E-TOU-C rates. For these customers, even though adding an HPWH might increase upper-tier usage (and thus their E-TOU-C bills), the bill increases are still lower than the increases they would pay if they switched to non-tiered E-ELEC and forfeited the benefit accorded to them by the larger baseline quantities if they remain on E-TOU-C.

¹⁴ As noted earlier, a 120°F tank temperature is the recommended temperature used by the Department of Energy's Energy Saver website.

Table 6

**Territory T, All-Electric Use, Customers' Net Bill Impact
Switching to 50-Gallon HPWH with 3.7 UEF and 120°F Tank Temperature**

Gas	Non-CARE	CARE
Gas Rate Schedule	G1	G1L
Gas Annual Usage (therm)	339	313
Gas Bill	\$524	\$381
Gas Water Heater Usage Saved (therm)	183	183
Gas Bill (w/o Gas Water Heater)	\$239	\$156
Gas Bill Savings (after replacing w/HPWH)	\$285	\$224
Electric	Non-CARE	CARE
Electric Rate Schedule (Before)	E-TOU-C	E-TOU-C-L
Electric Rate Schedule (After, Optimal)	E-TOU-C	E-TOU-C-L
Electric Annual Usage (Before, kWh)	4107	4148
Electric Bill (Before)	\$988	\$651
Added HPWH Usage (kWh)	949	949
Electric Bill (after adding HPWH)	\$1,264	\$831
Electric Bill Increase (after adding HPWH)	\$275	\$179
Annual Net Bill Impact	-\$10	-\$45

Again, PG&E recommends helping these customers adopt highly efficient HPWH via targeted electrification programs, with well-trained vendors and right-sized incentive programs, rather than through additional rate changes, because net bill savings are possible for them if they choose a highly efficient HPWH and operate it at a 120°F setting. Moreover, these customers can also achieve even more net bill savings by participating in PG&E's thermal storage load-shifting program called WatterSaver which shifts water heater load from on-peak hours to off-peak hours.

7. Benchmark Studies

As a benchmarking exercise, PG&E compared the results of the net bill impact analysis above with some other studies that also estimate net bill impacts when residential customers switch from natural gas water heaters to electric HPWH units. Although different studies focus on different regions and have different input assumptions, the results are directionally consistent with those obtained in PG&E's Study.

SMUD's Residential Space and Water Heating Electrification study showed the most common water heater capacity is 50 gallons, and the most chosen UEF for HPWH is 3.55.¹⁵ SMUD found that, "participants who converted their gas water heating to heat

¹⁵ DNV, SMUD's Residential Space and Water Heating Electrification, Measurement, Verification, And Market Characterization Study Report (Apr. 29, 2021) p.74.

pumps realized an annual energy cost savings of \$56.” PG&E’s E-ELEC rate, with its \$15 fixed charge, is the most similar to SMUD’s default residential rate. However, the fixed charge on SMUD’s residential rate is higher, at \$22.70,¹⁶ and it has lower volumetric rates than E-ELEC. Given such differences, SMUD’s \$56 net bill savings estimate is comparable to PG&E’s range of \$20 to \$31 net bill savings for Basic use customers switching from a 50-gallon gas water heater to a 50-gallon HPWH (as shown in Table 1 above).

Appendix A of PG&E’s San Joaquin Valley Disadvantaged Communities 2020 Annual Report presents results showing estimated annual net bill savings of about \$481 for participants after completion of the whole-home electrification project.^{17,18} Because installing an HPWH is just one of many technology changes included in a whole-home electrification effort, the net bill savings estimate from this report is consistent with the results from PG&E’s Study here, which focuses solely on HPWH and does not include a net bill impact from space heating conversion (which would typically see higher annual net bill savings). The two HPWH models most typically being installed in the field at present tend to be 50-gallon capacity with an UEF of 3.75, and 60-gallon with UEF of 3.85. Those gallon capacity sizes are within the size ranges used in this Study, and the UEFs of 3.75 and 3.85 are near the higher end of the UEFs used in this Study. Customers’ net bill savings are higher when they adopt HPWHs with higher UEFs; therefore it is not surprising that the SJVDC report showed higher net bill savings than are reflected in this more conservative Study. Indeed the SJVDC Report reinforces PG&E’s recommendation to focus on educating customers and vendors on selecting more highly efficient HPWH models for greater net bill savings.

The consulting firm E3’s “Residential Building Electrification in California Report” (E3 Report) stated, “Heat pump water heater results in bill savings for retrofits, [and a] mixed story for new construction.”¹⁹ The E3 Report showed that, for the Bay Area (a mix of CEC Climate Zones 3 and 4, or a mix of PG&E’s Baseline Territories T and X), the average annual net bill savings when a single-family home switches from a gas storage water heater to an HPWH range from about \$25 to \$70.^{20,21} The E3 Report defined average bill savings as the annual present value of the total bill savings of an appliance throughout

¹⁶ <https://www.smud.org/-/media/Documents/Electric-Rates/Residential-and-Business-Rate-information/PDFs/1-R.ashx>

¹⁷ [SanJoaquinValleySJV-DisadvantagedCommunitiesOIR_Report_PGE_20201221_635322.pdf](#), p. 25.

¹⁸ Customers have a 20% discount for bill protection applied after participating in this pilot, so a portion of the savings are due to the discount.

¹⁹ The E3 Report can be found at the following link: https://www.ethree.com/wp-content/uploads/2019/07/CA_Res_Building_Electrification_Final_Presentation.pdf

²⁰ [E3 Report](#), p. 27. Single Family, HPWH vs Gas Storage.

²¹ The E3 Report used a gas water heater with UEF of 0.63. This UEF is higher than the 0.56 UEF used in PG&E’s Study. Therefore, customers’ gas usage saving would be expected to be lower in the E3 study. The E3 Report also used an HPWH with UEF of 3.0 and 3.4. The efficiency for HPWH is near the lower and the middle range of the efficiency used in PG&E’s Study, knowing that the E3 Report was completed several years ago, and released in April 2019. Since it used lower UEFs than PG&E’s Study, the E3 Report’s electric usage increase due to HPWH is expected to be higher than the usage used estimated in PG&E’s Study holding other factors constant. However, the tank temperature assumption, which is another major factor for energy usage, is unknown in the E3 Report.

its lifetime. E3 forecasted that gas rates would increase by about 50 percent from 2020 to 2030, while electric rates would increase by about 20 percent during that same ten-year period.²² In contrast, PG&E's Study only looked at a one-year bill impact (conservatively choosing 2020), without taking into consideration the expectation that future gas rate increases will very likely outstrip electric rate increases during the transition to decarbonization. If PG&E's Study had used a net present value of gas and electric rate increases, similar to that used in the E3 Report, PG&E's net bill savings for Territory T and X combined would have been about \$33 dollars per year from replacing a 50-gallon gas water heater with a 50-gallon HPWH, and this result is within the range of the E3 Report's results.

8. Conclusion

In conclusion, PG&E's Study shows that, on average, customers who switch from a gas water heater to a typical industry-prevalent HPWH are likely to see a net bill savings by taking service on PG&E's new pro-electrification rate, Schedule E-ELEC, recently approved in D.21-11-016. Because this Study only looks at 2020 gas prices and natural gas rates are expected to increase faster than electric rates in the coming decade, the net bill savings from moving to an HPWH in PG&E's service territory will grow over time, especially as higher efficiency HPWH models become more dominant in this emerging market. Based on this Study, the presence of PG&E's new electrification rate, E-ELEC, will provide bill savings to help encourage PG&E's residential customers to replace their old gas water heaters with new HPWH units; therefore, it is not necessary for PG&E to file a special new rate design window application to propose a further HPWH-specific rate approaches beyond its new pro-electrification rate, Schedule E-ELEC, which is expected to become effective in early 2023.

Finally, PG&E notes that even though HPWH Net Bill Impact Study shows that, based on average gas water heater and HPWH profiles, a customer that replaces its gas water heater with an HPWH and qualifies for Schedule E-ELEC can enjoy increased net bill savings over time, it is important to remember that such rate benefits would arrive for the customer slowly over the life of any HPWH they might purchase. These net bill savings do not directly help customers overcome the potential up-front financial barrier presented when deciding whether they can fit the purchase and installation cost of a new HPWH into their household budget. Such systems typically range in cost from about \$1,300 to \$2,000 for the HPWH itself, and installation costs can add upwards of \$2,000. In addition, sometimes electrical panel upgrades are required that can add another \$4,000, or so. The Energy Division's April 2021 SGIP HPWH Staff Proposal estimates total costs of the average HPWH to be \$4,540 if a panel upgrade is not necessary and \$8,381 if it is.²³

²² https://www.ethree.com/wp-content/uploads/2019/07/CA_Res_Building_Electrification_Final_Presentation.pdf, p. 25. Utility Rate Escalation Assumptions

²³ See CPUC Energy Division Staff, "SGIP HPWH Staff Proposal," April 19, 2021, pp. 28-31 (Tables 3-1, 3-2 and 3-3). This Staff Proposal is included as Attachment 1 to ALJ Cathleen Fogel's April 16, 2021 "Administrative Law Judge's Ruling Providing Proposal, Requesting Comment, and Updating Procedural Schedule," which can be found at <https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M377/K729/377729072.PDF>.

Therefore, PG&E respectfully recommends the CPUC prioritize and continue its focus on ways to address the up-front financial barriers for HPWH adoption. This includes ensuring that the available up-front customer incentives to purchase the HPWH itself are right-sized (both checking that the total dollar amount of incentives for switching to an HPWH are adequate and ensuring that the number of customers who may receive such incentives each year is high enough to spur accelerated HPWH adoption). It also means addressing the up-front costs which are not covered by such incentives and thus would benefit from new efforts to provide financing assistance. For example, the Commission's Clean Energy Financing Options (CEFO) OIR (R.20-08-022) is exploring development of integrated (multi-technology) customer financing options to further help enable customers to decide to invest in HPWHs and other clean energy technologies. PG&E will continue to wholeheartedly support the Commission's and the state's building electrification and decarbonization efforts, including seeking to help more residential customers overcome any current up-front cost barriers, to spur them to adopt HPWH and other decarbonization technologies to fight climate change.

**PG&E Gas and Electric
Advice Submittal List
General Order 96-B, Section IV**

AT&T Albion Power Company	East Bay Community Energy Ellison Schneider & Harris LLP Energy Management Service	Pioneer Community Energy
Alta Power Group, LLC Anderson & Poole	Engineers and Scientists of California	Public Advocates Office
Atlas ReFuel BART	GenOn Energy, Inc. Goodin, MacBride, Squeri, Schlotz & Ritchie	Redwood Coast Energy Authority Regulatory & Cogeneration Service, Inc. SCD Energy Solutions San Diego Gas & Electric Company
Barkovich & Yap, Inc. California Cotton Ginners & Growers Assn California Energy Commission	Green Power Institute Hanna & Morton ICF International Power Technology	SPURR San Francisco Water Power and Sewer Semptra Utilities
California Hub for Energy Efficiency Financing	Intertie	Sierra Telephone Company, Inc. Southern California Edison Company Southern California Gas Company Spark Energy Sun Light & Power Sunshine Design Tecogen, Inc. TerraVerde Renewable Partners Tiger Natural Gas, Inc.
California Alternative Energy and Advanced Transportation Financing Authority California Public Utilities Commission Calpine	Intestate Gas Services, Inc. Kelly Group Ken Bohn Consulting Keyes & Fox LLP Leviton Manufacturing Co., Inc.	TransCanada Utility Cost Management Utility Power Solutions Water and Energy Consulting Wellhead Electric Company Western Manufactured Housing Communities Association (WMA) Yep Energy
Cameron-Daniel, P.C. Casner, Steve Center for Biological Diversity	Los Angeles County Integrated Waste Management Task Force MRW & Associates Manatt Phelps Phillips Marin Energy Authority McClintock IP McKenzie & Associates	
Chevron Pipeline and Power City of Palo Alto	Modesto Irrigation District NLine Energy, Inc. NRG Solar	
City of San Jose Clean Power Research Coast Economic Consulting Commercial Energy Crossborder Energy Crown Road Energy, LLC Davis Wright Tremaine LLP Day Carter Murphy	OnGrid Solar Pacific Gas and Electric Company Peninsula Clean Energy	
Dept of General Services Don Pickett & Associates, Inc. Douglass & Liddell		