

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

ENERGY DIVISION

Agenda ID # 21098  
RESOLUTION E-5233  
December 1, 2022

R E S O L U T I O N

E-5233. Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company: Resolution of net electric and gas bill impact studies for customers switching from a natural gas water heater to an electric heat pump water heater.

PROPOSED OUTCOME:

- Approves Pacific Gas and Electric Company's finding that an additional rate adjustment is not required to ensure bill savings for customers switching from a gas water heater to an electric heat pump water heater.
- Approves Southern California Edison Company's finding that an additional rate adjustment is not required to ensure bill savings for customers switching from a gas water heater to an electric heat pump water heater.
- Finds that a rate adjustment is not required for San Diego Gas & Electric Company to ensure bill savings for customers switching from a gas water heater to an electric heat pump water heater.

SAFETY CONSIDERATIONS:

- There are no safety considerations associated with this resolution.

ESTIMATED COST:

- There are no costs associated with this resolution.

By Advice Letters 4571-G/6497-E, 4571-G-A/6497-E-A (PG&E), 4713-E, 4713-E-A (SCE), 3952-E/ 3063-G, 3952-E-A/ 3063-G-A (SDG&E) filed on February 7, 2022.

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## **SUMMARY**

This Resolution is being enacted within the California Public Utilities Commission's (CPUC's or Commission's) Building Decarbonization proceeding: Rulemaking (R.) 19-01-011.<sup>1</sup> In Ordering Paragraph (OP) 4 of Decision (D.) 21-11-002<sup>2</sup> of this proceeding, CPUC directed Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E) to study the net electric and gas bill impacts that result when a residential customer switches from a gas water heater to an electric heat pump water heater and submit the studies to CPUC through a Tier 3 Advice Letter (AL). If a utility's study shows an increase in customers' net energy bills resulting from switching to an electric heat pump water heater from a gas water heater, the Decision requires the utilities to propose a rate adjustment in a new Rate Design Window (RDW) Application.

This Resolution reviews the utilities' study findings and finds that a rate adjustment is not required for PG&E, SCE and SDG&E. However:

- 1) Beginning July 1, 2023, PG&E, SCE, and SDG&E shall collect information about the rate schedule and the type of water heater in customer households at the time of starting new service or moving existing service. To minimize administrative burden, this information may be collected at the same time as data required to be collected by Appendix D Section II.A of D.21-11-002. Annually, beginning February 1, 2024, each utility shall report this data to the CPUC along with the data required by Appendix D Section II.B of D.21-11-002. The non-confidential portions of the data shall be posted on a publicly accessible website at the same location as data posted to fulfil the requirements of Resolution E-5105.<sup>3</sup>
- 2) Within 90 days of issuance of the final decision for its TOU E-ELEC application,<sup>4</sup> SDG&E shall submit a Tier-1 informational AL estimating the bill impact for customers switching from gas water heater to electric heat pump water heater using the approved TOU E-ELEC rate with the inputs and assumptions specified in this Resolution.
- 3) Energy Division staff overseeing implementation of current and future heat pump water heater programs, including but not limited to the Technology and Equipment for Clean Heating Initiative and the electric heat pump water heater incentives under the Self-Generation Incentive Program, shall direct the

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<sup>1</sup> R.19-01-011:

[https://apps.cpuc.ca.gov/apex/f?p=401:56:0::NO:RP,57,RIR:P5\\_PROCEEDING\\_SELECT:R1901011](https://apps.cpuc.ca.gov/apex/f?p=401:56:0::NO:RP,57,RIR:P5_PROCEEDING_SELECT:R1901011)

<sup>2</sup> D.21-11-002: <https://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=421107786>.

<sup>3</sup> E-5105: <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M348/K071/348071702.PDF>

<sup>4</sup> SDG&E TOU E-ELEC Application (A.) 21-09-001: <https://apps.cpuc.ca.gov/apex/f?p=401:56:0::::>

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

implementer of these programs to ensure that customers who are switching to electric heat pump water heaters are educated regarding available electric rates that may result in bill savings.

- 4) We encourage PG&E, SCE and SDG&E to educate customers about the bill impact of their rate choices when opting for an electric heat pump water incentivized through ratepayer-funded programs. These include but may not be limited to programs and measures within the Energy Efficiency proceeding and the SGIP proceeding. Such education should ensure that a) customers are made aware of the most favorable rates available to them when switching from a gas water heater to an electric heat pump water heater, and b) customers are made aware whether they are likely to see bill savings and circumstances under which they are likely to see bill savings (such as tank temperature settings, behavioral changes, equipment efficiency and water heater size).

## **BACKGROUND**

On January 31, 2019, in response to the passage of Senate Bill (SB) 1477 (Stern, 2018), the CPUC initiated Rulemaking (R.) 19-01-011 to support the decarbonization of buildings in California. The proceeding was “designed to be inclusive of any alternatives that could lead to the reduction of greenhouse gas (GHG) emissions associated with energy use in buildings [related]...to the State’s goals of reducing economy-wide GHG emissions 40% below 1990 levels by 2030 and achieving carbon neutrality by 2045 or sooner.”<sup>5</sup>

Decision (D.) 20-03-027 completed Phase I of the proceeding. It established the two building decarbonization pilot programs required by SB 1477: (1) the Building Initiative for Low-Emissions Development (BUILD) Program and (2) the Technology and Equipment for Clean Heating (TECH) Initiative.

D.21-11-002 completed Phase II of the proceeding. This decision a) established the framework for layering customer incentives when multiple rate-payer programs incentivize identical or overlapping decarbonization measures, b) authorized a new \$50 million program for supporting the construction of decarbonized buildings in communities affected by wildfires and other natural disasters, c) provided guidance for data sharing among building decarbonization programs and, d) required PG&E, SCE and SDG&E to study whether customers would see bill increases if switching from gas waters to electric heat pump water heaters, and address these potential bill increases by means of a rate adjustment, if needed.

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<sup>5</sup> Order Instituting Rulemaking (OIR) 19-01-011 at 2.

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

This Resolution reviews the utilities' bill impact studies and serves to determine whether a rate adjustment is needed. It resolves the following ALs containing the utilities' studies: PG&E; 4571-G/6497-E, 4571-G-A/6497-E-A, SCE; 4713-E, 4713-E-A and SDG&E; 3952-E/ 3063-G, 3952-E-A/ 3063-G-A.

As explained above, these ALs were required by OP 4 of D.21-11-002, which states:

*Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company (utilities) shall address electric heat pump water heater (HPWH) barrier equitably, efficiently, and reasonably to avoid delay.*

*(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 heat pump water heater (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 utilities shall propose a rate adjustment for their residential customers who install HPWH in a new Rate Design Window application within six months of the issuance of this decision. The utilities' proposals shall comply with the requirements as set forth in Appendix D.*

PG&E, SCE, and SDG&E each timely submitted their ALs containing their respective studies on February 7, 2022, in compliance with OP 4(a). Energy Division staff requested additional information via supplemental ALs as well as data requests to determine whether the utilities needed to propose a rate adjustment in a new RDW application. To provide adequate time to respond to Energy Division, the utilities each sought timely extensions to the six-month deadline in OP 4(b) as allowed by Rule 16.6 of CPUC Rules of Practice and Procedure. The CPUC Executive Director granted these extensions to the three utilities on May 4, 2022.

Consequently, if this Resolution were to determine that a rate adjustment is required, the following deadlines would apply to each utility for proposing a rate adjustment:

- PG&E: November 30, 2022.
- SCE: Until 90 days after the issuance of this Resolution.<sup>6</sup>

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<sup>6</sup> Note that the Executive Director's approval of SCE's request for an extension is until 90 days after the issuance of the Commission's Decision on SCE's GRC Phase 2 Application (A.20-10-012), or 90 days after the issuance of the Commission Resolution on AL 4713-E, whichever occurs later. The CPUC issued D.22-08-001 approving SCE's GRC Phase 2 Application on August 9, 2022. As such, the 90-day filing deadline would be tied to this Resolution and not D.22-08-001.

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

- SDG&E: Until 90 days after the issuance of this Resolution, or, 90 days after the issuance of the CPUC's final Decision on SDG&E's proposed TOU E-ELEC rate in A.21-09-001, whichever is later.

Conversely, if this Resolution determines that a rate adjustment is not required, then the above deadlines would be moot.

### **NOTICE**

Notice of AL 4571-G/6497-E, 4571-G-A/6497-E-A (PG&E), 4713-E, 4713-E-A (SCE), and 3952-E/ 3063-G, 3952-E-A/ 3063-G-A (SDG&E) was made by publication in the Commission's Daily Calendar. PG&E, SCE, and SDG&E state that a copy of the Advice Letters was mailed and distributed in accordance with Section 4 of General Order 96-B.

### **PROTESTS**

Advice Letters 4571-G/6497-E, 4571-G-A/6497-E-A (PG&E), 4713-E, 4713-E-A (SCE), and 3952-E/ 3063-G, 3952-E-A/ 3063-G-A (SDG&E) were not protested.

## **DISCUSSION**

Consistent with the requirements of Decision (D.) 21-11-002, PG&E, SCE, and SDG&E each conducted independent studies to discern whether and under what circumstances their customers will realize bill savings when switching from a gas water heater to an electric heat pump water heater.

Each utility made a set of assumptions and estimates to arrive at an answer. Generally, all three utilities used equipment efficiency and the temperature set point of the water heater to be the dependent variables, while the climate zone where the equipment is going to operate to be the independent variable. Many other variables, such as original and eventual rate schedule choice, customer habits, location of equipment within the home, tank size of the existing and new equipment, etc. were recognized as additional variables that affect customer bills.

This Resolution discusses the various inputs and assumptions that impacted the utilities' bill calculations, and how Energy Division staff selected what was reasonable. Once Energy Division staff standardized the assumptions and fixed the inputs based on the rationale explained below, the utilities were asked to rerun their analyses with these uniform criteria. After the utilities had run the new analyses, submitted as responses to data requests, staff reviewed the results to determine whether customers will realize bill savings, and whether the utilities should be required to propose any rate adjustments.

### **I. Inputs and Assumptions for Estimating Bill Impacts**

Energy Division finalized the following inputs and assumptions in its review of the utilities' bill impact analyses.

- 1) Energy Use Estimates: Accepts outputs from the Database for Energy Efficient Resources (DEER) for estimating annual energy use of both gas water heaters and electric heat pump water heaters.<sup>7</sup>
- 2) Rate Schedule: Accepts bill analyses based on available and/or approved default TOU rates or pro-electrification TOU rates, reviews bill analyses for non-TOU rates
- 3) Bill Discounts: Assumes customer is not on any bill discount programs (CARE/FERA, Medical Baseline)

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<sup>7</sup> DEER is a Commission-maintained and vetted database that is updated annually through a resolution. DEER provides estimates of the typical energy-savings potential for several technologies and measures in residential and nonresidential applications. As new technologies and measures become available in the market, they are incorporated into the database following a Commission review process. DEER is used by California energy efficiency program administrators, private sector implementers, and the EE industry across the country to develop and design energy efficiency programs.

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

- 4) Behavioral changes: Assumes no behavioral changes from the customer
- 5) Load-shifting Potential: Assumes no load shifting from the electric heat pump water heater
- 6) Tank Temperature Settings: Assumes water heater operating tank temperature of 125°F
- 7) Water Heater Size: Assumes a “like-for-like” replacement for water heater size (e.g., 50-gallon with 50-gallon)
- 8) Gas Water Heater UEF: Assumes a UEF of 0.56 for the gas water heater that is being replaced
- 9) Electric Heat Pump Water Heater UEF: Assumes a UEF of 3.3 for the electric heat pump water heater that is being installed
- 10) Climate Zones: Reviews bill impacts in all climate zones

A more detailed discussion of each of these is presented below.

#### A. Use of Estimated Energy Use Profiles

Energy Division staff agrees with the utilities’ approach to use estimated energy use profiles, instead of actual (historic) customer meter data.

All three utilities avoided using customer energy consumption data collected from utility meters. That is, they did not analyze actual metered energy consumption of customers who previously had a gas water heater and subsequently switched to an electric heat pump water heater. Consequently, one common characteristic of the three studies was the use of the Database for Energy Efficient Resources (DEER) for estimating annual energy use of both gas water heaters and electric heat pump water heaters.<sup>7</sup>

For impact studies, although the CPUC generally favors the use of actual energy use data collected from customers’ electric and gas meters wherever possible, we agree that for this particular study it is appropriate to use modeled estimates of energy consumption, as it will be highly challenging to find a large enough sample of customers in every climate zone who had actually replaced their gas water heaters with similar characteristics of rates, efficiencies of previous and replaced equipment, to derive meaningful results. Further, unless installed through a ratepayer-incented program, the utility does not have sufficient insight into the customer’s equipment. Collecting such information first-hand would be time-consuming and cost prohibitive. Modeled estimates are therefore an acceptable approach.

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
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Regarding DEER, PG&E noted that because of the timing of when the ALs were due, it was unable to use the latest version (5.0) of the DEER water heater calculator and instead used version 4.2. SCE and SDG&E also used version 4.2 of the DEER water heater calculator.

Energy Division found that the newer version would not significantly impact bill calculations since the variables that impact the load profile (e.g., average daily hot water consumption, equipment efficiency, and air temperature changes by climate zone) were largely similar in both versions.<sup>8</sup> As such, Energy Division determined it acceptable to use the DEER water heater calculator version 4.2 for estimating annual energy used by gas water heaters and electric heat pump water heaters for these studies.<sup>9</sup> However, we do note that a limitation of the DEER water heater calculator is that the energy use profiles are based on hourly use estimates, while hot water consumption can fluctuate within smaller time intervals from minor use like washing hands or a short shower.

Overall, Energy Division finds that it is appropriate to use the DEER water heater calculator version 4.2 for estimating annual energy used for gas water heaters and electric heat pump water heaters.

## B. Rate Schedules

Energy Division staff agrees with the utilities' approach to use TOU rates for determining whether a rate adjustment is needed, but finds it beneficial to also study the bill impact for non-TOU rates.

In their original AL filings, all three utilities submitted their respective analyses for time-of-use (TOU) rate schedules only.<sup>10</sup> At Energy Division's request, supplemental analyses were later submitted by each utility that included non-TOU rates. Therefore, each utility studied bill impacts for at least their default TOU rate and their default non-TOU rate. Additionally, each utility also studied the impact of those rates designed specifically to promote building electrification ("pro-electrification rates"). Below we list the pro-electrification rates that were included in each utility's analysis:

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<sup>8</sup> Peter Biermayer (Energy Division) and Christopher Williams (DNVGL). E-mail to Abhilasha Wadhwa on March 25, 2022.

<sup>9</sup> See: <http://www.deeresources.com/index.php/water-heater-resources>.

<sup>10</sup> Time-of-use is a rate plan in which rates vary according to the time of day, season, and day type (weekday or weekend/holiday). Higher rates are charged during the peak demand hours and lower rates during off-peak (low) demand hours. Rates are also typically higher in summer months than in winter months. This rate structure provides price signals to energy users to shift energy use from peak hours to off-peak hours. See: <https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-rates>.



PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

- 1) **PG&E:** E-ELEC. Approved by CPUC in D.21-11-016 and expected to be available to customers in early 2023.<sup>11</sup>
- 2) **SCE:** TOU-D-Prime (available), TOU-D-4to9, and TOU-D-5to8. SCE proposed an incremental baseline allowance for customers with electric heat pump water heaters who take service on either of these rates in its GRC Phase 2 Application (A.20-10-012). The parties reached a settlement agreement on December 17, 2021. On August 9, 2022, in D.22-08-001, CPUC approved the rate adjustment, that is, the increased baseline allowance, to be applied to these rates. Both rates are currently available without the newly approved baseline allowance, which is expected to be incorporated into the rate schedules and made available to customers in 2023.
- 3) **SDG&E:** TOU E-ELEC (pending CPUC decision). SDG&E proposed this rate in A.21-09-001. The parties did not reach a settlement. A Proposed Decision was issued on September 29, 2022.<sup>12</sup>

Energy Division accepted PG&E's use of E-ELEC rate, since it has already been approved by CPUC. Similarly, Energy Division also accepted SCE's use of TOU-D-4to9 and TOU-D-5to8 rates with the newly approved baseline adjustment. Energy Division did not accept that portion of SDG&E's analysis that studied bill impacts using their proposed pro-electrification rate TOU E-ELEC, as it is currently pending CPUC review under A.21-09-001. We accepted SDG&E's current default TOU rate- TOU-DR1- for reviewing their analysis.

In a 2015 decision, D.15-07-001,<sup>13</sup> CPUC had directed PG&E, SCE and SDG&E to propose default TOU rates for residential customers. In subsequent GRC proceedings, CPUC approved the dates by which utilities must transition their customers. The transition was completed in 2022.<sup>14</sup> Most customers would be automatically moved over to TOU rates, unless they seek to opt out. As of the writing of this Resolution almost 60 percent of PG&E customers are on TOU rates. Similarly, for SCE, about 57 percent of customers are currently on TOU rates (approximately two million customers). For SDG&E, nearly 78 percent of customers are on TOU rates.

This is a significant portion of each utility's customer base. Energy Division asserts that it is important that utilities also study bill impacts for non-TOU customers, especially because a currently unknown number of customers may continue to stay on or switch

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<sup>11</sup> D.21.11-016: <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M424/K378/424378035.PDF>.

<sup>12</sup> <https://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=497334796>

<sup>13</sup> D.15-07-001: <https://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=153110321>

<sup>14</sup> SDG&E transitioned all eligible customers in May 2020, PG&E in April 2022, and SCE in June 2022. CARE/FERA customers in non-coastal climate zones were exempt from the transition.

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

back to these rates. It is also important to study non-TOU rates so that when customers switch to electric heat pump water heaters, they can be provided a factual comparison of their estimated bill impacts based on all the available rates. For this reason, the utilities were asked to also study bill impacts using non-TOU rates. These are included in the findings section for each utility.

Regarding customer awareness of rates, we note that there are various ratepayer-funded programs that incentivize customers to adopt electric heat pump water heaters. Many of these programs exist outside the Building Decarbonization proceeding, such as measures within the Energy Efficiency proceeding,<sup>15</sup> the Self-Generation Incentive Program (SGIP) proceeding,<sup>16</sup> and the Energy Savings Assistance program proceeding. However, often the utilities have little to no direct involvement in the implementation of these programs. For instance, the TECH Initiative is implemented by a third-party program implementer with direct oversight from Energy Division staff, and with SCE as the contracting agent.

With regard to the role of utilities in facilitating rates education for customers, it is important for Energy Division staff to understand what rate the customers who have electric heat pump water heaters are currently on, and whether they eventually switch to a rate that saves them the most money, as this could help guide future policies and programs by identifying gaps in customer education.

We find it reasonable that PG&E, SCE and SDG&E report to the CPUC the rate schedule and type of water heater in customer households at the time of starting new service or moving existing service, on an ongoing basis.

In conclusion, we find it reasonable that if a utility's analysis shows, on average, bill savings for a vast majority of its customers on pro-electrification TOU rates- or in the absence of a pro-electrification rate- any available TOU rate, then a rate adjustment should not be required from that utility.

### C. Load Shifting Potential

Energy Division agrees with the utilities' approach that assumes no shifting of energy use from peak to non-peak hours for estimating bill savings.

All three utilities assumed no shifting of energy use from peak to non-peak hours ("load shifting") from electric heat pump water heaters for their primary analysis. SCE also

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<sup>15</sup> Energy Efficiency proceeding; R-13-11-005:

[https://apps.cpuc.ca.gov/apex/f?p=401:56:9148136253432::NO:RP,57,RIR:P5\\_PROCEEDING\\_SELECT:R1311005](https://apps.cpuc.ca.gov/apex/f?p=401:56:9148136253432::NO:RP,57,RIR:P5_PROCEEDING_SELECT:R1311005)

<sup>16</sup> SGIP proceeding; R.20-05-012:

[https://apps.cpuc.ca.gov/apex/f?p=401:56:0::NO:RP,57,RIR:P5\\_PROCEEDING\\_SELECT:R2005012](https://apps.cpuc.ca.gov/apex/f?p=401:56:0::NO:RP,57,RIR:P5_PROCEEDING_SELECT:R2005012)

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SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

submitted estimates of annual net energy costs with load shifting.<sup>17</sup> While we believe that electric heat pump water heaters hold promise as load shifting devices, the technology is fairly new to the current market, and their load shifting potential continues to be explored in real world conditions. The Technology and Equipment for Clean Heating (TECH) Initiative<sup>18</sup> launched a regional pilot in early 2022 to promote the load shifting potential of electric heat pump water heaters,<sup>19</sup> the results of which will likely not be available until at least late 2023. Additionally, under the Self-Generation Incentive Program, the CPUC issued D.22-04-036<sup>20</sup> on April 11, 2022 which established, among other things, the load shifting requirements for electric heat pump water heaters installed in residences. As such we find that it is fairly early to estimate load shifting potential of electric heat pump water heaters. By not modelling the load shifting potential at this stage, we also leave room for greater bill savings for the customer if and when they explore this potential. Along with this assumption, customer behavioral changes are also assumed to be null, as explained in the section below.

Therefore, we find that it is reasonable to assume no load shifting potential in reviewing the utilities' study findings.

#### D. Behavioral Changes

Energy Division staff agrees with the utilities' assumption of no behavioral change from the customer when switching over to an electric heat pump water heater.

All three utilities assume no behavioral changes from the customer- so as to model neither positive nor negative impact on the bills from behavioral changes. For instance, the studies do not assume that the customer will shift their hot water usage from peak to off-peak hours.

We accept this assumption, as it lends itself to a more conservative approach for estimating customer bill impacts. If customers do shift their hot water usage in this way, then they may see more bill savings than those reflected in the utilities' analyses. Conversely, if a customer uses more hot water during peak hours after switching to an

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<sup>17</sup> SCE AL 4713-E, Appendix E.

<sup>18</sup> The TECH Initiative was authorized by Senate Bill 1477 and approved by the CPUC as part of D.20-03-027 on March 26, 2020. It authorized \$120 million for installation of space and water heating technologies in California. As of September 6, 2022, the TECH Initiative had installed 1,236 HPWHs and 8,563 heat pump HVAC units.

<sup>19</sup> Slide 44: TECH Initiative Quarterly Meeting June 29, 2022: <https://energy-solution.com/wp-content/uploads/2022/07/TECH-4th-Quarterly-Stakeholder-Meeting.pdf>

<sup>20</sup> D.22-04-036: <https://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=467581288>

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SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

electric heat pump water heater, such as on account of the “rebound effect<sup>21</sup>” from procuring a more efficient equipment, then that behavior is also not accounted for in the utilities’ analysis.

Therefore, we find it reasonable to assume no behavioral changes from the customer in reviewing the utilities’ study findings.

#### E. CARE/FERA and Medical Baseline Discount

Energy Division finds that it is appropriate to assume no bill discounts when analyzing bill impacts.

California Alternate Rates for Energy (CARE) and Family Electric Rate Assistance (FERA) are two income-based programs that offer a discount on the electric and gas bills of the enrolling customer.<sup>22</sup> FERA offers an 18 percent discount on their electricity bill. CARE offers a 30-35 percent discount on their electricity bill and a 20 percent discount on their gas bill. Similarly, the Medical Baseline program<sup>23</sup> provides enrollees a higher amount of electricity and gas on a discounted rate, based on the approved medical need and climate zone. Also, a customer who meets the eligibility criteria for both CARE/FERA and Medical Baseline can simultaneously enroll in both programs.

As the CARE/FERA programs offer a steeper discount on electricity bills than gas bills, customers on these programs who install electric heat pump water heaters see some benefit even without the utilities doing any adjustments to the rates. While this higher bill discount for electric rates is overall favorable for electrification of CARE/FERA-enrolled households, it does not offer an accurate picture of the impact of current rates for low-income households that are not on these discounts. Similarly, Medical Baseline program customers may see higher bill savings, but the program is not used by a majority of the customers. The more conservative approach is to consider only undiscounted customer bills when deciding whether a rate adjustment is needed or not, because if those customer sees bill savings when switching from a gas water to an electric heat pump water heater, the CARE/FERA and Medical Baseline customer will likely see even more bill savings under the same rate.

Therefore, we find it reasonable that bill impacts should be evaluated primarily for customers who are not on the CARE/FERA and/or Medical Baseline program.

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<sup>21</sup> Gillingham et. Al. “The Rebound Effect and Energy Efficiency Policy”

[https://environment.yale.edu/gillingham/GillinghamRapsonWagner\\_Rebound.pdf](https://environment.yale.edu/gillingham/GillinghamRapsonWagner_Rebound.pdf)

<sup>22</sup> See: <https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-costs/care-fera-program>.

<sup>23</sup> Medical Baseline: <https://www.cpuc.ca.gov/consumer-support/financial-assistance-savings-and-discounts/medical-baseline>.

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SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

## F. Tank Temperature Settings

Energy Division finds that 125°F is the appropriate tank temperature setting to assume for the bill impact analysis.

PG&E and SDG&E analyzed the impact of different tank temperature settings varying from 120°F to 135°F on the electric heat pump water heater's energy use, and its consequent bill impact. SCE's initial analysis was based on a tank temperature assumption of 135°F only, but at Energy Division staff's request, subsequent analysis was submitted for 125°F tank temperature setting.

Lower tank temperature settings result in lower energy usage. There is also a correlation between setting the device at a higher temperature and load shifting; in other words, if a device is set to a higher temperature (e.g., 135°F) during off-peak hours, then it can potentially deliver hot water during peak hours for longer without kicking into electric resistance mode (which is more energy intensive).

The default device settings from heat pump water heater manufacturers do not vary the tank temperature at different times of the day. Energy Division staff looked at three manufacturers' recommended tank temperature settings.<sup>24</sup> To prevent scalding, manufacturers recommend that the tank temperatures be kept at 120-125°F. The default factory settings for electric heat pump water heaters are in this range. This also aligns with the Center for Disease Control and Prevention's recommendations to prevent burns from scalding water, especially in households with children.<sup>25</sup>

For this reason, we find it reasonable to assume tank temperature settings of 125°F for the analysis.

## G. Water Heater Size

Energy Division agrees with the assumption that most customers are likely to switch to a water heater of a similar tank capacity to what they previously had.

Another variable that impacts energy use and consequently energy bills is the size of the electric heat pump water heater that replaces the original gas water heater. Because

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<sup>24</sup> 1) Rheem Use & Care Manual: <https://s3.amazonaws.com/WebPartners/ProductDocuments/2679665F-4FDA-42AC-8DBF-A938F4CA2FAC.pdf> ; p.3.

2) A.O Smith Voltex Hybrid Electric Heat Pump Water Heater Installation Instructions and Use & Care Guide: [https://www.hotwater.com/lit/im/res\\_elec/318257-002.pdf](https://www.hotwater.com/lit/im/res_elec/318257-002.pdf)

3) Bradford White Heat Pump Water Heater Installation and Instruction Manual: [https://bradfordwhitecorp.s3.amazonaws.com/wp-content/uploads/residential\\_heat\\_pump\\_aerotherm\\_re\\_series\\_iomanual\\_re2h50s\\_re2h65t\\_re2h80t\\_52169.pdf](https://bradfordwhitecorp.s3.amazonaws.com/wp-content/uploads/residential_heat_pump_aerotherm_re_series_iomanual_re2h50s_re2h65t_re2h80t_52169.pdf)

<sup>25</sup> [https://www.cdc.gov/SafeChild/Fact\\_Sheets/Burns%20Fact%20Sheet-a.pdf](https://www.cdc.gov/SafeChild/Fact_Sheets/Burns%20Fact%20Sheet-a.pdf)

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

electric heat pump water heaters heat water slowly (but more efficiently), a tank size larger than the original tank that it is replacing allows for more quantity of hot water delivery before the electric resistance mode kicks on. Consequently PG&E AL states that (all else being constant), an 80-gallon electric heat pump water heater is likely to use less energy than a 50-gallon electric heat pump water heater.<sup>26</sup> However, a larger capacity water heater is likely to cost more, which may deter many customers from upsizing their original water heater. Customers may not understand the incremental advantage of upsizing and instead opt for a “like-for-like” size replacement. PG&E ran multiple scenarios with like-for-like tank size replacement as well as with an upsized tank size replacement. Similarly, SDG&E also varied the tank size but initially combined the results into a single analysis with a range of results. SCE used a like-for-like approach.

As such, for this variable, we take the more conservative approach and assume that a 40- or 50-gallon gas water heater will be only replaced by a 50-gallon electric heat pump water heater.

It is reasonable to assume that a customer replacing a gas water heater will install a electric heat pump water heater of a similar size.

#### H. Uniform Energy Factor (UEF) for Gas Water Heaters

Energy Division agrees with PG&E and SCE’s assumption of an average UEF of 0.56 for gas water heaters.

PG&E and SCE assumed an average UEF<sup>27</sup> of 0.56 for the gas water heater that would be replaced, while SDG&E modeled different efficiencies that are likely to exist in the customer base.<sup>28</sup> PG&E explains that it chose a UEF of 0.56 based on the minimum efficiency requirements for 50-gallon tank gas water heaters under Federal Appliance Regulations, which have been in effect since 2015.<sup>29</sup> So any gas water heaters replaced since 2015 will have a minimum efficiency of 0.56. In other words, Energy Division accepts the assumption that the gas water heaters being replaced, on average, are no more than seven years old.

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<sup>26</sup> Attachment 1 of PG&E AL 4571-G/6497-E; p.6.

<sup>27</sup> UEF is the newest method of water heater overall efficiency (applicable to water heater testing starting January 1, 2016). The higher the UEF value, the more efficient the water heater. UEF is determined by the Department of Energy’s test method outlined in 10 CFR Part 430, Subpart B, Appendix E.

1) [https://www.energystar.gov/products/water\\_heaters/residential\\_water\\_heaters\\_key\\_product\\_criteria](https://www.energystar.gov/products/water_heaters/residential_water_heaters_key_product_criteria)

2) <https://www.ecfr.gov/current/title-10/chapter-II/subchapter-D/part-430#Appendix-E-to-Subpart-B-of-Part-430>

<sup>28</sup> SCE AL 4713 pg.1 Footnote 2.

<sup>29</sup> Attachment 1 of PG&E AL4571-G/6497-E; p.2.



PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

We find it reasonable to assume a UEF of 0.56 for the gas water heater that would expectedly be replaced by a customer.

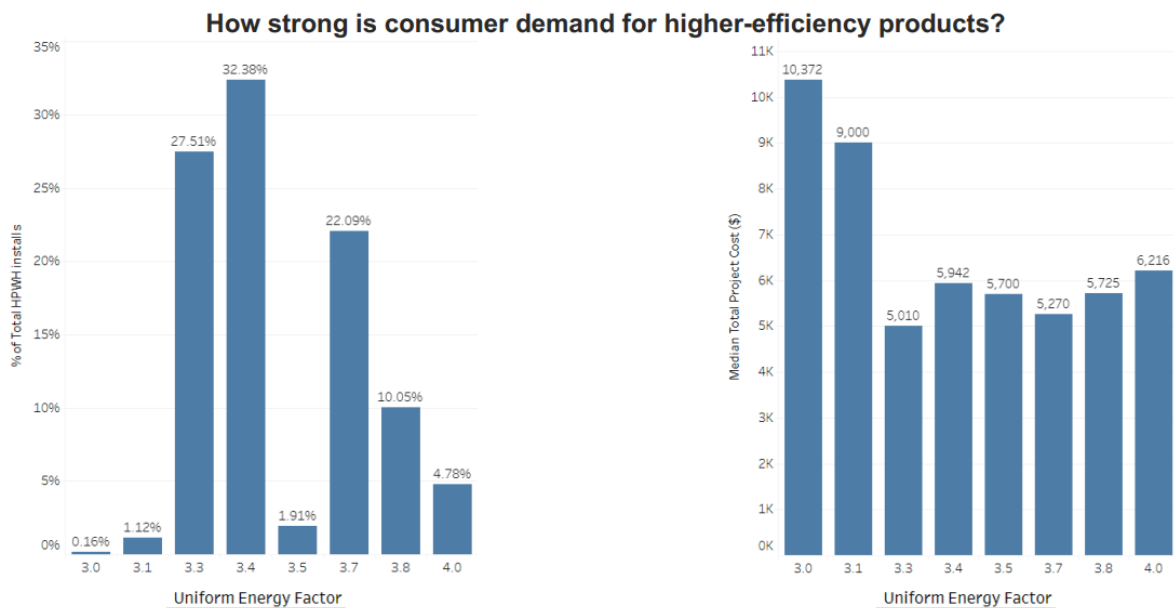
#### I. UEF for electric heat pump water heaters

Energy Division finds that a UEF of 3.3<sup>30</sup> for electric heat pump water heater is a reasonable assumption.

PG&E and SDG&E analysis modeled different values for the UEFs of installed devices. SCE's initial analyses used a UEF of 3.1. Although higher UEF devices are available in the market, they are not necessarily the most popular choice for the consumer. We explain this statement below.

To narrow down on the appropriate UEF assumptions, we looked at the range of UEFs for electric heat pump water heaters installed by customers who participated in the TECH Initiative.

**Figure 1: Popularity and Price of heat pump water heater efficiency<sup>31</sup>**



Quarterly Stakeholder Meeting – TECH Clean California

We see in Figure 1, over 50% of customers installed a UEF of less than 3.5. We also note that although the TECH Initiative is a pilot program in its very first year of

<sup>30</sup> Note that the actual value used by all three utilities is 3.31, as what is available in the DEER water heater calculator v4.2a.

<sup>31</sup> Slide 75, TECH Initiative Quarterly Stakeholder Meeting June 29, 2022: <https://energy-solution.com/wp-content/uploads/2022/07/TECH-4th-Quarterly-Stakeholder-Meeting.pdf>

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

implementation, almost 40% of the customers opted for electric heat pump water heaters with a UEF greater than 3.5. Further, of the customers opting for a UEF greater than 3.5, a majority of customers opted for electric heat pump water heaters with a UEF of 3.7. We also anticipate that the median project cost for the higher efficiency and larger capacity models could likely decrease as more funding (such as with the passage of the Inflation Reduction Act of 2022<sup>32</sup>) allows for higher levels of mass manufacturing of electric heat pump water heaters. However, to be on the conservative side, Energy Division believes that it is appropriate to model bill savings using a UEF of 3.3, as it is currently one of the two most prevalent choice of customers. The other prevalent choice were devices with a slightly higher UEF of 3.4, but those have an almost \$1000 higher installed cost.

Therefore, we find it reasonable to assume a UEF of 3.3 for electric heat pump water heaters in studying the impact on customer bills when switching from a gas water heater.

## J. Climate Zones

Energy Division asked utilities to model bill impacts for customers in each climate zone of their service territory.

All heat pumps move thermal energy from one place to another. In an electric heat pump water heater, the heat pump moves heat from the surrounding air into the hot water storage tank. This is why heat pumps operate at efficiencies that exceed 200 percent: they move thermal energy instead of converting electricity to heat.<sup>33</sup> Therefore, the performance of the heat pump depends on the temperature of the air around it. All else being constant, an electric heat pump water heater is likely to perform better in a hotter climate than a milder or colder one. However, as the technology matures, the performance of these devices is expected to improve in all types of climates.

In their original analysis, the three utilities did not include all climate zones in assessing bill impacts. At Energy Division's request, more comprehensive analysis covering all climate zones was submitted by the utilities in the supplemental advice letters and served to the proceeding service list.

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<sup>32</sup> H.R.5376 - Inflation Reduction Act of 2022: <https://www.congress.gov/bill/117th-congress/house-bill/5376/text>.

<sup>33</sup> Shapiro, Carl, and Srikanth Puttagunta, "Field Performance of Heat Pump Water Heaters in the Northeast" National Renewable Energy Laboratory, United States Department of Energy. February 2016. <https://www.nrel.gov/docs/fy16osti/64904.pdf>.



PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

We find it appropriate to look at bill impacts in every climate zone to assess whether a rate adjustment is needed to ensure bill savings for customers who switch their gas water heater to an electric heat pump water heater.

## **II. PG&E Study Findings**

Over 98% of PG&E customers could see bill savings on pro-electrification TOU rates, while the vast majority of PG&E customers see bill increases on non-TOU rates when switching from a gas water heater to an electric heat pump water heater.

### **A. Bill Impact Analysis for PG&E Customers on Pro-Electrification TOU Rate**

Table 1 shows PG&E's analysis for TOU rates based on the standardized inputs and assumptions requested by Energy Division. The rate schedule used assumes a customer switching from E-1 (non-TOU rate) to E-ELEC (pro-electrification TOU rate).

PG&amp;E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;

SDG&amp;E 3952-E/3063-G, 3952-E/3063-G-A/AWB

**Table 1: PG&E Bill Analysis of Customers Switching from Rate E-1 to E-ELEC, and from a 0.56 UEF gas water heater to a 3.3 UEF electric heat pump water heater operated at 125°F tank temperature.<sup>34</sup>**

<i>Basic Use</i>	P	Q	R	S	T	V	W	X	Y
Gas	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE
Gas Rate Schedule	G1	G1	G1	G1	G1	G1	G1	G1	G1
Gas Annual Usage	555	579	427	437	457	492	396	490	639
Gas Bill	\$1,247	\$1,302	\$953	\$969	\$998	\$1,080	\$876	\$1,080	\$1,408
Gas Water Heater Usage Saved	171	183	162	171	183	199	162	175	197
Gas Bill (w/o Water Heater)	\$832	\$869	\$569	\$570	\$581	\$623	\$500	\$672	\$945
Gas Bill Saving	\$415	\$433	\$384	\$399	\$417	\$457	\$376	\$409	\$463
Electric	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE
Starting Electric Rate Schedule	E-1	E-1	E-1	E-1	E-1	E-1	E-1	E-1	E-1
Ending Electric Rate Schedule	<b>E-ELEC</b>	<b>E-ELEC</b>	<b>E-ELEC</b>	<b>E-ELEC</b>	<b>E-ELEC</b>	<b>E-ELEC</b>	<b>E-ELEC</b>	<b>E-ELEC</b>	<b>E-ELEC</b>
Annual Usage (Before)	7139	6410	7989	7884	4215	5475	8063	6306	5436
Electric Bill (Before)	\$2,445	\$2,196	\$2,751	\$2,741	\$1,437	\$1,916	\$2,777	\$2,184	\$1,803
HPWH Usage	<b>1136</b>	<b>1233</b>	<b>1056</b>	<b>1136</b>	<b>1233</b>	<b>1441</b>	<b>1056</b>	<b>1161</b>	<b>1684</b>
Electric Bill (add HPWH)	\$2,756	\$2,449	\$3,078	\$3,051	\$1,804	\$2,224	\$3,132	\$2,471	\$2,317
Electric Bill Increase	\$311	\$254	\$326	\$310	\$366	\$308	\$356	\$287	\$514
<b>Net Bill Impact</b>	<b>-\$104</b>	<b>-\$179</b>	<b>-\$58</b>	<b>-\$89</b>	<b>-\$51</b>	<b>-\$149</b>	<b>-\$20</b>	<b>-\$122</b>	<b>\$51</b>

<sup>34</sup> PG&E response to Energy Division data request; May 27, 2022.

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

**Table 2: PG&E Distribution of Customers by climate zone (baseline territory)<sup>35</sup>**

% Customers	Baseline Territory	Count of Active Res Electric Customers
2.9%	P	141,209
0.3%	Q	12,525
10.9%	R	523,680
17.2%	S	827,986
23.6%	T	1,138,250
1.1%	V	50,638
5.3%	W	256,413
37.4%	X	1,803,153
1.2%	Y	58,300
0.1%	Z	4,918
100.0%	<b>Total</b>	<b>4,817,072</b>

We see from Table 1 and Table 2 that more than 98% of PG&E customers could potentially realize bill savings when switching from a gas water heater to an electric heat pump water heater, moving to the E-ELEC TOU rate under the aforementioned assumptions. The only customers that do not benefit on average are customers in climate zone Y,<sup>36</sup> which is predominantly the cooler, mountain areas.<sup>37</sup> These customers constitute about 1.3% of PG&E's overall customer base, and would see an average bill increase of 1.6%. This bill increase will potentially be even smaller (0.3%) with more efficient (higher UEF) equipment. This is shown in Table 3 below.

<sup>35</sup> PG&E response to Energy Division data request; September 7, 2022. PG&E notes that this analysis uses 2020 rates.

<sup>36</sup> Although PG&E did not analyze bill impacts for climate zone Z separately, it is also in the mountain areas, so we assume that bill impacts are largely similar to climate zone Y.

<sup>37</sup> PG&E Baseline Territory Map: [https://www.pge.com/notes/rates/PGE CZ\\_90Rev.pdf](https://www.pge.com/notes/rates/PGE CZ_90Rev.pdf)

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

**Table 3: PG&E Bill Analysis of Customers Switching from Rate E-1 to E-ELEC, and from a 0.56 UEF gas water heater to a 3.7 UEF electric heat pump water heater operated at 125°F tank temperature.<sup>35</sup>**

<i>Basic Use</i>	P	Q	R	S	T	V	W	X	Y
Gas	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE
Gas Rate Schedule	G1	G1	G1	G1	G1	G1	G1	G1	G1
Gas Annual Usage	555	579	427	437	457	492	396	490	639
Gas Bill	\$1,247	\$1,302	\$953	\$969	\$998	\$1,080	\$876	\$1,080	\$1,408
Gas Water Heater Usage Saved	171	183	162	171	183	199	162	175	197
Gas Bill (w/o Water Heater)	\$832	\$869	\$569	\$570	\$581	\$623	\$500	\$672	\$945
Gas Bill Saving	\$415	\$433	\$384	\$399	\$417	\$457	\$376	\$409	\$463
Electric	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE
Starting Electric Rate Schedule	E-1	E-1	E-1	E-1	E-1	E-1	E-1	E-1	E-1
Ending Electric Rate Schedule (Optimal)	E-ELEC	E-ELEC	E-ELEC	E-ELEC	E-ELEC	E-ELEC	E-ELEC	E-ELEC	E-ELEC
Annual Usage (Before)	7139	6410	7989	7884	4215	5475	8063	6306	5436
Electric Bill (Before)	\$2,445	\$2,196	\$2,751	\$2,741	\$1,437	\$1,916	\$2,777	\$2,184	\$1,803
HPWH Usage	<b>1006</b>	<b>1092</b>	<b>936</b>	<b>1006</b>	<b>1092</b>	<b>1277</b>	<b>936</b>	<b>1029</b>	<b>1541</b>
Electric Bill (add HPWH)	\$2,719	\$2,408	\$3,043	\$3,014	\$1,762	\$2,176	\$3,098	\$2,433	\$2,275
Electric Bill Increase	\$274	\$213	\$292	\$273	\$325	\$260	\$321	\$249	\$473
<b>Net Bill Impact</b>	<b>-\$142</b>	<b>-\$221</b>	<b>-\$93</b>	<b>-\$126</b>	<b>-\$92</b>	<b>-\$197</b>	<b>-\$54</b>	<b>-\$160</b>	<b>\$9</b>

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

#### B. Bill Impact Analysis for PG&E Customers on Default TOU Rate

Table 4 shows that over 76% of customers on PG&E's default TOU rate (E-TOU-C) do not see bill savings, even on a higher efficiency electric heat pump water heater. However, if at the time of switching to an electric heat pump water heater, these customers are made aware of the more favorable rate (TOU E-ELEC) available to them, and choose to switch to that rate, then these bill increases would likely not materialize.<sup>38</sup>

**Table 4: PG&E Bill Analysis of Customers Switching from Rate E-1 to E-TOU-C, and from a 0.56 UEF gas water heater to a 3.7 UEF electric heat pump water heater operated at 125°F tank temperature.<sup>35</sup>**

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<sup>38</sup> Note that PG&E's TOU E-ELEC rate does not have an enrollment cap.

<i>Basic Use</i>	P	Q	R	S	T	V	W	X	Y
Gas	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE
Gas Rate Schedule	G1	G1	G1	G1	G1	G1	G1	G1	G1
Gas Annual Usage	555	579	427	437	457	492	396	490	639
Gas Bill	\$1,247	\$1,302	\$953	\$969	\$998	\$1,080	\$876	\$1,080	\$1,408
Gas Water Heater Usage Saved	171	183	162	171	183	199	162	175	197
Gas Bill (w/o Water Heater)	\$832	\$869	\$569	\$570	\$581	\$623	\$500	\$672	\$945
Gas Bill Saving	\$415	\$433	\$384	\$399	\$417	\$457	\$376	\$409	\$463
Electric	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE
Starting Electric Rate Schedule	E-1	E-1	E-1	E-1	E-1	E-1	E-1	E-1	E-1
Electric Rate Schedule (After)	E-TOU-C	E-TOU-C	E-TOU-C	E-TOU-C	E-TOU-C	E-TOU-C	E-TOU-C	E-TOU-C	E-TOU-C
Annual Usage (Before)	7139	6410	7989	7884	4215	5475	8063	6306	5436
Electric Bill (Before)	\$2,445	\$2,196	\$2,751	\$2,741	\$1,437	\$1,916	\$2,777	\$2,184	\$1,803
HPWH Usage	<b>1006</b>	<b>1092</b>	<b>936</b>	<b>1006</b>	<b>1092</b>	<b>1277</b>	<b>936</b>	<b>1029</b>	<b>1541</b>
Electric Bill (add HPWH)	\$2,868	\$2,596	\$3,190	\$3,200	\$1,853	\$2,399	\$3,233	\$2,599	\$2,391
Electric Bill Increase	\$423	\$401	\$439	\$459	\$415	\$483	\$456	\$415	\$588
<b>Net Bill Impact</b>	<b>\$8</b>	<b>-\$33</b>	<b>\$54</b>	<b>\$60</b>	<b>-\$2</b>	<b>\$26</b>	<b>\$80</b>	<b>\$7</b>	<b>\$125</b>

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

### C. Bill Impact Analysis for PG&E Customers on Non-TOU Rates

In this section, we review the impact on customer bills if they chose to stay on non-TOU rates, or switched back to non-TOU rates. Table 5 shows this impact. We find that all customers could see bill increases ranging from 0.6% (climate zone P) to 6.3% (climate zone Y) on non-TOU rates, all other assumptions being the same.

**Table 5: PG&E Bill Impact Analysis for customers on E-1 (non-TOU rate) switching from a 0.56 UEF gas water heater to a 3.3 UEF electric heat pump water heater operated at 125°F tank temperature.<sup>39</sup>**

<i>Basic Use</i>	P	Q	R	S	T	V	W	X	Y
Gas	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE
Gas Rate Schedule	G1	G1	G1	G1	G1	G1	G1	G1	G1
Gas Annual Usage	555	579	427	437	457	492	396	490	639
Gas Bill	\$938	\$981	\$714	\$723	\$744	\$807	\$654	\$807	\$1,050
Gas Water Heater Usage Saved	171	183	162	171	183	199	162	175	197
Gas Bill (w/o Water Heater)	\$607	\$639	\$411	\$412	\$421	\$451	\$361	\$487	\$687
Gas Bill Saving	\$330	\$342	\$303	\$312	\$323	\$356	\$293	\$320	\$363
Electric	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE	Non-CARE
Starting Electric Rate Schedule	E-1	E-1	E-1	E-1	E-1	E-1	E-1	E-1	E-1
Electric Rate Schedule (After)	E-1	E-1	E-1	E-1	E-1	E-1	E-1	E-1	E-1
Annual Usage (Before)	7139	6410	7989	7884	4215	5475	8063	6306	5436
Electric Bill (Before)	\$1,897	\$1,703	\$2,135	\$2,127	\$1,115	\$1,487	\$2,154	\$1,694	\$1,398
HPWH Usage	<b>1136</b>	<b>1233</b>	<b>1056</b>	<b>1136</b>	<b>1233</b>	<b>1441</b>	<b>1056</b>	<b>1161</b>	<b>1684</b>
Electric Bill (add HPWH)	\$2,245	\$2,081	\$2,458	\$2,475	\$1,493	\$1,929	\$2,478	\$2,050	\$1,914
Electric Bill Increase	\$348	\$378	\$324	\$348	\$378	\$442	\$324	\$356	\$517
<b>Net Bill Impact</b>	<b>\$18</b>	<b>\$36</b>	<b>\$21</b>	<b>\$37</b>	<b>\$55</b>	<b>\$86</b>	<b>\$31</b>	<b>\$36</b>	<b>\$153</b>

<sup>39</sup> PG&E response to Energy Division data request; May 27, 2022.

### III. SCE Study Findings

SCE had requested a rate adjustment in A.20-10-012 for its TOU-D-4to9 and TOU-D-5to8 rates<sup>40</sup> to curtail bill increases for customers switching from a gas water heater to a electric heat pump water heater prior to the issuance of D.21-11-002.

On December 17, 2021, parties to SCE's 2020 GRC Phase 2 Application entered into an uncontested settlement agreement accepting SCE's proposed rate adjustment to TOU-D-4to9 and TOU-D-5to8 with the increased baseline allowance for heat pump water heaters. SCE filed a motion to the CPUC requesting approval of the settlement agreement.<sup>41</sup> The settlement approves an incremental baseline to be offered to qualified customers on TOU-D-4to9 and TOU-D-5to8, if SCE has a record of an electric heat pump water heater at the location or if a customer can attest they have adopted electric heat pump water heater technology, including those already receiving an all-electric baseline allowance.<sup>42</sup>

On August 9, 2022, in D.22-08-001, the CPUC approved the settlement agreement accepting SCE's proposed rate adjustment, but deferred to the building decarbonization proceeding (this Resolution) to determine whether the approved rate adjustment satisfied the requirements set forth in D.21-11-002.<sup>43</sup>

Here, we review whether the new rates satisfy the requirement of OP 4 using the same inputs and assumptions discussed in Section I. The rate schedule assumes a customer switching to TOU-D-4to9 or TOU-D-5to8 (with the recently approved baseline allowance adjustment).<sup>44</sup>

#### A. Bill Impact Analysis for SCE Customers on Default TOU Rates

SCE's analysis shows that all but about 2% of customers could see potential bill savings.

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<sup>40</sup> Note that the rate structure of the two rates are similar. TOU-D-5to8 limits peak hours to three hours, versus four hours for TOU-D-4to9 but the peak rate is 13 cents more per kilowatt hour. See full schedule for SCE TOU rates: <https://www.sce.com/residential/rates/Time-Of-Use-Residential-Rate-Plans>

<sup>41</sup> Motion of Southern California Edison Company and Settling Parties for Adoption of Residential and Small Commercial Rate Design Settlement Agreement: <https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M432/K761/432761053.PDF>. See Settlement under Appendix A, starting p.A-42.

<sup>42</sup> Ibid. at p.A-44.

<sup>43</sup> OP 2 and 3 of D.22-08-001

<sup>44</sup> Ibid.



PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

Table 6 and Table 7 show SCE's bill analysis of customers switching from rate TOU-D-4to9 to TOU-D-4to9/5to8 with the new baseline allowance adjustment recently approved by D.22-08-001.

**Table 6: SCE Bill Analysis of Customers on Rate TOU-D-4to9/5to8 with the new baseline allowance adjustment,\* switching from a 0.56 UEF gas water heater to a 3.3 UEF electric heat pump water heater operated at 125°F tank temperature<sup>45</sup> (Climate Zones 5-9).**

Climate		TOU-D-4to9	TOU-D-4to9	TOU-D-5to8
Zone		with GWH	with HPWH	with HPWH
			& incremental BA	& incremental BA
<b>Zone 5</b>	Electric Bill w/o WH	\$1,778	\$1,778	\$1,779
	Gas Bill w/o WH	\$613	\$613	\$613
	Incremental WH Cost	\$421	\$348	\$321
	Energy Cost	\$2,812	\$2,738	\$2,713
	Bill Impact from Default (%)		-3%	-4%
	<b>Bill Impact from Default (\$)</b>		<b>-\$74</b>	<b>-\$98</b>
<b>Zone 6</b>	Electric Bill w/o WH	\$1,420	\$1,420	\$1,422
	Gas Bill w/o WH	\$399	\$399	\$399
	Incremental WH Cost	\$334	\$292	\$270
	Energy Cost	\$2,153	\$2,112	\$2,091
	Bill Impact from Default (%)		-2%	-3%
	<b>Bill Impact from Default (\$)</b>		<b>-\$42</b>	<b>-\$62</b>
<b>Zone 8</b>	Electric Bill w/o WH	\$1,673	\$1,673	\$1,675
	Gas Bill w/o WH	\$326	\$326	\$326
	Incremental WH Cost	\$312	\$272	\$251
	Energy Cost	\$2,311	\$2,271	\$2,252
	Bill Impact from Default (%)		-2%	-3%
	<b>Bill Impact from Default (\$)</b>		<b>-\$40</b>	<b>-\$60</b>
<b>Zone 9</b>	Electric Bill w/o WH	\$1,873	\$1,873	\$1,875
	Gas Bill w/o WH	\$430	\$430	\$430
	Incremental WH Cost	\$329	\$273	\$252
	Energy Cost	\$2,631	\$2,576	\$2,557
	Bill Impact from Default (%)		-2%	-3%
	<b>Bill Impact from Default (\$)</b>		<b>-\$55</b>	<b>-\$75</b>

<sup>45</sup> SCE response to Energy Division data request; October 12, 2022.

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

**Table 7: SCE Bill Analysis of Customers on Rate TOU-D-4to9/5to8 with the new baseline allowance adjustment,\* switching from a 0.56 UEF gas water heater to a 3.3 UEF electric heat pump water heater operated at 125°F tank temperature (Climate Zones 10-16).<sup>45</sup>**

Climate		TOU-D-4to9	TOU-D-4to9	TOU-D-5to8
Zone		with GWH	with HPWH	with HPWH
			& incremental BA	& incremental BA
<b>Zone 10</b>	Electric Bill w/o WH	\$2,291	\$2,291	\$2,295
	Gas Bill w/o WH	\$487	\$487	\$487
	Incremental WH Cost	\$341	\$272	\$250
	Energy Cost	\$3,120	\$3,051	\$3,032
	Bill Impact from Default (%)		-2%	-3%
	<b>Bill Impact from Default (\$)</b>		<b>-\$69</b>	<b>-\$88</b>
<b>Zone 13</b>	Electric Bill w/o WH	\$2,139	\$2,139	\$2,144
	Gas Bill w/o WH	\$487	\$487	\$487
	Incremental WH Cost	\$331	\$283	\$261
	Energy Cost	\$2,957	\$2,910	\$2,892
	Bill Impact from Default (%)		-2%	-2%
	<b>Bill Impact from Default (\$)</b>		<b>-\$47</b>	<b>-\$65</b>
<b>Zone 14</b>	Electric Bill w/o WH	\$2,381	\$2,381	\$2,385
	Gas Bill w/o WH	\$667	\$667	\$667
	Incremental WH Cost	\$383	\$302	\$280
	Energy Cost	\$3,432	\$3,351	\$3,332
	Bill Impact from Default (%)		-2%	-3%
	<b>Bill Impact from Default (\$)</b>		<b>-\$81</b>	<b>-\$100</b>
<b>Zone 15</b>	Electric Bill w/o WH	\$2,798	\$2,798	\$2,798
	Gas Bill w/o WH	\$411	\$411	\$411
	Incremental WH Cost	\$254	\$189	\$175
	Energy Cost	\$3,463	\$3,398	\$3,384
	Bill Impact from Default (%)		-2%	-2%
	<b>Bill Impact from Default (\$)</b>		<b>-\$65</b>	<b>-\$79</b>
<b>Zone 16</b>	Electric Bill w/o WH	\$1,746	\$1,746	\$1,748
	Gas Bill w/o WH	\$528	\$528	\$528
	Incremental WH Cost	\$378	\$496	\$476
	Energy Cost	\$2,651	\$2,769	\$2,752
	Bill Impact from Default (%)		4%	4%
	<b>Bill Impact from Default (\$)</b>		<b>\$118</b>	<b>\$101</b>

\* As approved by D.22-08-001.

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

We see that with the newly approved baseline, customers in all but climate zone 16, see bill savings.

Next, we look at the number of customers in each SCE climate zone. Climate zone 16 customers constitute about 2% of SCE customers:<sup>46</sup>

**Table 8: SCE Customer Distribution Across Climate Zones**

Climate Zone	Residential Accounts	Share
05	653	0.0%
06	850,866	19.0%
08	1,061,105	23.7%
09	922,608	20.6%
10	922,893	20.6%
13	167,728	3.7%
14	323,755	7.2%
15	134,966	3.0%
16	99,868	2.2%
All	4,484,442	100.0%

Even in climate zone 16, the average bill increase after switching to an electric heat pump water heater is 4%. This can be somewhat mitigated with a higher efficiency unit (UEF 3.7) and reduces the total annual bill by about \$18-\$27 as compared to a UEF 3.3 unit (Table 9). It would still not be less than the original bill with a gas water heater.

**Table 9: SCE Bill Analysis of Customers on Rate TOU-D-4to9/5to8 with the new baseline allowance adjustment, and a 3.7 UEF electric heat pump water heater for Climate Zone 16.**

Climate Zone		TOU-D-4to9 with GWH	TOU-D-4to9 with HPWH & incremental BA	TOU-D-5to8 with HPWH & incremental BA
<b>Zone 16</b>	Electric Bill w/o WH	\$1,746	\$1,746	\$1,748
	Gas Bill w/o WH	\$528	\$528	\$528
	Incremental WH Cost	\$378	\$478	\$449
	Energy Cost	\$2,651	\$2,751	\$2,725
	Bill Impact from Default (%)		4%	3%
	<b>Bill Impact from Default (\$)</b>		<b>\$100</b>	<b>\$74</b>

<sup>46</sup> SCE AL 4713-E Appendix C, p.13.

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

## B. Bill Impact Analysis for SCE Customers on Non-TOU Rates

About 45% of SCE customers are likely to see bill increases if they choose a non-TOU rate- Schedule D- after switching to an electric heat pump water heater. Customers in climate zones 5, 6, 8 and 16 see bill increases. These bill increases range from 1% (climate zone 8) to 7% (climate zone 16). See Table 10 and Table 11 below.

**Table 10: SCE Bill Impact Analysis for customers opting for Schedule D (non-TOU rate) switching from a 0.56 UEF gas water heater to a 3.3 UEF electric heat pump water heater operated at 125°F tank temperature (Climate Zone 5, 6, 8, 9)**

Climate Zone		TOU-D-4to9 with GWH	Schedule D with HPWH
Zone 5	Electric Bill w/o WH	\$1,778	\$1,821
	Gas Bill w/o WH	\$613	\$613
	Incremental WH Cost	\$421	\$426
	Energy Cost	\$2,812	\$2,860
	Bill Impact from Default (%)		2%
	Bill Impact from Default (\$)		<b>\$48</b>
Zone 6	Electric Bill w/o WH	\$1,420	\$1,422
	Gas Bill w/o WH	\$399	\$399
	Incremental WH Cost	\$334	\$364
	Energy Cost	\$2,153	\$2,185
	Bill Impact from Default (%)		1%
	Bill Impact from Default (\$)		<b>\$32</b>
Zone 8	Electric Bill w/o WH	\$1,673	\$1,662
	Gas Bill w/o WH	\$326	\$326
	Incremental WH Cost	\$312	\$345
	Energy Cost	\$2,311	\$2,332
	Bill Impact from Default (%)		1%
	Bill Impact from Default (\$)		<b>\$21</b>
Zone 9	Electric Bill w/o WH	\$1,873	\$1,855
	Gas Bill w/o WH	\$430	\$430
	Incremental WH Cost	\$329	\$346
	Energy Cost	\$2,631	\$2,631
	Bill Impact from Default (%)		0%
	Bill Impact from Default (\$)		<b>\$0</b>

**Table 11: SCE Bill Impact Analysis for customers opting Schedule D (non-TOU rate) switching from a 0.56 UEF gas water heater to a 3.3 UEF electric heat pump water heater operated at 125°F tank temperature (Climate Zone 10, 13, 14, 15, 16)**

Climate		TOU-D-4to9	Schedule D
Zone		with GWH	with HPWH
<b>Zone 10</b>	Electric Bill w/o WH	\$2,291	\$2,254
	Gas Bill w/o WH	\$487	\$487
	Incremental WH Cost	\$341	\$345
	Energy Cost	\$3,120	\$3,087
	Bill Impact from Default (%)		-1%
	Bill Impact from Default (\$)		<b>-\$33</b>
<b>Zone 13</b>	Electric Bill w/o WH	\$2,139	\$2,104
	Gas Bill w/o WH	\$487	\$487
	Incremental WH Cost	\$331	\$357
	Energy Cost	\$2,957	\$2,948
	Bill Impact from Default (%)		0%
	Bill Impact from Default (\$)		<b>-\$9</b>
<b>Zone 14</b>	Electric Bill w/o WH	\$2,381	\$2,362
	Gas Bill w/o WH	\$667	\$667
	Incremental WH Cost	\$383	\$376
	Energy Cost	\$3,432	\$3,406
	Bill Impact from Default (%)		-1%
	Bill Impact from Default (\$)		<b>-\$26</b>
<b>Zone 15</b>	Electric Bill w/o WH	\$2,798	\$2,791
	Gas Bill w/o WH	\$411	\$411
	Incremental WH Cost	\$254	\$256
	Energy Cost	\$3,463	\$3,457
	Bill Impact from Default (%)		0%
	Bill Impact from Default (\$)		<b>-\$5</b>
<b>Zone 16</b>	Electric Bill w/o WH	\$1,746	\$1,744
	Gas Bill w/o WH	\$528	\$528
	Incremental WH Cost	\$378	\$570
	Energy Cost	\$2,651	\$2,842
	Bill Impact from Default (%)		7%
	Bill Impact from Default (\$)		<b>\$191</b>

#### IV. SDG&E Study Findings

SDG&E's analysis was unique in that it divided customers in each climate zone into two groups, or profiles: a low electric usage customer and a high electric usage customer. We appreciate that this approach lends more insight into what type of customers are more likely to see bill savings, but it is less straight-forward for determining percentage of customers that may not see bill savings.

##### A. Bill Impact Analysis for SDG&E Customers on Default TOU Rates

SDG&E's analysis shows that all but about 1% of customers could see potential bill savings on the default TOU-DR-1 rate.

Table 13 shows the results of SDG&E's analysis using the standardized inputs and assumptions requested by Energy Division.

Overall, for TOU-DR1 rate, both profiles of customers (low electric usage and high electric usage) see bill savings that are proportional to their energy use.

Similar to PG&E's and SCE's analyses, SDG&E's analysis also shows that it is more challenging to see bill savings for customers in a mountain climate zone, which contains about 1% of SDG&E customers. Under our assumptions, these customers see a bill increase in the range of 0.2-1.3% (Table 13, climate zone 14, rows 1 and 2). However, in the case of SDG&E we see that on average, all customers could realize bill savings with a 3.7 UEF electric heat pump water heater, holding all other assumptions constant (Table 13, climate zone 14, rows 3 and 4).

**Table 12: SDG&E Distribution of Customers by Climate Zone**

	A = B + D	B	C = B / A	D	E = D / A
Climate Zone	Total Customers	Number Non-CARE	% Non-CARE by Climate Zone	Number CARE	% CARE by Climate Zone
Coastal	763,597	603,661	79.1%	159,936	20.9%
Inland	556,955	401,142	72.0%	155,813	28.0%
Mountain	14,375	11,546	80.3%	2,829	19.7%
Desert	2,908	2,216	76.2%	692	23.8%
Total Customers	1,337,835	1,018,565	76.1%	319,270	23.9%

Table 13: SDG&E Bill Analysis of Customers on TOU-DR1 rate.<sup>47</sup>

Coastal (Climate zone 7) TOU-DR1; Non-CARE Temperature set to 125 degrees					(A)	(B) = (A) * Electric Rate	(C) = Therms * gas rate	(D) = (B) + (C)	(E)	(F) = [(A) + (E)] * Electric Rate	(G) = (F) – (D)
Customer Profile	Gas Tank Size (Gallons)	Gas UEF	HPWH Tank Size (Gallons)	HPWH UEF	Electric Consumption pre-HPWH (kWh)	Pre- Adoption Electric Bill	Gas Water Heater Bill (Annual)	Annual Utility Bill Range Gas WH, no HPWH	Annual Electric Consumption with HPWH (kWh)	New Annual Electric Bill	Annual Utility Bill Change
1	50	0.56	50	3.30	2,758	\$1,065	\$422	\$1,486	3,806	\$1,485	(\$1)
2	50	0.56	50	3.30	7,990	\$3,090	\$422	\$3,511	9,038	\$3,506	(\$5)
1	50	0.56	50	3.70	2,758	\$1,065	\$422	\$1,486	3,687	\$1,438	(\$48)
2	50	0.56	50	3.70	7,990	\$3,090	\$422	\$3,511	8,919	\$3,460	(\$51)

Inland (Climate zone 10) TOU-DR1; Non-CARE Temperature set to 125 degrees					(A)	(B) = (A) * Electric Rate	(C) = Therms * gas rate	(D) = (B) + (C)	(E)	(F) = [(A) + (E)] * Electric Rate	(G) = (F) – (D)
Customer Profile	Gas Tank Size (Gallons)	Gas UEF	HPWH Tank Size (Gallons)	HPWH UEF	Electric Consumption pre-HPWH (kWh)	Pre- Adoption Electric Bill	Gas Water Heater Bill (Annual)	Annual Utility Bill Range Gas WH, no HPWH	Annual Electric Consumption with HPWH (kWh)	New Annual Electric Bill	Annual Utility Bill Change
3	50	0.56	50	3.30	3,045	\$1,181	\$411	\$1,592	4,066	\$1,585	(\$7)
4	50	0.56	50	3.30	7,683	\$2,985	\$411	\$3,396	8,704	\$3,383	(\$13)
3	50	0.56	50	3.70	3,045	\$1,181	\$411	\$1,592	3,950	\$1,540	(\$52)
4	50	0.56	50	3.70	7,683	\$2,985	\$411	\$3,396	8,588	\$3,338	(\$58)

Mountain (Climate zone 14) TOU-DR1; Non-CARE Temperature set to 125 degrees					(A)	(B) = (A) * Electric Rate	(C) = Therms * gas rate	(D) = (B) + (C)	(E)	(F) = [(A) + (E)] * Electric Rate	(G) = (F) – (D)
Customer Profile	Gas Tank Size (Gallons)	Gas UEF	HPWH Tank Size (Gallons)	HPWH UEF	Electric Consumption pre-HPWH (kWh)	Pre- Adoption Electric Bill	Gas Water Heater Bill (Annual)	Annual Utility Bill Range Gas WH, no HPWH	Annual Electric Consumption with HPWH (kWh)	New Annual Electric Bill	Annual Utility Bill Change
5	50	0.56	50	3.30	2,260	\$871	\$421	\$1,292	3,371	\$1,310	\$18
6	50	0.56	50	3.30	9,371	\$3,638	\$421	\$4,059	10,483	\$4,068	\$9
5	50	0.56	50	3.70	2,260	\$871	\$421	\$1,292	3,248	\$1,262	(\$30)
6	50	0.56	50	3.70	9,371	\$3,638	\$421	\$4,059	10,360	\$4,021	(\$38)

Desert (Climate zone 15) TOU-DR1; Non-CARE Temperature set to 125 degrees					(A)	(B) = (A) * Electric Rate	(C) = Therms * gas rate	(D) = (B) + (C)	(E)	(F) = [(A) + (E)] * Electric Rate	(G) = (F) – (D)
Customer Profile	Gas Tank Size (Gallons)	Gas UEF	HPWH Tank Size (Gallons)	HPWH UEF	Electric Consumption pre-HPWH (kWh)	Pre- Adoption Electric Bill	Gas Water Heater Bill (Annual)	Annual Utility Bill Range Gas WH, no HPWH	Annual Electric Consumption with HPWH (kWh)	New Annual Electric Bill	Annual Utility Bill Change
7	50	0.56	50	3.30	2,230	\$867	\$334	\$1,201	2,986	\$1,164	(\$37)
8	50	0.56	50	3.30	9,114	\$3,558	\$334	\$3,892	9,871	\$3,842	(\$50)
7	50	0.56	50	3.70	2,230	\$867	\$334	\$1,201	2,901	\$1,131	(\$70)
8	50	0.56	50	3.70	9,114	\$3,558	\$334	\$3,892	9,786	\$3,809	(\$83)

<sup>47</sup> SDG&E response to Energy Division data request. September 14, 2022.



PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

## B. Bill Impact Analysis for SDG&E Customers on Non-TOU Rates

High electric users in all four SDG&E climate zones see bill increases on a non-TOU rate. Low electric users in mountain climate zone see bill increases on a non-TOU rate, but see bill savings in all other climate zones.

Given that SDG&E's analysis grouped customers into low electric usage profile and high electric usage profile, it is harder to discern the exact percentage of customers who are likely to see bill savings, unless both profiles had a similar end result.

**Table 14**<sup>48</sup> shows SDG&E bill impact analysis for customers opting Rate DR (non-TOU rate) switching from a 0.56 UEF gas water heater to a 3.3 and 3.7 UEF electric heat pump water heater operated at 125°F tank temperature.

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<sup>48</sup> We note that there is a summation error in the submitted tables for climate zone 7, Column D. If  $D = B + C$  as indicated in the table, these values should be \$1,503 and \$3,927.

**Table 14: SDG&E Bill Impact Analysis for customers opting Rate DR (non-TOU rate) switching from a 0.56 UEF gas water heater to a 3.3 and 3.7 UEF electric heat pump water heater operated at 125°F tank temperature<sup>49</sup>**

Coastal (Climate zone 7) DR; Non-CARE Temperature set to 125 degrees					(A)	(B) =(A) * Electric Rate	(C) = Therms * gas rate	(D) = (B) + (C)	(E)	(F) =[ (A) + (E)] * Electric Rate	(G) = (F) – (D)
Customer Profile	Gas Tank Size (Gallons)	Gas UEF	HPWH Tank Size (Gallons)	HPWH UEF	Electric Consumption pre-HPWH (kWh)	Pre-Adoption Electric Bill	Gas Water Heater Bill (Annual)	Annual Utility Bill Range Gas WH, no HPWH	Annual Electric Consumption with HPWH (kWh)	New Annual Electric Bill	Annual Utility Bill Change
1	50	0.56	50	3.30	2,758	\$1,081	\$422	\$1,492	3,806	\$1,492	(\$11)
2	50	0.56	50	3.30	7,990	\$3,505	\$422	\$4,022	9,038	\$4,022	\$96
1	50	0.56	50	3.70	2,758	\$1,081	\$422	\$1,445	3,687	\$1,445	(\$58)
2	50	0.56	50	3.70	7,990	\$3,505	\$422	\$3,963	8,919	\$3,963	\$37

Inland (Climate zone 10) DR; Non-CARE Temperature set to 125 degrees					(A)	(B) =(A) * Electric Rate	(C) = Therms * gas rate	(D) = (B) + (C)	(E)	(F) =[ (A) + (E)] * Electric Rate	(G) = (F) – (D)
Customer Profile	Gas Tank Size (Gallons)	Gas UEF	HPWH Tank Size (Gallons)	HPWH UEF	Electric Consumption pre-HPWH (kWh)	Pre-Adoption Electric Bill	Gas Water Heater Bill (Annual)	Annual Utility Bill Range Gas WH, no HPWH	Annual Electric Consumption with HPWH (kWh)	New Annual Electric Bill	Annual Utility Bill Change
3	50	0.56	50	3.30	3,045	\$1,194	\$411	\$1,605	4,066	\$1,594	(\$10)
4	50	0.56	50	3.30	7,683	\$3,314	\$411	\$3,725	8,704	\$3,818	\$93
3	50	0.56	50	3.70	3,045	\$1,194	\$411	\$1,605	3,950	\$1,549	(\$56)
4	50	0.56	50	3.70	7,683	\$3,314	\$411	\$3,725	8,588	\$3,761	\$36

Mountain (Climate zone 14) DR; Non-CARE Temperature set to 125 degrees					(A)	(B) =(A) * Electric Rate	(C) = Therms * gas rate	(D) = (B) + (C)	(E)	(F) =[ (A) + (E)] * Electric Rate	(G) = (F) – (D)
Customer Profile	Gas Tank Size (Gallons)	Gas UEF	HPWH Tank Size (Gallons)	HPWH UEF	Electric Consumption pre-HPWH (kWh)	Pre-Adoption Electric Bill	Gas Water Heater Bill (Annual)	Annual Utility Bill Range Gas WH, no HPWH	Annual Electric Consumption with HPWH (kWh)	New Annual Electric Bill	Annual Utility Bill Change
5	50	0.56	50	3.30	2,260	\$886	\$421	\$1,307	3,371	\$1,322	\$15
6	50	0.56	50	3.30	9,371	\$3,990	\$421	\$4,411	10,483	\$4,539	\$128
5	50	0.56	50	3.70	2,260	\$886	\$421	\$1,307	3,248	\$1,274	(\$33)
6	50	0.56	50	3.70	9,371	\$3,990	\$421	\$4,411	10,630	\$4,478	\$67

Desert (Climate zone 15) DR; Non-CARE Temperature set to 125 degrees					(A)	(B) =(A) * Electric Rate	(C) = Therms * gas rate	(D) = (B) + (C)	(E)	(F) =[ (A) + (E)] * Electric Rate	(G) = (F) – (D)
Customer Profile	Gas Tank Size (Gallons)	Gas UEF	HPWH Tank Size (Gallons)	HPWH UEF	Electric Consumption pre-HPWH (kWh)	Pre-Adoption Electric Bill	Gas Water Heater Bill (Annual)	Annual Utility Bill Range Gas WH, no HPWH	Annual Electric Consumption with HPWH (kWh)	New Annual Electric Bill	Annual Utility Bill Change
7	50	0.56	50	3.30	2,230	\$874	\$334	\$1,208	2,986	\$1,171	(\$37)
8	50	0.56	50	3.30	9,114	\$3,743	\$334	\$4,077	9,871	\$4,081	\$4
7	50	0.56	50	3.70	2,230	\$874	\$334	\$1,208	2,901	\$1,137	(\$71)
8	50	0.56	50	3.70	9,114	\$3,743	\$334	\$4,077	9,786	\$4,042	(\$35)

<sup>49</sup> SDG&E response to Energy Division data request; September 14, 2022.

## CONCLUSION

In view of the analyses showing the impact of rates on customer bills when switching to an electric heat pump water heater, we stress the importance of customer education regarding available rates. We call upon both the utilities and Energy Division staff to ensure that such customer education becomes an integral part of all ratepayer-funded programs under CPUC oversight that aim to promote electric heat pump water heater adoption.

We note again that these analyses make several general assumptions about existing equipment efficiencies, energy consumption, customer's prior rate schedule etc., and use average numbers for a representative customer before and after switching to an electric heat pump water heater. Each customer's individual circumstance will vary. It is therefore important that customers be able to make informed choices specific to their situation regarding the impact of various rates on their bills when replacing a gas water heater with electric heat pump water heater.

Relatedly, we also note that customers adopting full electrification of their home may see a completely different bill impact on these same rates and assumptions than what is presented in the utilities' analyses. Since it is beyond the scope of this Resolution to study customer bill impacts from other electrification measures, we identify it for future consideration within this or other related proceedings.

We find it reasonable that Energy Division staff overseeing implementation of current and future heat pump water heater programs, including but not limited to the TECH Initiative and the heat pump water heater incentives under SGIP proceeding, direct the implementer of these programs in PG&E service territory to ensure that customers who are switching to electric heat pump water heaters are educated regarding available electric rates that may result in bill savings.

We also find it reasonable that PG&E, SCE and SDG&E be encouraged to educate customers about the bill impact of their rate choices when opting for an electric heat pump water incentivized through ratepayer-funded programs. These include but may not be limited to programs and measures within the Energy Efficiency proceeding and the SGIP proceeding. Such education should ensure that a) customers are made aware of the most favorable rates available to them when switching from a gas water heater to an electric heat pump water heater, and b) customers are made aware whether they are likely to see bill savings and circumstances under which they are likely to see bill savings (such as tank temperature settings, behavioral changes, equipment efficiency and water heater size).

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

Specific to SDG&E, we note that it does not yet have an approved pro-electrification rate. It will be important for customers in SDG&E territory adopting electric heat pump water heaters to understand which rates are most favorable for them, and to have the analyses for the approved rate be available publicly.

Therefore, it is reasonable to require SDG&E to submit a Tier-1 informational AL estimating the bill impact for customers switching from gas water heater to electric heat pump water heater using the TOU E-ELEC rate, when approved, with the inputs and assumptions specified in this Resolution.

Overall, we find that:

- PG&E's E-ELEC rate satisfies the requirements of D.21-11-002 OP 4. PG&E is not required to propose a new rate adjustment in a future Rate Design Window filing
- SCE's recently approved baseline adjustment for TOU-D-4to9 and TOU-D-5to8 under D.22-08-001 satisfies the requirements of D.21-11-002 OP 4. SCE is not required to propose a new rate adjustment in a future Rate Design Window filing
- SDG&E's TOU-DR1 rate satisfies the requirements of D.21-11-002 OP 4. SDG&E is not required to propose a new rate adjustment in a future Rate Design Window filing.

## **COMMENTS**

Public Utilities Code section 311(g)(1) provides that this resolution must be served on all parties and subject to at least 30 days public review. Please note that comments are due 20 days from the mailing date of this resolution. Section 311(g)(2) provides that this 30-day review period and 20-day comment period may be reduced or waived upon the stipulation of all parties in the proceeding. Interested stakeholders do not need to have party status in order to submit comments on the resolution.

The 30-day review and 20-day comment period for the draft of this resolution was neither waived nor reduced. Accordingly, this draft resolution was mailed for comments, and will be placed on the Commission's agenda no earlier than 30 days from today.

## **FINDINGS**

1. It is appropriate to use the DEER water heater calculator version 4.2 for estimating annual energy used for gas water heaters and electric heat pump water heaters.

2. If a utility's analysis shows bill savings for the vast majority of its customers on pro-electrification TOU rates, or any available TOU rate, then a rate adjustment should not be required from that utility.
3. It is reasonable to assume no load shifting potential in reviewing the utilities' study findings.
4. It is reasonable to assume no behavioral changes from the customer in reviewing the utilities' study findings.
5. It is reasonable that bill impacts should be evaluated primarily for customers who are not on the CARE/FERA and/or Medical Baseline program.
6. It is reasonable to assume tank temperature settings of 125°F for the analysis.
7. It is reasonable to assume that a customer replacing a gas water heater will install an electric heat pump water heater of a similar tank size.
8. It is reasonable to assume a UEF of 0.56 for the gas water heater that would expectedly be replaced by a customer with an electric heat pump water heater.
9. It is reasonable to assume a UEF of 3.3 for the electric heat pump water heater in studying the impact on customer bills when switching from a gas water heater.
10. It is appropriate to consider bill impacts in every climate zone.
11. It is reasonable to direct Energy Division staff overseeing implementation of current and future heat pump water heater programs, including but not limited to the TECH Initiative and the heat pump water heater incentives under SGIP, to direct the implementer of these programs to ensure that customers who are switching to electric heat pump water heaters are educated regarding available electric rates that may result in bill savings.
12. It is reasonable to encourage PG&E, SCE and SDG&E to educate customers about the bill impact of their rate choices when opting for an electric heat pump water incentivized through ratepayer-funded programs.
13. PG&E's E-ELEC rate satisfies the requirements of D.21-11-002 OP 4. PG&E is not required to propose a new rate adjustment in a future Rate Design Window filing.
14. SCE's recently approved baseline adjustment for TOU-D-4to9 and TOU-D-5to8 under D.22-08-001 satisfies the requirements of D.21-11-002 OP 4. SCE is not required to propose a new rate adjustment in a future Rate Design Window filing.
15. SDG&E TOU-DR1 rate satisfies the requirements of D.21-11-002 OP 4. SDG&E is not required to propose a new rate adjustment in a future Rate Design Window filing.
16. It is reasonable that SDG&E submit a Tier-1 informational AL estimating the bill impact for customers switching from gas water heater to electric heat pump water

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

heater using the TOU E-ELEC rate, when approved, with the inputs and assumptions specified in this Resolution.

17. It is reasonable that PG&E, SCE and SDG&E report to the CPUC the rate schedule and type of water heater in customer households collected at the time a customer starts new service or moves existing service.

**THEREFORE, IT IS ORDERED that:**

1. Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company have satisfied the requirements of Ordering Paragraph 4 of D.21-11-002, and are not required to propose a rate adjustment in a new Rate Design Window application.
2. Beginning July 1, 2023, Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company shall collect information about the rate schedule and the type of water heater in customer households at the time of starting new service or moving existing service. To minimize administrative burden, this information may be collected at the same time as data required to be collected by Appendix D Section II.A of D.21-11-002. Annually, beginning February 1, 2024, each utility shall report this data to the CPUC along with the data required by Appendix D Section II.B of D.21-11-002. The non-confidential portions of the data shall be posted on a publicly accessible website at the same location as data posted to fulfil the requirements of Resolution E-5105.
3. Within 90 days of issuance of the final decision of its TOU E-ELEC Application 21-09-001, San Diego Gas & Electric Company is required to submit a Tier-1 informational Advice Letter estimating the bill impact for customers switching from gas water heater to electric heat pump water heater using the approved TOU E-ELEC rate with the inputs and assumptions specified in this Resolution.
4. Energy Division staff overseeing implementation of current and future heat pump water heater programs, including but not limited to the Technology and Equipment for Clean Heating Initiative and the heat pump water heater incentives under the Self-Generation Incentive Program, shall direct the implementer of these programs to ensure that customers who are switching to electric heat pump water heaters are educated regarding available electric rates that may result in bill savings.

PG&E 4571-G/6497-E, 4571-G/6497-E-A; SCE 4713-E, 4713-E-A;  
SDG&E 3952-E/3063-G, 3952-E/3063-G-A/AWB

This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed, and adopted at a conference of the Public Utilities Commission of the State of California held on December 1, 2022; the following Commissioners voting favorably thereon:

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Rachel Peterson  
Executive Director