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Witnesses:	R. Thomas
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SOUTHERN CALIFORNIA EDISON®

An *EDISON INTERNATIONAL*® Company

(U 338-E)

SOUTHERN CALIFORNIA EDISON COMPANY'S TESTIMONY IN SUPPORT OF ITS 2019 RATE DESIGN WINDOW APPLICATION

Before the

Public Utilities Commission of the State of California

Rosemead, California
December 16, 2019

SCE-01: SOUTHERN CALIFORNIA EDISON COMPANY'S TESTIMONY IN SUPPORT OF ITS 2019 RATE DESIGN WINDOW APPLICATION

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I.

INTRODUCTION

A. Summary

In this 2019 Rate Design Window (RDW) application, Southern California Edison (SCE) seeks the following relief:

- **Chapter II:** Regarding SCE's obligation to consider storage-specific rates that incorporate the conversion of distribution costs from a monthly maximum demand charge to a daily peak demand charge:
    - Commission approval that SCE met its compliance obligation
- **Chapter III:** Regarding SCE's obligation to propose a study plan for development of a residential electric essential usage model:
    - Commission approval that SCE met its compliance obligation by attaching to its testimony in this proceeding the Proposed Interim Joint Investor-Owned Utilities Study Plan and Process for Identifying Electric Essential Usage for Residential Customers (the Proposed Joint IOU Study Plan); and
    - A ruling removing consideration of all issues concerning the Proposed Joint IOU study plan from this proceeding, and directing that such issues be considered and approved in a separate, consolidated proceeding involving SCE, Pacific Gas and Electric Company (PG&E), and San Diego Gas & Electric Company (SDG&E)
- **Chapter IV:** Regarding SCE's obligation to submit a study on the applicability of the all-electric baseline quantities to residential customers with heat pump water heaters:
    - Commission approval that SCE met its compliance obligation

II.

STUDY OF STORAGE-SPECIFIC RATES WITH A DAILY DEMAND CHARGE

A. Study Overview

Decision (D.) 18-11-027, which approved SCE's 2018 General Rate Case (GRC) Phase 2 Medium and Large Power Rate Group Rate Design Settlement Agreement, required SCE to study storage-specific non-residential rates that incorporate the conversion of distribution costs from a monthly maximum demand charge to a daily peak demand charge and include its study findings in this RDW application.[1]

Pursuant to that mandate, SCE conducted a study through which it converted non-coincident (i.e., based on highest demand regardless of the time of occurrence) monthly demand charges to a non-coincident daily demand charge (DDC) and conducted bill comparisons using storage accounts. SCE used the most recently adopted Option D Base Rate from SCE's 2018 GRC Phase 2 as the starting reference rate for the development of trial DDC rates. SCE believes Option D as the reference point is the logical choice to provide a consistent default rate reference used to design all of SCE's optional non-residential rates. As shown in Section II.D below, the results of SCE's study illustrate that a daily demand rate provides a similar benefit for storage customers to the already-adopted Option E optional rate. Given these results, and the added cost and complexity of implementing a DDC rate, as well as the cost for incremental education and outreach, SCE concludes that a new DDC rate is unnecessary.

B. Underlying Goals and Principles

1. SCE's Support for California's Greenhouse Gas Reduction Goals

California is at the forefront of developing innovative energy policies geared toward a more sustainable environment. SCE fully supports California in this effort with its Pathway 2045[2] as a

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[1] D.18-11-027, Ordering Paragraph (OP) 10; A.17-06-030, Motion Of Southern California Edison Company And Settling Parties For Adoption Of Medium And Large Power Rate Group Rate Design Settlement Agreement, Attachment A, Medium and Large Power Rate Design Settlement Agreement, Section 4.J, p. A-26.

[2] Pathway 2045 is SCE's integrated roadmap for California to reduce greenhouse gas emissions and air pollutants by decarbonizing through powering 100% of retail sales with carbon-free electricity, electrifying

means of achieving California's greenhouse gas (GHG) reduction goals. Forward-looking rate designs that provide accurate price signals to customers are a key element in achieving these GHG reduction goals.

Legacy non-coincident peak demand charges are often seen as a disincentive to the adoption and widespread acceleration of GHG-reducing technologies, such as distributed energy resources (DERs) like energy storage, electric vehicles, and solar distributed generation, since recovery of distribution cost purely through legacy non-coincident peak demand charges may not reflect cost causation and may promote inefficient use of energy in the electricity environment going forward. On the other hand, there is a disadvantage in only incorporating energy charges for distribution cost recovery given that some distribution costs are truly fixed, do not demonstrate any type of time dependency as experienced on distribution circuits due to the temporal nature of circuit loading, and are associated with the function of connecting loads and sources of energy to the grid. These types of costs are appropriately recovered through demand charges.

In the 2018 GRC Phase 2, SCE restructured its distribution cost structure to recover an appropriate level of cost through non-coincident peak demand charges, and another portion though time-variant charges. This change alleviated the central disincentive to GHG-reducing technologies found in the legacy non-coincident peak demand structure.

2. Rate Design Principles

In its rate design, SCE strives to adhere to the ten attributes of a sound rate structure, the "Bonbright Principles."[3] In this testimony, SCE focuses on four principles that are particularly relevant: (1) fairly apportion cost of service among customer classes to reflect cost causation; (2) set prices in a manner that promotes the efficient use of energy and supports economic efficiency; (3) ensure rate

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ransportation and buildings, and using low-carbon fuels for technologies that are not viable for electrification. Whitepaper available at http://edison.com/pathway2045.

[3] *See* Bonbright, Danielson, and Kamerschen, "Principles of Public Utility Rates," Columbia University Press, New York NY, 1961, specifically, Chapter 16 entitled "Criteria of a Sound Rate Structure."

stability that minimizes unexpected rate changes and year to year revenue collection; and (4) maintain rate simplicity, understandability, and public acceptability of rate structures.

C. SCE's 2018 GRC Phase 2

1. Settled Rate Structures Adopted for Medium and Large Power Customers

In SCE's 2018 GRC Phase 2 application, SCE proposed considerable structural changes to its non-residential rates including new time-of-use (TOU) periods, flexible generation capacity, and time-differentiated distribution to better align the utility's underlying costs with new system conditions as well as to facilitate the integration of DERs. SCE also proposed to restructure its legacy non-coincident peak demand charge (non-time differentiated) into a two-part grid (non-time differentiated) and peak (time-differentiated) distribution cost recovery structure. The grid component facilitates the bi-directional flow of energy expected with DER applications, while the time-dependent peak component is associated with capacity growth and a pricing signal designed to reduce peak load conditions coincident with distribution system peaks.

SCE also proposed two new basic rate structures for its non-residential medium and large power customers: an Option D Base Rate design and an Option E optional rate design intended to benefit customers who adopt DER technologies. Both structures included new TOU periods and a combination of customer ($/meter), TOU energy ($/kilowatt hours or kWh), and demand (kilowatt or kW) charges. The two structures differed from each other only in the method used to recover distribution peak and generation peak capacity costs. Option D recovers these costs primarily through time-related demand (TRD) charges, while Option E recovers these peak capacity costs primarily through TOU energy charges.

a) Option D Base Rate

SCE proposed replacing Option B with a new Option D as the Base Rate design for medium and large power customers. In terms of distribution and generation rate design, SCE's original Option D proposal consisted of (1) generation energy recovered through TOU energy charges; (2) generation capacity recovered through a combination of TOU energy charges and TRD charges; (3) distribution peak costs recovered through a combination of TOU cents-per-kWh Energy Charges

(approximately 50 percent) with the balance recovered through a new TRD charge and facilities-related demand (FRD) charge; and (4) distribution grid costs recovered through an FRD charge.[4]

The Solar Energy Industries Association (SEIA) supported SCE's Option D proposal in large part but disagreed that coincident-peak-related distribution costs should be recovered via non-coincident demand charges. SEIA instead proposed its own Option D rate that used the Public Advocates Office's (Cal Advocates') peak load risk factors (PLRFs) instead of SCE's,[5] and further functionalized peak marginal distribution costs into coincident peak and non-coincident peak (and also included a non-peak component).[6]

The Settlement Agreement adopted a compromise rate design for Option D. For SCE's TOU-GS-2 and TOU-GS-3 rates, the settling parties agreed that Option D would: (1) use a settled distribution demand marginal cost (DDMC) for distribution, consisting of a summer on-peak TRD charge, a winter mid-peak TRD charge, flat cents-per-kWh energy charges to recover summer off-peak capacity costs, and a FRD charge to recover grid-related costs; and (2) for generation, allocate peak and capacity costs to TOU periods using the loss of load expectation (LOLE) methodology, recover summer on-peak and winter capacity costs through TRD charges, recover summer mid and off-peak capacity costs through energy charges, and recover generation energy costs through TOU energy charges.[7] For SCE's TOU-8 rate, the settling parties agreed to the same distribution and generation rate design as for TOU-GS-2 and TOU-GS-3, except that a settled generation capacity marginal cost (GCMC) value is used.[8]

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[4] A.17-06-030, Motion Of Southern California Edison Company And Settling Parties For Adoption Of Medium And Large Power Rate Group Rate Design Settlement Agreement (Motion for Adoption of Medium and Large Power Settlement Agreement), pp. 5-6.

[5] The PLRF is a determinant variant that allocates the distribution peak-capacity-related marginal costs across the hours of the year. Total seasonal PLRFs were the same between SCE and Cal Advocates' respective PLRFs, however, Cal Advocates' PLRFs had different TOU periods. For example, Cal Advocates' Summer On-Peak and Off-Peak were 29% and 38%, respectively, compared to SCE's proposal of 38% and 29%, respectively.

[6] Motion for Adoption of Medium and Large Power Settlement Agreement, at p. 6.

[7] *Id*. at pp.6 -7.

[8] *Id*. at pp. 7-8.

The Commission approved the settled rate design for Option D in D.18-11-027.

b) Option E Optional Rate

In addition to replacing Option B with Option D, SCE also proposed to offer Option E as the replacement rate for the then-current Option R (as well as for Option A). Prior to SCE's 2018 GRC Phase 2, Option R was offered to non-Standby non-residential customers with demands greater than 20 kW but not exceeding 4 megawatts (MW) who employ solar generating technologies. Participation on the former Option R rate structure was capped at 400 MW. Option R was structured so that SCE recovers all generation-related capacity costs and a portion of the distribution-related capacity costs through volumetric energy charges on a cents-per-kWh basis. The key aspect of the Option R rate design was the greater proportion of distribution costs that are recovered via energy charges as opposed to non-coincident peak demand charges.

In SCE's 2018 GRC Phase 2, SCE proposed the replacement of the Option R rate design with Option E, which uses a methodology consistent with the marginal cost studies that bifurcate distribution design demand marginal costs between grid and peak cost components. There are several advantages to this change. Recovering the peak capacity distribution revenue though energy rates is consistent with the applicable underlying cost studies presented in SCE's 2018 GRC Phase 2 and (1) allows Option E to be more "technology agnostic" (as opposed to Option R which was limited to customers who employ solar technologies) by basing the cost studies on the respective class as a whole rather than a subset of customers within the class, and (2) allows Option E to be available to all Medium Power customers (customers with demand less than 500 kW) without a participation cap.[9]

In terms of distribution and generation rate design, SCE's original proposal for Option E was as follows: (1) for distribution, recover all peak capacity costs through TOU energy charges (unlike Option R which only recovered some of these costs through energy charges) and recover

[9] Customers on Option E with demands greater than 500kW retain technology-based eligibility requirements. Additionally, participation on Option E is capped at 250MW. *See* Motion for Adoption of Medium and Large Power Settlement Agreement, pp. 19-21.

grid costs through a non-time variant monthly demand charge; and (2) for generation, recover both peak capacity and energy costs through TOU energy charges.[10]

While SEIA strongly supported the direction of SCE's proposed changes (i.e., more time-dependent recovery of distribution costs),[11] SEIA proposed its own Option E rate in its testimony to further reduce non-coincident demand charges. Specifically, SEIA proposed that Option E should alternate functionalization of marginal distribution costs into coincident peak (recovered via Energy Charges), non-coincident peak (recovered via maximum non-coincident demand charges), and non-peak (flat energy rates). SEIA also proposed using Cal Advocates' PLRFs as opposed to SCE's.

Ultimately, an all-party settlement was reached which adopted a compromise rate design between SEIA and SCE's Option E proposed rate designs. The settling parties agreed on the following rate design for Option E applicable to customers with service voltages less than 50 kilovolts (kV): (1) for the combined grid and peak distribution costs, recovery of 30% through the non-time variant monthly demand charge, 10% through a flat energy charge, and 60% via TOU energy charges using Cal Advocates' PLRFs; and (2) for generation costs, recovery via a TRD charge set at 25% of the Standby Backup Demand Charge with the balance recovered via TOU energy charges.[12]

The Commission approved the settled rate design for Option E in D.18-11-027.

2. <u>Settling Parties' Agreement That SCE Consider a Storage-Specific Rate</u>

Energy storage rates are designed to encourage charging of energy storage devices during hours of low GHG intensity on the grid, and discharge during hours of high GHG intensity on the grid. Such rates would provide a greater incentive for customers to install energy storage devices, which aligns with SCE's goal to reduce GHG emissions through its Pathway 2045 plan.[13]

In addition to proposing its own rate design for Options D and E, SEIA also proposed an "Option S" rate in its A.17-06-030 testimony for customers with onsite, Self-Generation Incentive

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[10] *See* Motion for Adoption of Medium and Large Power Settlement Agreement, pp. 10, 13.

[11] *Id*., at pp. 10-11.

[12] *Id.*, p. 10.

[13] SCE's Pathway 2045 whitepaper available at http://edison.com/pathway2045.

Program (SGIP)-eligible storage. SEIA's Option S featured the conversion of distribution costs from a *monthly* maximum demand charge to a *daily* maximum demand charge applicable during the summer on-peak and summer and winter mid-peak periods. According to SEIA's testimony, this type of design would provide customers who install storage devices with a daily incentive to reduce their peak demand, thereby using stored power at times that benefit the system and achieving GHG reductions.

SCE did not propose storage-specific rates in its 2018 GRC Phase 2 application (although SCE designed its Option E to be suitable for storage technologies by sending clear and more cost-based price signals reflecting the updated Renewables Portfolio Standard (RPS) driven cost profile). However, the settling parties did agree that SCE would consider a storage-specific rate in this proceeding:

> SCE shall file an RDW application no later than Q4 2019 that includes the consideration of storage-specific rates that incorporate the conversion of distribution costs from a monthly maximum demand charge to a daily peak demand charge. SCE is not obligated to propose or support such a design in its application, and may consider alternate rate structures. The targeted implementation of any rates adopted as part of this RDW application shall be late 2020, assuming CSRP is fully implemented, when billing system issues would not make implementation of this type of rate design structure difficult.[14]

D. Daily Demand Charge Study

1. Use of the Option D Base Rate as the Starting Point

For purposes of this study, SCE used the Option D Base Rate[15] in each rate class to develop the trial DDC rates. Using the Base Rate as the starting point maintains a consistent cost reference across the various optional rates offered by SCE and ensures revenue neutrality, as illustrated in Appendix B. Absent this step, an optional rate could be designed with a specific feature that compounds a previous adjustment made to the Base Rate for another purpose, resulting in an inappropriate revenue shift to non-participants. For example, the currently effective Option E rate uses a combination of time-variant energy and non-time variant demand charges to produce a bill result similar

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[14] Medium and Large Power Rate Design Settlement Agreement, Section 4.J, p. A-26. Note that Customer Service Re-Platform (CSRP) implementation has subsequently been delayed until 2021.

[15] Base rate is the rate option within an Otherwise Applicable Tariff (OAT) that all other options within the rate schedule are designed to be revenue neutral to. For example, if a customer opts off their default critical peak pricing (CPP) rate, but does not elect an alternative option, the customer will be placed on the OAT's base rate.

to recovering 100% of distribution grid costs through a DDC. Adding a DDC to the current Option E to recover the balance of distribution grid charges would thus produce a result with a greater benefit than having 100% of distribution grid costs recovered through a DDC alone. For this reason, SCE did not start with the Option E rate to develop trial DDC rates and instead used the Base Rate as the starting point. Section D.3 below discusses the bill comparisons between the Option E and the trial DDC rates.

The currently effective Option D Base Rates recover distribution grid costs through a combination of demand charges and non-time-variant energy charges, both on a $/kWh basis. Two scenarios were prepared for this study based on how grid costs are being recovered in the Base Rate. In the first scenario, SCE designed the DDC rate such that the revenues collected through a DDC were equivalent to those collected through the distribution demand charge of the Base Rate. In a second scenario, SCE designed the DDC rate such that the revenues collected through a DDC were equivalent to those to be collected through *both* the energy and distribution demand charges of the Base Rate. In both scenarios, the DDC rate was designed to be revenue neutral to the Base Rate. For illustrative purposes, SCE also converted the transmission demand[16] rate into a daily demand rate. The generation component of the DDC rate is the same as the generation component of Option E, where costs are recovered through a combination of time-variant energy and demand charges. The DDC rate structures are shown in Table II-1[17] below and in Appendix C.

[16] The actual conversion of transmission related rate structure would occur in a proceeding before the Federal Energy Regulatory Commission (FERC).

[17] The analysis was focused on these two rate classes (TOU-GS-3 & TOU-8-SEC), as they contained the most storage accounts on which to base the study. SCE did not have ample storage accounts in the GS-1, GS-2, TOU-8-PRI, and TOU-8-SUB rate classes to perform further analysis on those rate classes.

Table II-1
Illustrative Trial Daily Demand Charge Rate Structures

	TOU-GS-3						TOU-8-SEC					
	Scenario 1			Scenario 2			Scenario 1			Scenario 2		
	Rate D (FRD DD)			Rate D (FRD DD, incl peak)			Rate D (FRD DD)			Rate D (FRD DD, incl peak)		
	Delivery	Generation	Total Rate	Delivery	Generation	Total Rate	Delivery	Generation	Total Rate	Delivery	Generation	Total Rate
Energy Charge - $/kWh												
Summer Season												
On-Peak	0.02712	0.28409	0.31121	0.02712	0.28409	0.31121	0.02628	0.28646	0.31274	0.02628	0.28646	0.31274
Mid-peak	0.02712	0.07141	0.09853	0.02712	0.07141	0.09853	0.02628	0.06543	0.09171	0.02628	0.06543	0.09171
Off-Peak	0.02712	0.04698	0.07410	0.02712	0.04698	0.07410	0.02628	0.04166	0.06794	0.02628	0.04166	0.06794
Winter Season												
Mid-peak	0.02712	0.09101	0.11813	0.02712	0.09101	0.11813	0.02628	0.08803	0.11431	0.02628	0.08803	0.11431
Off-Peak	0.02712	0.05178	0.07890	0.02712	0.05178	0.07890	0.02628	0.04593	0.07221	0.02628	0.04593	0.07221
Super-Off-Peak	0.02712	0.03322	0.06034	0.02712	0.03322	0.06034	0.02628	0.02946	0.05574	0.02628	0.02946	0.05574
Customer Charge - $/month	301.25	0.00	301.25	301.25	0.00	301.25	450.75	0.00	450.75	450.75	0.00	450.75
Facilities Related												
Demand Charge - $/kW/Day	0.55	0.00	0.55	0.77	0.00	0.77	0.54	0.00	0.54	0.75	0.00	0.75
Time Related Demand Charge - $/kW												
Summer Season												
On-Peak	9.79	3.71	13.50	0.00	3.71	3.71	9.55	4.36	13.91	0.00	4.36	4.36
Mid-Peak	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Winter Season												
Mid-Peak	3.31	0.65	3.96	0.00	0.65	0.65	3.20	0.82	4.02	0.00	0.82	0.82
Off-Peak	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2. Rate Design Development

The forecast billing determinants used to construct the trial DDC rates consisted of three components: (1) the time-of-use kWh and kW based on the newly adopted time periods from SCE's 2016 RDW Application; (2) non-time variant kWh used for non-bypassable charges; and (3) the sum of daily demands (kW). All the billing determinants were calculated using methods consistent with SCE's approach in GRC Phase 2 filings, with the exception of the sum of daily demands which represented a new billing determinant. In calculating the sum of daily demands for each account, SCE first calculated the daily demand as the maximum of the 15-minute demand in each day and then averaged the daily demands by month. The sum of the daily demands was then determined by multiplying the average daily demands by the number of days in each month.

3. Bill Impacts

In evaluating the effectiveness of the trial DDC rates, SCE applied the billing determinants of existing bundled energy storage customers to revenue neutral rate designs for Option D, Option E, and both trial DDC variants. The energy storage customer data set initially consisted of 120 non-residential storage accounts as of December 2018. Of the 120 customer accounts, 110 were in the

TOU-GS-3 and TOU-8-SEC rate classes. Of those 110 accounts, 100 were bundled customers (80 TOU-GS-3, and 20 TOU-8-SEC accounts). The evaluation of the trial DDC rates was performed on these 100 bundled customer accounts within the original data set.

Table II-2 depicts the bill impact results for the bundled energy storage customers in the TOU-GS-3 rate class. The results indicate while the two DDC variants (Scenario 1 and Scenario 2) are beneficial options for these customers when compared to Option D, the average annual monthly bills under both of these variants do not vary significantly from the bills under the already-adopted Option E rate. In fact, both DDC variants generally show a slight average annual monthly bill *increase* when compared to Option E. Additionally, the percent difference in bills between Option E and the two DDC variants is less than 1%, signifying that Option E is virtually as beneficial to these customers as a DDC rate would be.

Table II-2
Monthly Bill Comparison for Bundled Service TOU-GS-3 Customers with Storage

Average Monthly Usage (kWh)	% Population	# of Service Accounts	Option D Bill	Option E Bill	Scenario 1 Bill	Scenario 2 Bill	Average Load Factor
c. 10000 - 19999	3.8%	3	$ 4,918	$ 3,882	$ 3,993	$ 4,008	11%
d. 20000 - 29999	36.3%	29	$ 5,646	$ 4,804	$ 4,780	$ 4,806	15%
e. 30000-39999	21.3%	17	$ 6,672	$ 5,889	$ 5,769	$ 5,800	16%
f. 40000 - 49999	12.5%	10	$ 8,481	$ 7,535	$ 7,650	$ 7,690	20%
g. 50000 - 59999	8.8%	7	$ 10,342	$ 9,159	$ 9,223	$ 9,253	18%
h. 60000 - 69999	7.5%	6	$ 11,466	$ 10,558	$ 10,769	$ 10,767	26%
i. 70000 - 79999	2.5%	2	$ 11,738	$ 11,476	$ 11,337	$ 11,457	31%
j. 80000 - 89999	2.5%	2	$ 12,921	$ 12,937	$ 13,163	$ 13,084	35%
l. 100000 - 109999	2.5%	2	$ 17,873	$ 17,015	$ 17,408	$ 17,141	25%
m. 110000 - 119999	2.5%	2	$ 19,281	$ 18,243	$ 19,307	$ 19,272	34%
Grand Total	100.0%	80	$ 8,019	$ 7,165	$ 7,210	$ 7,227	18%

The results for TOU-8-SEC customers, shown in Table II-3, are similar to those of the TOU-GS-3 group, with Option E and both DDC variants benefiting customers compared to the Option D rate. The percent difference in bills between Option E and both DDC variants was also relatively insignificant at approximately 2%, again signifying that Option E is virtually as beneficial to these customers as a DDC rate would be.

Table II-3
Monthly Bill Comparison for Bundled Service TOU-8-SEC Customers with Storage

Average Monthly Usage (kWh)	% Population	# of Service Accounts	Option D Bill	Option E Bill	Scenario 1 Bill	Scenario 2 Bill	Average Load Factor
b. 0 - 49999	4.8%	1	$ 6,146	$ 5,320	$ 5,182	$ 5,174	16%
c. 50000 - 99999	38.1%	8	$ 15,792	$ 13,282	$ 13,915	$ 14,154	18%
d. 100000 - 149999	23.8%	5	$ 21,698	$ 18,676	$ 19,566	$ 19,319	23%
e. 150000-199999	14.3%	3	$ 30,677	$ 28,334	$ 28,397	$ 28,279	29%
f. 200000 - 249999	4.8%	1	$ 35,379	$ 33,126	$ 32,525	$ 33,415	27%
g. 250000 - 299999	4.8%	1	$ 35,702	$ 36,359	$ 37,683	$ 37,941	54%
h. 300000 - 349999	4.8%	1	$ 39,810	$ 42,384	$ 42,620	$ 42,874	60%
p. 700000 - 749999	4.8%	1	$ 99,667	$ 101,722	$ 101,732	$ 101,291	55%
Grand Total	100.0%	21	$ 25,884	$ 23,979	$ 24,480	$ 24,541	27%

These results are explained by how distribution related costs are recovered within the settled Option E structure. The Option E distribution related cost recovery moves recovery from a traditional monthly non-coincident peak demand charge to primarily time-variant energy charges. Because the final settled rate only recovers 30% of distribution revenues through a non-coincident peak demand charge, the majority (70%) of distribution revenue recovery occurs through time-variant energy charges, which are far more effective in mitigating the bill impact associated with intermittent loads when compared to daily peak demand charges.

4. <u>Conclusion</u>

In sum, the trial DDC rates, like Option E, recognize the appropriate use of demand charges for fixed cost recovery, with both variants providing similar benefits to the participants as Option E. However, given the similar bill impacts between the trial DDC rates and Option E, the Commission should not adopt a DDC-based rate at this time. Option E is available today, has similar benefits to a DDC rate, and does not require any incremental education and outreach efforts above those already in place. A new DDC rate, on the other hand, would require incremental effort to inform and educate customers about the concept, in addition to time-consuming and expensive billing system changes.

In a future proceeding, parties should explore adjustments to participation rules based on the information gained from the annual Option E Tier 1 advice letter SCE is required to submit under OP 9 of D.18-11-027.

III.

RESIDENTIAL ESSENTIAL USE STUDY PLAN

A. Background

The decision (D.18-11-027) approving SCE's 2018 GRC Phase 2 application (A.17-06-030) instructed SCE to "develop a study plan (including budget) for developing a model of what constitutes essential use for its residential customers."[18] This model would be used to "determine if SCE's residential customers are meeting their basic electricity needs at a reasonable cost."[19]

The general scope for the study plan is as follows:

> The SCE study plan must consider a model that uses research, both existing (information sources such as the Residential Appliance Saturation Survey and Experian data) and new direct customer surveys, to collect information on household size (in terms of both square footage and number of residents), building features (age, construction materials, insulation, etc.), and appliances (efficiency and usage) in order to better evaluate the essential electricity needs of SCE's residential customers. The model of essential usage must be able to specify the amount of essential usage in both summer and winter for residential customers separately in each of the hot climate zone (SCE climate zones 10, 13, 14, and 15), the warm climate zone (SCE climate zones 5 and 9), and the cool climate zone (SCE climate zones 6, 8, and 16).[20]

The decision also stipulated that the study plan for the development of this model must be submitted with SCE's next RDW or GRC Phase 2 application, whichever came first.

B. Proposed Essential Use Study Plan

In accordance with OP 14 of D.18-11-027, SCE has included a proposed study plan for identifying and quantifying residential essential use in Appendix D. Both PG&E and SDG&E have a similar obligation to develop an essential use study plan.[21] SCE, PG&E, and SDG&E (the investor-owned utilities or IOUs) believe that a jointly developed study plan will provide a standard measure of essential use and a consistent methodological approach across service territories. As such, the proposed

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[18] D.18-11-027, OP 14.

[19] D.18-11-027, p. 50.

[20] D.18-11-027, OP 14.

[21] *See* Appendix D, Section A.

study plan attached as Appendix D is a joint IOU study plan and is identical to the proposed study plan that PG&E recently submitted in its 2020 GRC Phase 2 proceeding (A.19-11-019).

Among other things, this IOU proposed study plan addresses how essential use should be defined, what specific uses warrant inclusion in essential use, what customer segments should be included in the study, and why a single essential use study is appropriate.[22] The IOU proposed study plan also requests Commission approval to execute a joint essential use study and contract with the 2019 Residential Appliance Saturation Survey (RASS) consultant to administer the study on a directed-award basis.[23]

In developing this proposal, the IOUs consulted with stakeholders in two workshops held on August 28, 2019 and September 6, 2019, both of which were noticed to the service lists of SCE's 2018 GRC Phase 2, the Affordability Order Instituting Rulemaking proceeding (R.18-07-006), and PG&E's GRC Phase 2 (A.16-06-013).[24] If approved, the IOU proposal calls for further stakeholder engagement in the development of the specific study design details.

C. Request for Consolidation of Issues Pertaining to the Essential Use Study Plan in a Single Proceeding

In order to satisfy their respective obligations stemming from the decisions separately requiring that PG&E and SCE propose an essential use study plan,[25] PG&E submitted the IOUs' proposed study plan in its recent GRC Phase 2 proceeding, while SCE is submitting the same study plan in this proceeding. However, in order to better facilitate stakeholder feedback and provide for a common timeline, SCE is requesting that the Commission remove consideration of all issues concerning the essential use study plan from this proceeding, and direct that such issues instead be considered and approved in a separate, consolidated proceeding involving all three IOUs.[26] Consolidating consideration

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[22] *See* Appendix D, Sections B-E.

[23] *See* Appendix D, Sections A, G, H.

[24] *See* Appendix D, Section I.

[25] D.18-08-013, OP 14; D.18-11-027, OP 14.

[26] *See also* Appendix D, Section F.

of this study in a single proceeding would more efficiently allow interested parties to participate in the development of the essential use study.

D. Cost Recovery

As detailed in Section H of Appendix D, based on the proposed study plan and prior studies of similar scope and magnitude, the preliminary cost estimate for this study is between $500,000 and $750,000 depending on its final design. SCE is not seeking cost recovery in this proceeding. For the reasons detailed in Section C above, SCE believes it would be appropriate for the Commission to determine and approve an authorized budget and recovery mechanism within the proposed consolidated proceeding as opposed to in this RDW. If the Commission does not approve a budget and recovery mechanism in that proposed consolidated proceeding, then SCE proposes recording its portion of the incurred costs of the essential use study in an appropriate memorandum account.

IV.

STUDY ON APPLICABILITY OF ALL-ELECTRIC BASELINE TO HEAT PUMP WATER HEATER CUSTOMERS

A. Background

1. 2018 GRC Phase 2 Settlement Agreement

As part of the Residential and Small Commercial Rate Design Settlement Agreement in SCE's 2018 GRC Phase 2 proceeding, SCE agreed to conduct a study on the applicability of All-electric baseline allowances to customers who adopt heat pump water heaters (HPWHs).[27] The study results, and any proposed changes to the All-electric baseline requirements, were to be included in SCE's next GRC Phase 2 or RDW application.[28] The agreement to study the application of All-electric baseline allowances to HPWHs emerged from a joint desire between SCE and other parties to the settlement agreement to find an appropriate rate that would encourage the use of HPWHs as a GHG-reducing technology.

2. Policy Context

In 2016, Senate Bill 32 updated the California Global Warming Solutions Act of 2006 to require that GHG emissions in the state be reduced to at least 40 percent below 1990 levels no later than 2030. In June 2018, the California Energy Commission (CEC) published the report, Deep Decarbonization in a High Renewables Future.[29] The report concluded that HPWHs play a role in meeting that goal:

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[27] A.17-06-030, Motion Of Southern California Edison Company And Settling Parties For Adoption Of Residential and Small Commercial Rate Design Settlement Agreement, Attachment A, Settlement Agreement, p. A-17.

[28] *Id.*

[29] Report available at https://ww2.energy.ca.gov/2018publications/CEC-500-2018-012/CEC-500-2018-012.pdf (p. 67).

> To meet the state's 2030 climate goals, business and household decisions will play a pivotal role: from vehicle purchases, to water heater and heating, ventilation and air conditioning (HVAC) purchase and installation decisions, to vehicle driving behavior. Market transformation is necessary to bring down the cost and improve the performance of customer-facing zero-emissions technologies, primarily zero-emission vehicles and electric heat pumps in buildings.[30]

3. California Public Utilities Code Section 739

California Public Utilities Code Section 739 provides for separate baseline quantities for Basic customers (those with both electric and gas service) and for All-electric customers. Customers are eligible for All-electric baseline quantities if they either: (1) have electric service only, or (2) have electric space heating. However, the use of a HPWH alone does not qualify a customer for the All-electric baseline quantities. In addition to the quantities varying between these two groups of customers, the quantities are also set at different levels for each group. The Basic customers have baseline quantities "based on from 50 to 60 percent of average residential consumption" whereas the All-electric baseline quantities are "established at 60 to 70 percent of average residential consumption during the winter season."[31]

An additional standard allowance, referred to as a Medical Baseline Allowance, is provided for residential customers who are dependent on life support equipment or who are being treated for a life-threating illness or have a compromised immune system. This allowance is intended to cover all of the additional usage necessitated by most customers with qualifying conditions. Additional Medical Baseline standard allowances can be provided in cases where a single allowance is deemed insufficient.

4. Study Overview

Customers in existing building stocks who retrofit gas water heating with HPWHs require more electric energy usage than they did with gas water heating. SCE's study investigates the impact of this additional load and whether the All-electric baseline quantities are appropriate for these customers. Additionally, SCE investigates whether there are alternative means for providing additional baseline

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[30] *Id.*

[31] Pub. Util. Code § 739(a)(1).

quantities for HPWH customers that would reduce the electric bill impact component associated with the increased electric usage from HPWHs more effectively than making HPWH customers eligible for the All-electric baseline quantities.

For its study, SCE examined whether the All-electric baseline quantities are well suited to the operational usage of HPWH customers. As discussed in Section B.2 below, SCE found that the increased electric consumption for residential customers who install HPWHs would not be properly accounted for by the All-electric baseline quantities, which led SCE to then examine two alternative options for providing appropriate levels of additional baseline quantities to these HPWH customers: an "Increased Consumption Allowance Option" and an "Incremental Baseline Option."

Based on this study, SCE does not recommend that the All-electric baseline requirements be changed to make HPWH customers eligible for All-electric baseline quantities as the use of those baseline quantities would increase bill volatility for HPWH customers and result in disparate bill impacts across the various climate zones which are not commensurate with the additional HPWH load. Instead, as discussed in Sections B.3 and B.4 below, SCE prefers the Increased Consumption Allowance Option and Incremental Baseline Option alternatives (preferring the latter more than the former) to changing the All-electric baseline requirements as these alternatives would provide consistent bill savings for HPWH adopters without increasing bill volatility. SCE plans to continue to review these options and may make a formal proposal for a HPWH baseline allowance solution in its 2021 GRC Phase 2 Application based on that continued review.

B. SCE's HPWH Study

1. HPWH Usage Findings

In this study, SCE employed the HPWH hourly loads estimated by Energy and Environmental Economics, Inc. (E3) for their study "Residential Building Electrification in California."[32] E3 produced HPWH usage estimates for SCE climate zones 6, 9, and 10. These zones

[32] https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf.

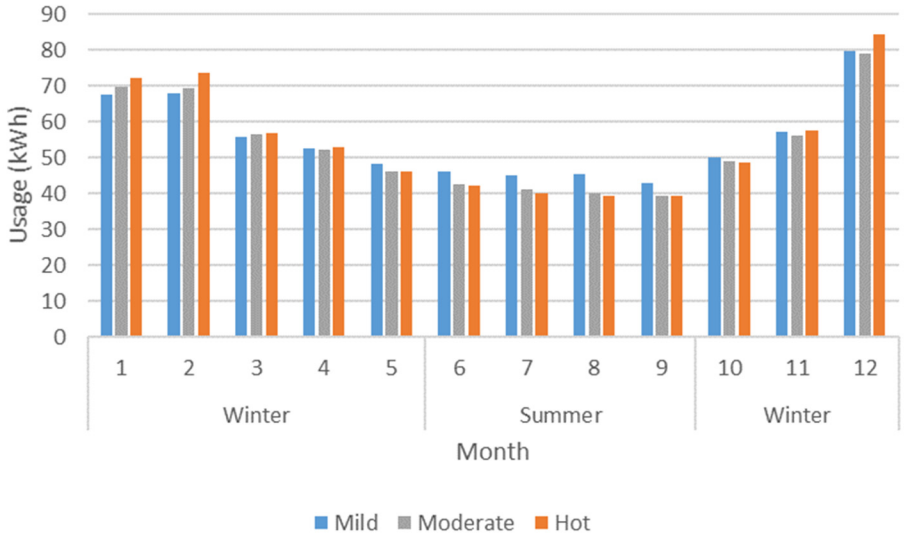
represent mild, moderate, and hot climate, respectively. A map of all climate zones in SCE's territory can be referenced in Appendix G. Based on this data and SCE's study, SCE finds the following.

- **While HPWHs do not use much energy at a given time, HPWHs consume energy every day, year-round.** Based on the E3 load estimates, the total annual usage from HPWHs is about 650 kWh, or roughly 10% of the average residential customer's annual usage.[33]
- **Because HPWHs transfer heat from surrounding air into water, they use less energy in the summer due to the higher ambient temperatures.** Figure IV-1 shows that the least amount of energy consumed monthly during the summer by HPWHs is as little as half the energy consumed in the winter.[34] It also illustrates that HPWHs typically require less energy in the winter in the mild climate zone than they do in the hot climate zones which typically have colder winters. Conversely, HPWHs require less energy in the summer in the hot climate zone than they do in the mild climate zone.

[33] *See* Appendix E.

[34] SCE's summer season is June through September; winter season is October through May.

Figure IV-1
Monthly Heat Pump Water Heater Energy Usage



- **HPWHs have the potential to allow for flexibility in the consumption of electricity given that the heated water is stored for use at a later time.** If the time of heating is modulated to occur outside of peak times, customers may be able to take advantage of low-cost periods and reduce their bill. This flexibility can be enhanced by heating the water above standard temperatures and then mixing it with cold water at the outlet at the time of consumption. This practice allows the energy consumption necessary to provide the required volume of hot water to be concentrated in the times of lowest cost.

2. <u>Suitability of the All-Electric Baseline Quantities for HPWH Customers</u>

The increased electric consumption for residential customers who install HPWHs would not be properly accounted for by the All-electric baseline quantities. Table IV-4 below shows the current All-electric baseline quantities that a Basic customer might receive if eligible. This table illustrates that a HPWH customer would receive a lower baseline allocation in the summer under the All-electric baseline in all zones except 5 and 13 even though that customer's summer consumption would increase with a HPWH. Moreover, while it is true that customers in all zones would receive additional baseline quantities in the winter under the All-electric baseline, the additional amount

received varies significantly based on the climate zone. For example, in Zone 9 customers would receive an additional 2 kWh/day, while in Zone 14 customers would receive an additional 9.3 kWh/day. In Zone 13, the daily baseline quantity would nearly double from 12.6 kWh/day to 24.3 kWh/day. These differences between the Basic and All-electric baseline quantities result from the differing existing energy consumption patterns of the customers underlying each group. Consumption of Basic customers is dominated by A/C usage during the summer while All-electric customers' consumption is dominated by heating loads during the winter.

Table IV-4
Current Basic and All-electric Baseline Quantities

	Summer		Winter	
Zone	Basic	All-electric	Basic	All-electric
5	17.2	17.9	18.7	29.1
6	11.4	8.8	11.3	13.0
8	12.6	9.8	10.6	12.7
9	16.5	12.4	12.3	14.3
10	18.9	15.8	12.5	17.0
13	22.0	24.6	12.6	24.3
14	18.7	18.3	12.0	21.3
15	46.4	24.1	9.9	18.2
16	14.4	13.5	12.6	23.1

Table IV-5 shows that the primary result of applying All-electric baseline quantities to customers with HPWHs is increased bill volatility. Bills would increase during the summer in most zones for these customers and would decrease during the winter. While the net effect would be an annual savings for most customers, the amount would vary widely depending on the climate zone. As shown in Table IV-5, the total bill impacts expected from applying All-electric baseline quantities to customers with HPWHs range from a 1.9% annual increase (Zone 15) to a 5.9% annual decrease (Zone 13).

Table IV-5
Seasonal and Annual Bills with Various Baseline Quantities

Basic Average Usage Profile including HPWH

		Current Basic Baseline	Current AE Baseline	Total Bill Impact
Zone 5	**Summer**	$611	$558	
	Winter	$1,142	$1,142	
	Annual	$1,753	$1,700	-3.0%
Zone 6	**Summer**	$500	$522	
	Winter	$720	$692	
	Annual	$1,220	$1,214	-0.5%
Zone 8	**Summer**	$648	$671	
	Winter	$700	$665	
	Annual	$1,348	$1,336	-0.9%
Zone 9	**Summer**	$753	$787	
	Winter	$795	$762	
	Annual	$1,549	$1,550	0.1%
Zone 10	**Summer**	$901	$927	
	Winter	$834	$760	
	Annual	$1,736	$1,687	-2.8%
Zone 13	**Summer**	$939	$917	
	Winter	$867	$782	
	Annual	$1,806	$1,699	-5.9%
Zone 14	**Summer**	$932	$935	
	Winter	$932	$822	
	Annual	$1,864	$1,757	-5.7%
Zone 15	**Summer**	$1,140	$1,317	
	Winter	$972	$836	
	Annual	$2,112	$2,153	1.9%
Zone 16	**Summer**	$711	$719	
	Winter	$900	$802	
	Annual	$1,611	$1,521	-5.6%

This volatility is primarily driven by the fact that customers who currently qualify for All-electric baseline quantities have different energy use patterns than Basic customers with a HPWH. The former's dependence on electric space heating leads to a large increase in energy usage that is confined to the winter, while the latter's dependence on a HPWH leads to an increase in energy usage

that is both more moderate and year-round. As a result, the All-electric baseline quantities for winter, which are currently set at 70% of average residential usage, are generally substantially larger than required by HPWH customers, while the All-electric baseline quantities for summer are generally smaller than required.

3. Alternative Options to Provide Additional Baseline Quantities to HPWH Customers

Because the All-electric baseline quantities themselves are not well suited to the operational usage of HPWH customers, SCE considered alternative means of providing additional baseline quantities to HPWH customers.[35] For this analysis, the HPWH customers are treated as a sub-group in that the estimated HPWH loads were added to each Basic customer's bill and the baseline quantities re-calculated.

First, SCE examined the results of applying the All-electric average consumption range (i.e., 60-70% of average usage) to come up with baseline quantities that could be specific to Basic customers with a HPWH. SCE refers to this as the "Increased Consumption Allowance Option." SCE examined two scenarios under this option. First, SCE, calculated the baseline quantities for these customers at 60% of the average residential customer. This corresponds to the current Basic quantities but adjusts for the HPWH loads. Second, SCE calculated the baseline quantities for these customers at 70% of the average residential customer. This quantity corresponds to the level permitted for all-electric customers. Critically, in both cases, SCE allowed for baseline quantities to be set at the specified percentage of average residential consumption (60% for scenario 1, 70% for scenario 2) in the summer in addition to the winter because HPWHs are in use throughout the year.

In addition to considering applying the All-electric average consumption range to the sub-group of HPWH customers, SCE also examined the results of calculating the amount of incremental baseline quantity necessary to keep the customer's average rate unchanged by additional HPWH load. SCE refers to this as the "Incremental Baseline Option." SCE calculated the incremental allowance by applying the current Basic baseline percentage of 60% to the average daily HPWH usage in each season.

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[35] *See* Appendix F.

The sensitivity of the additional baseline quantities provided under both the Increased Consumption Allowance Option scenarios and the Incremental Baseline Option is shown in Table IV-6 below. SCE notes that the additional baseline quantities provided at 70% of the average sub-group are *greater* than the additional HPWH load, and thus 70% provides excessive baseline quantities for HPWH customers. SCE also notes that the Incremental Baseline Option quantities are determined solely on the HPWH load and result in baseline quantities about twice the size as the additional amount produced by Increased Consumption Allowance Option at 60% of the average customer's consumption.

Table IV-6
Baseline Quantity Alternatives for HPWH Customers

Zone	Basic @60%	Basic+HPWH @60%	Basic+HPWH @70%	Basic+HPWH Incremental
	Summer			
5	17.2	17.1	23.5	18.0
6	11.4	11.6	15.0	12.2
8	12.6	13.0	16.5	13.4
9	16.5	16.9	21.6	17.2
10	18.9	19.4	24.3	19.6
13	22.0	22.4	27.9	22.7
14	18.7	19.3	24.1	19.4
15	46.4	46.8	59.7	47.1
16	14.4	14.7	18.9	15.2
	Winter			
5	18.7	18.7	25.4	20.0
6	11.3	11.8	15.1	12.6
8	10.6	11.1	14.0	11.9
9	12.3	13.0	16.4	13.6
10	12.5	13.2	16.5	13.8
13	12.6	13.2	16.5	13.9
14	12.0	12.8	15.8	13.3
15	9.9	10.1	12.8	11.2
16	12.6	13.1	16.5	13.9

As shown in Table IV-7, the results of calculating the baseline quantities at 60% for the sub-population with HPWH results in only small bill savings for HPWH customers over the current Basic baseline quantities. However, these small savings would be realized without the bill volatility

experienced if the All-electric baseline quantities were used. Indeed, both the summer bills and the winter bills for HPWH customers under the Increased Consumption Allowance Option at 60% are lower than when using the current baseline quantities. As expected, the resulting baseline quantities using 70% of the average customer loads are considerably more. This provides HPWH customers with considerable benefit in the winter. This is similar to the benefit provided by the use of the All-electric baseline quantities, except that under this option each zone now receives a similar benefit in the winter due to the mild zones receiving greater allocation and the hot zones receiving less. Additionally, by providing summer baseline quantities at 70% as well, HPWH customers also receive a considerable benefit during summer under this option, unlike when using the All-electric baseline quantities. This results in larger net savings and avoids bill volatility. Finally, the Incremental Baseline Option also reduces both summer and winter bills for HPWH customers with a consistent net impact across weather zones. The bill savings resulting from the Incremental Baseline Option are about twice as large as those realized under the Increased Consumption Allowance Option at 60%, although not as large as those realized under the Increased Consumption Allowance Option at 70%. However, SCE notes again that additional baseline quantities provided at 70% of the average sub-group are more than needed to offset the additional HPWH load.

Table IV-7
Seasonal and Annual Bills with Various Baseline Quantities

Basic Average Usage Profile including HPWH

		Current Basic Baseline	Subgroup @ 60% Baseline	Subgroup @ 70% Baseline	Incremental Baseline
Zone 5	**Summer**	$611	$564	$521	$557
	Winter	$1,142	$1,142	$965	$1,135
	Annual	$1,753	$1,706	$1,486	$1,692
Zone 6	**Summer**	$500	$498	$470	$494
	Winter	$720	$711	$658	$702
	Annual	$1,220	$1,209	$1,128	$1,196
Zone 8	**Summer**	$648	$645	$616	$642
	Winter	$700	$691	$644	$681
	Annual	$1,348	$1,336	$1,260	$1,323
Zone 9	**Summer**	$753	$750	$711	$748
	Winter	$795	$784	$728	$777
	Annual	$1,549	$1,534	$1,439	$1,525
Zone 10	**Summer**	$901	$897	$857	$896
	Winter	$834	$823	$768	$816
	Annual	$1,736	$1,720	$1,625	$1,712
Zone 13	**Summer**	$939	$935	$890	$933
	Winter	$867	$857	$802	$849
	Annual	$1,806	$1,792	$1,692	$1,782
Zone 14	**Summer**	$932	$927	$887	$926
	Winter	$932	$919	$870	$914
	Annual	$1,864	$1,846	$1,757	$1,840
Zone 15	**Summer**	$1,140	$1,130	$1,130	$1,130
	Winter	$972	$970	$925	$954
	Annual	$2,112	$2,100	$2,055	$2,084
Zone 16	**Summer**	$711	$709	$674	$705
	Winter	$900	$892	$835	$882
	Annual	$1,611	$1,601	$1,509	$1,587

4. Preferability of the Incremental Baseline Option Over the Increased Consumption Allowance Option

Of all the alternatives considered, SCE finds the Incremental Baseline Option to be the most preferable. First, providing an incremental allowance may not require a statutory change whereas

either changing the eligibility requirements for the All-electric baseline quantities or increasing the percent of average customer consumption that applies to Basic customers with HPWHs would require changes to statute.

Second, implementing an incremental baseline quantity adder would provide an amount of baseline quantity commensurate with HPWH usage but would leave an incentive for customers to operate the HPWH in a manner that takes advantage of low-cost periods. Table IV-8 below quantifies the current impact of the HPWH load on bills for the average customer on TOU-D-4-9PM in Zone 9 (Basic+HPWH Current Baseline column) and then shows both how adding incremental baseline quantities can affect that customer's bill (Basic+HPWH Incremental Baseline column) and how that customer can operate a HPWH to achieve further bill savings (Basic+HPWH Shifted Incremental Baseline column).

This table shows that, by adding a HPWH, the average Basic customer's bill would increase approximately $144 annually and their average rate would increase from 20.5 cents/kWh to 20.8 cents/kWh. However, providing an incremental baseline quantity would increase this average customer's bill credit from $339 to $363 annually and decrease their average rate back down to 20.5 cents/kWh. This should render the customer indifferent to the incremental usage. Additionally, if the customer were to shift 33% of her HPWH usage to the middle of the day when energy charges are lowest, the customer could further reduce her annual bill by $13 and achieve an average rate lower than they had without the HPWH. The example illustrates the results for an incremental baseline amount to make the average rate indifferent. However, to overcome for near-term customer hesitation in adopting this new technology, the indifference base line amount can be set to a higher level for a specified transitory period (i.e., a certain number of years) in order to encourage HPWH adoptions.

In sum, the Incremental Baseline Option not only renders a customer indifferent to the incremental usage required by a HPWH but also allows for the customer to reduce the additional energy cost resulting from a HPWH even further by shifting usage. This load-shifting behavior incentive is an advantage that is not provided under the Increased Consumption Allowance Option. Finally, the

quantity provided by the Incremental Baseline Option could also be adjusted to reflect any additional value associated with reduced carbon dioxide emissions.

Table IV-8
Example of Bill Savings Mechanisms

Zone 9 TOU-D (4-9 PM)		Basic Current Baseline	Basic+HPWH Current Baseline	Basic+HPWH Incremental Baseline	Basic+HPWH, Shifted Incremental Baseline
Summer	On	$282	$293	$293	$289
	Mid	$74	$78	$78	$77
	Off	$491	$515	$515	$518
$/Month		$4	$4	$4	$4
Winter	Mid	$281	$314	$314	$303
	Off	$394	$439	$439	$424
	Super-Off	$210	$237	$237	$253
$/Month		$8	$8	$8	$8
Total		$1,744	$1,887	$1,887	$1,875
Annual Bill Credit		($339)	($339)	($363)	($363)
Summer Bill Credit		($136)	($136)	($142)	($142)
Winter Bill Credit		($202)	($202)	($221)	($221)
Total w/Bill Credit		$1,405	$1,549	$1,525	$1,512
HPWH Annual			$144	$120	$108
HPWH Sum/Month			$9.54	$8.10	$7.64
HPWH Win/Month			$13.17	$10.91	$9.62
HPWH Savings				-17%	-25%
Avg. Rate		$0.205	$0.208	$0.205	$0.203

5. Final Considerations

Stakeholders should also be mindful that, although only HPWH load is under consideration in this study, there are additional appliances which customers could choose to electrify which would also support Building Electrification initiatives to reduce carbon dioxide emissions. Thus, it is worth considering whether Section 739 should be amended to provide for additional consumption allowances (in the range of 60-70% of average customer consumption in both summer and winter) in order to allocate adequate baseline quantities to customers with any qualifying appliances, such as a HPWH, electric range, or dryer.

Finally, SCE notes that stakeholders should also keep in mind the future direction of baseline quantities when considering how best to address the cost of additional HPWH loads. In Chapter III of this testimony, SCE describes the proposed joint IOU study to determine residential essential use. It is not clear at this time what implications, if any, this essential use study could have on the baseline statute.

Appendix A

Witness Qualifications

SOUTHERN CALIFORNIA EDISON COMPANY

QUALIFICATIONS AND PREPARED TESTIMONY OF

ROBERT A. THOMAS

Q. Please state your name and business address for the record.

A. My name is Robert Thomas, and my business address is 2244 Walnut Grove Avenue, Rosemead, California 91770.

Q. Briefly describe your present responsibilities at the Southern California Edison Company.

A. I am Director of the Pricing Design, Load Research, and Forecasting Groups in the Regulatory Affairs Department at Southern California Edison Company. In this position, I am responsible for development of SCE's rate designs. I have held this position since September 2019.

Q. Briefly describe your educational and professional background.

A. I hold a Bachelor's of Science and Engineering from the University of Arizona, a Masters in Business Administration from California State Polytechnic University, Pomona and a Professional Engineering License in Mechanical Engineering.

Prior to my present position, my responsibilities have included Principle Manager of Pricing Design, Marginal Cost and Sales Forecasting, within the Regulatory Operations, where I was responsible for the development of pricing designs and the underlying cost of service studies, including sales forecasting. Prior to this position, I held the position of Manager of the Analysis and Program Support Group, within SCE's Business Customer Division, where I was responsible for providing customer specific rate and financial analyses involving self-generation, load growth, contract rates, and hourly pricing options. Prior to this position, I was the SCE's Program Manager for the Self Generation Incentive Program. In this position, I was responsible for all aspects of the program to include dispute resolution, processing applications, program promotion and was SCE's lead representative on the Working Group.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of testimony in *SCE's 2019 Rate Design Window Application, Exhibit SCE-01, Chapter II, entitled Study Of Storage-Specific Rates With A Daily Demand Charge.*

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY

QUALIFICATIONS AND PREPARED TESTIMONY OF

HANK ELGIN

Q. Please state your name and business address for the record.

A. My name is Henry Elgin, and my business address is 8631 Rush Street, Rosemead, California 91770.

Q. Briefly describe your present responsibilities at the Southern California Edison Company.

A. I am a Load Research Analyst in the Pricing, Design & Research Group of State Regulatory Operations Department. In this position, I am responsible for the development, analysis and reporting of load research studies supporting regulatory proceedings, primarily involving rate design.

Q. Briefly describe your educational and professional background.

A. I hold a Bachelor of Science in Statistics and a minor in German from the California Polytechnic State University, San Luis Obispo, and a Master of Science degree in Statistics and Econometrics from the University of Essex, UK. I joined the Load Research group at Southern California Edison in 2013. I perform load research activities including sample selection, data management and estimation of energy consumption characteristics for rate groups and customer classes.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor *SCE's 2019 Rate Design Window Application, Exhibit SCE-01, Chapter III, entitled Residential Essential Use Study Plan and Chapter IV, entitled Study on Applicability of All-electric Baseline to Heat Pump Water Heater Customers.*

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does

Appendix B

Annual Bill Comparisons Illustrating Revenue Neutrality

Annual Bill Comparisons for Bundled Service TOU-GS-3 Customers

Average Monthly Usage (kWh)	% Population	# of Service Accounts	Option D Bill	Option E Bill	Scenario 1 Bill	Scenario 2 Bill	Average Load Factor
b. 0 - 9999	1.4%	83	$ 3,106	$ 2,093	$ 1,993	$ 1,861	11%
c. 10000 - 19999	2.9%	173	$ 5,090	$ 3,797	$ 3,844	$ 3,743	12%
d. 20000 - 29999	7.2%	424	$ 5,896	$ 4,909	$ 4,991	$ 4,994	15%
e. 30000-39999	8.3%	488	$ 7,162	$ 6,170	$ 6,318	$ 6,352	19%
f. 40000 - 49999	8.1%	481	$ 8,497	$ 7,628	$ 7,818	$ 7,829	23%
g. 50000 - 59999	8.7%	511	$ 9,703	$ 8,995	$ 9,200	$ 9,178	29%
h. 60000 - 69999	9.7%	575	$ 10,603	$ 10,227	$ 10,415	$ 10,411	34%
i. 70000 - 79999	9.1%	537	$ 11,765	$ 11,563	$ 11,715	$ 11,694	37%
j. 80000 - 89999	7.7%	452	$ 12,980	$ 12,919	$ 13,040	$ 13,017	40%
k. 90000 - 99999	6.7%	397	$ 13,945	$ 14,132	$ 14,209	$ 14,213	44%
l. 100000 - 109999	6.3%	373	$ 15,131	$ 15,516	$ 15,542	$ 15,540	46%
m. 110000 - 119999	5.6%	333	$ 16,115	$ 16,757	$ 16,734	$ 16,758	50%
n. 120000 - 129999	4.2%	247	$ 17,345	$ 18,065	$ 18,021	$ 18,062	51%
o. 130000 - 139999	3.2%	191	$ 18,450	$ 19,324	$ 19,235	$ 19,272	52%
p. 140000 - 149999	2.3%	138	$ 19,871	$ 20,922	$ 20,810	$ 20,847	53%
q. 150000 - 159999	2.5%	148	$ 20,774	$ 22,003	$ 21,845	$ 21,896	55%
r. 160000 - 169999	1.7%	102	$ 21,670	$ 23,040	$ 22,823	$ 22,918	57%
s. 170000 - 179999	1.1%	65	$ 22,894	$ 24,429	$ 24,160	$ 24,255	58%
t. 180000 - 189999	0.9%	53	$ 23,945	$ 25,732	$ 25,412	$ 25,538	60%
u. 190000 - 199999	0.6%	38	$ 25,485	$ 27,113	$ 26,809	$ 26,853	60%
v. 200000+	1.6%	97	$ 27,722	$ 30,134	$ 29,687	$ 29,898	67%
Grand Total	100.0%	5,906	$ 12,469	$ 12,374	$ 12,442	$ 12,450	36%

Annual Bill Comparisons for Bundled Service TOU-8-SEC Customers

Average Monthly Usage (kWh)	% Population	# of Service Accounts	Option D Bill	Option E Bill	Scenario 1 Bill	Scenario 2 Bill	Average Load Factor
b. 0 - 49999	4.9%	86	$ 7,548	$ 5,612	$ 5,675	$ 5,544	16%
c. 50000 - 99999	8.2%	145	$ 17,106	$ 13,845	$ 14,355	$ 14,313	19%
d. 100000 - 149999	13.9%	246	$ 22,362	$ 19,925	$ 20,428	$ 20,399	27%
e. 150000-199999	17.3%	306	$ 26,786	$ 25,464	$ 25,912	$ 25,858	37%
f. 200000 - 249999	14.6%	259	$ 32,286	$ 31,523	$ 31,944	$ 31,946	44%
g. 250000 - 299999	11.0%	195	$ 37,279	$ 37,628	$ 37,696	$ 37,648	51%
h. 300000 - 349999	8.3%	147	$ 42,685	$ 43,668	$ 43,721	$ 43,817	55%
i. 350000 - 399999	5.9%	104	$ 49,416	$ 50,134	$ 50,211	$ 50,191	55%
j. 400000 - 449999	3.8%	68	$ 55,681	$ 56,710	$ 56,693	$ 56,727	56%
k. 450000 - 499999	2.5%	45	$ 60,595	$ 62,611	$ 62,492	$ 62,668	61%
l. 500000 - 549999	2.1%	37	$ 67,423	$ 69,888	$ 69,847	$ 70,059	59%
m. 550000 - 599999	1.1%	20	$ 72,838	$ 75,372	$ 75,030	$ 75,153	61%
n. 600000 - 649999	1.3%	23	$ 78,285	$ 80,920	$ 80,773	$ 81,110	60%
o. 650000 - 699999	1.1%	19	$ 85,647	$ 89,588	$ 89,124	$ 89,236	61%
p. 700000 - 749999	0.8%	14	$ 94,959	$ 96,323	$ 96,849	$ 96,970	55%
q. 750000 - 799999	0.8%	14	$ 96,876	$ 100,789	$ 100,543	$ 100,699	62%
r. 800000 - 849999	0.5%	8	$ 97,562	$ 103,055	$ 102,178	$ 102,748	67%
s. 850000 - 899999	0.3%	5	$ 106,307	$ 111,564	$ 110,681	$ 111,150	62%
t. 900000 - 949999	0.3%	5	$ 110,956	$ 117,213	$ 116,766	$ 117,375	70%
u. 950000 - 999999	0.1%	2	$ 116,557	$ 122,472	$ 120,542	$ 120,777	68%
v. 1000000+	1.3%	23	$ 149,717	$ 157,881	$ 156,464	$ 156,735	65%
Grand Total	100.0%	1,771	$ 38,086	$ 37,720	$ 37,950	$ 37,961	42%

Appendix C

Comparison of 2018 GRC Phase 2 and Trial Daily Demand Charge Rates

Comparison of 2018 GRC Phase 2 and Trial Daily Demand Charge Rates for TOU-GS-3 Bundled Service Customers

TOU-GS-3	March 2019 GRC Rates Rate D			March 2019 GRC Rates Rate E			Scenario 1 Rate D (FRD DD)			Scenario 2 Rate D (FRD DD, incl peak)			
	Delivery	Generation	Total Rate	Delivery	Generation	Total Rate	Delivery	Generation	Total Rate	Delivery	Generation	Total Rate	
Energy Charge - $/kWh													
Summer Season													
On-Peak	0.02712	0.07933	0.10645	0.14572	0.28409	0.42981	0.02712	0.28409	0.31121	0.02712	0.28409	0.31121	
Mid-peak	0.02712	0.07134	0.09846	0.09015	0.07141	0.16156	0.02712	0.07141	0.09853	0.02712	0.07141	0.09853	
Off-Peak	0.02712	0.04691	0.07403	0.05984	0.04698	0.10682	0.02712	0.04698	0.07410	0.02712	0.04698	0.07410	
Winter Season													
Mid-peak	0.02712	0.06161	0.08873	0.04732	0.09101	0.13833	0.02712	0.09101	0.11813	0.02712	0.09101	0.11813	
Off-Peak	0.02712	0.05171	0.07883	0.03031	0.05178	0.08209	0.02712	0.05178	0.07890	0.02712	0.05178	0.07890	
Super-Off-Peak	0.02712	0.03315	0.06027	0.03897	0.03322	0.07219	0.02712	0.03322	0.06034	0.02712	0.03322	0.06034	
Customer Charge - $/month	301.25	0.00	301.25	301.25	0.00	301.25	301.25	0.00	301.25	301.25	0.00	301.25	
Facilities Related													
Demand Charge - $/kW	12.22	0.00	12.22	8.57	0.00	8.57	0.55	0.00	0.55	0.77	0.00	0.77	<= Daily Demand
Time Related Demand Charge - $/kW													
Summer Season													
On-Peak	9.79	17.14	26.93	0.00	3.71	3.71	9.79	3.71	13.50	0.00	3.71	3.71	
Mid-Peak	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Winter Season													
Mid-Peak	3.31	3.12	6.43	0.00	0.65	0.65	3.31	0.65	3.96	0.00	0.65	0.65	
Off-Peak	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Notes: Rate D, filed D Rate
Rate E, filed E Rate
Scenario 1: Rate D (FRD DD), filed D Rate, with FRD converted to DD
Scenario 2: Rate D (FRD DD, incl peak), filed D Rate, with FRD and peak converted to DD
Based on March 2019 Rates/Revenue neutrailty

Comparison of 2018 GRC Phase 2 and Trial Daily Demand Charge Rates for TOU-8-SEC Bundled Service Customers

TOU-8-SEC	March 2019 GRC Rates Rate D			March 2019 GRC Rates Rate E			Scenario 1 Rate D (FRD DD)			Scenario 2 Rate D (FRD DD, incl peak)			
	Delivery	Generation	Total Rate	Delivery	Generation	Total Rate	Delivery	Generation	Total Rate	Delivery	Generation	Total Rate	
Energy Charge - $/kWh													
Summer Season													
On-Peak	0.02628	0.07268	0.09896	0.13411	0.28646	0.42057	0.02628	0.28646	0.31274	0.02628	0.28646	0.31274	
Mid-peak	0.02628	0.06536	0.09164	0.08675	0.06543	0.15218	0.02628	0.06543	0.09171	0.02628	0.06543	0.09171	
Off-Peak	0.02628	0.04159	0.06787	0.05510	0.04166	0.09676	0.02628	0.04166	0.06794	0.02628	0.04166	0.06794	
Winter Season													
Mid-peak	0.02628	0.05464	0.08092	0.04403	0.08803	0.13206	0.02628	0.08803	0.11431	0.02628	0.08803	0.11431	
Off-Peak	0.02628	0.04586	0.07214	0.02879	0.04593	0.07472	0.02628	0.04593	0.07221	0.02628	0.04593	0.07221	
Super-Off-Peak	0.02628	0.02939	0.05567	0.03732	0.02946	0.06678	0.02628	0.02946	0.05574	0.02628	0.02946	0.05574	
Customer Charge - $/month	450.75	0.00	450.75	450.75	0.00	450.75	450.75	0.00	450.75	450.75	0.00	450.75	
Facilities Related													
Demand Charge - $/kW	12.52	0.00	12.52	8.83	0.00	8.83	0.54	0.00	0.54	0.75	0.00	0.75	<= Daily Demand
Time Related Demand Charge - $/kW													
Summer Season													
On-Peak	9.55	20.13	29.68	0.00	4.36	4.36	9.55	4.36	13.91	0.00	4.36	4.36	
Mid-Peak	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Winter Season													
Mid-Peak	3.20	3.93	7.13	0.00	0.82	0.82	3.20	0.82	4.02	0.00	0.82	0.82	
Off-Peak	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Notes: Rate D, filed D Rate
Rate E, filed E Rate
Scenario 1: Rate D (FRD DD), filed D Rate, with FRD converted to DD
Scenario 2: Rate D (FRD DD, incl peak), filed D Rate, with FRD and peak converted to DD
Based on March 2019 Rates/Revenue neutrailty

Appendix D

Proposed Interim Joint Investor-Owned Utilities Study Plan and Process for Identifying Electric Essential Usage for Residential Customers

APPENDIX D

PROPOSED INTERIM JOINT INVESTOR-OWNED UTILITIES STUDY PLAN AND PROCESS FOR IDENTIFYING ELECTRIC ESSENTIAL USAGE FOR RESIDENTIAL CUSTOMERS

ATTACHMENT D
PROPOSED INTERIM JOINT INVESTOR-OWNED UTILITIES STUDY PLAN AND PROCESS FOR IDENTIFYING ELECTRIC ESSENTIAL USAGE FOR RESIDENTIAL CUSTOMERS

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ATTACHMENT D
PROPOSED INTERIM JOINT INVESTOR-OWNED UTILITIES STUDY PLAN AND PROCESS FOR IDENTIFYING ELECTRIC ESSENTIAL USAGE FOR RESIDENTIAL CUSTOMERS

A. Introduction

Ordering Paragraph (OP) 14 of California Public Utilities Commission (CPUC or Commission) Decision (D.) 18-08-013, issued August 17, 2018, directed Pacific Gas and Electric Company (PG&E) "to develop a study plan (including budget) for developing a model of what constitutes essential use for its residential customers." The Commission also issued a nearly identical requirement to Southern California Edison (SCE) in OP 14 of D.18-11-027, issued November 29, 2018. Finally, an Administrative Law Judge (ALJ) Ruling issued on November 1, 2019 directed San Diego Gas & Electric Company (SDG&E) "to participate in PG&E and SCE's stakeholder process for developing a model of what constitutes essential use for its residential customers, and to develop such a model consistent with the specific directions provided to PG&E in D.18-08-013."[1] That Ruling directed SDG&E to file and serve a document that details SDG&E's timeline for completing development of its essential use model.

This document presents the required plan to identify the essential usage of electricity for residential customers for PG&E, SCE, and SDG&E (collectively, the Joint IOUs). To facilitate consistency across the Joint IOU territories and to accommodate a streamlined approach to engaging with stakeholders, the Joint IOUs propose conducting a coordinated statewide study, hereinafter referred to as the Essential Use Study (Study).

The proposed Joint IOU Study plan incorporates comments received from stakeholders to date. The Joint IOUs continue to work with interested stakeholders to develop this plan further.

We are also proposing that the CPUC issue a ruling creating an expedited, bifurcated Joint Study proceeding. In addition, the Joint IOUs are seeking approval from the Commission with respect to their proposals to:

- Execute a statewide Essential Use Study;

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[1] ALJ Ruling in Application (A.) 19-03-002 Directing SDG&E to File/Serve Supplemental Information, Issued November 1, 2019.

- Contract with the 2019 Residential Appliance Saturation Survey (RASS) consultant to administer the Study on a directed-award basis; and
- Provide a preliminary estimate of cost[2] of between $500,000 and $750,000 to complete the Study, depending on its final design.

Provided that the Joint IOUs receive Commission approval to proceed with the development of this Study plan, the Joint IOUs will host a minimum of two public Study design meetings. These meetings will be noticed to the appropriate service lists, including: the most recent PG&E, SCE, and SDG&E[3] General Rate Case (GRC) Phase II proceedings, SCE's 2019 Rate Design Window (RDW) application, and the CPUC's Affordability Rulemaking proceeding, (R.) 18-077-006. Following these public meetings, the Study design will be finalized considering stakeholder feedback.[4]

B. How Should Essential Use Be Defined?

While the Scoping Memo in the Affordability Rulemaking determined that the Essential Use Study for PG&E, and consequently for SCE, should remain in their respective GRC Phase II/RDW proceedings rather than within the scope of R.18-07-006,[5] the Affordability Rulemaking aims to define both essential service and, more specifically, energy essential service, as the level of energy use needed for essential services. The Joint IOUs recommend that the definition of essential use for the Essential Use Study being discussed herein utilize the definition of energy essential service being determined in R.18-07-006.

On April 12, 2019, an ALJ Ruling (April Ruling) was issued in the Affordability Rulemaking inviting comments and responses to questions presented in an attachment (Attachment J) containing background information

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2 OP 14 of D.18-08-013, issued August 17, 2018, directed PG&E "to develop a study plan (including budget)" for the Study. Similarly, OP 14 of D.18-11-027, issued November 29, 2018, directed SCE "to develop a study plan (including budget)" for the Study. This is referenced in this document as a "preliminary estimate of cost."

3 SDG&E is using two service lists for its 2019 GRC Phase II proceeding: the service list for its 2016 GRC Phase II proceeding (A.15-04-012) and the service list for its 2019 Electric Sales Forecast proceeding (A.18-03-003).

4 To ensure ongoing collaboration with interested parties, further public meetings will be held (and continue to be noticed to the above-referenced service lists) as the Study is underway. These public meetings will provide additional opportunities for stakeholders to provide comments and suggestions and to ask questions regarding the Study as it progresses.

5 See Scoping Memo in R.18-07-006, dated November 19, 2018, at p. 5.

and a summary of several proposals. Attachment J of the April Ruling included the following discussion regarding the definition of essential service quantity:

> Across the water and energy industries, various conceptions of an essential service quantity already exist. The Public Utilities Code has provided for "an adequate supply of healthful water…at an affordable cost" since as early as 1993,[6] and tiered rate structures common in both the water and energy spaces reflect the idea of an essential baseline. With that said, the notion of an essential service quantity can differ greatly across utilities, in part based on differing assumptions of what is adequate or reasonable. An appropriate definition for essential services should be flexible, applicable to all Commission-regulated utilities, and set a common baseline for the assumptions behind the definition. The following definition reflects input received from parties via comments and information from the January 22, 2019 workshop pertaining to this OIR:
>
> An essential service quantity of utility service is that quantity which is necessary for health, comfort, and safety.

One of the questions posed in Attachment J was how this definition of essential service could be refined. Parties provided several responses.

On August 20, 2019, an ALJ Ruling in the Affordability Rulemaking was issued inviting comments on the *Staff Proposal on Essential Service and Affordability Metrics* (Staff Proposal). In this proposal, Commission staff from its Water, Energy, and Communications Divisions proposed the following high-level definition:

> Essential Service: service that meets a household's basic needs and is reasonably necessary for that household's health, safety, and full participation in society.[7]

The Staff Proposal also provides a proposal for a more specific definition for energy essential service:[8]

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6 Public Utilities Code § 739.8.

7 August 20, 2019 ALJ Ruling in R.18-07-006, Staff Proposal, p. 5.

8 In the first public meeting for the Essential Use Study, the Public Advocates Office at the California Public Utilities Commission (Cal Advocates) noted that this Staff Proposal, which was referenced in the presentation deck for the meeting in relation to "essential use quantities" and affordability metrics, is in the public comments phase and is preliminary. Home Energy Analytics Inc. (HEA) commented that Lawrence Berkeley National Labs has conducted research that identifies electricity-using devices that provide life-safety, health, and security functions to residential customers (EPIC Project EPC-15-024) that may be of value to this project. Specifically, HEA notes that this study identifies base loads from items like GFCI outlets and garage door backup batteries and concludes that the new California building code will result in a minimum of 80-continuous-watts (700 kilowatt-hour/year) for all new homes that will impact residential essential use.

> Energy Essential Service: service required for home heating and cooling; lighting; cooking; personal hygiene; medical care; and meaningful participation in society, such as operating a computer or charging a mobile device. These amounts vary seasonally and regionally.[9]

A workshop concerning the Staff Proposal took place on August 26, 2019. Parties subsequently provided opening and reply comments to the Staff Proposal on September 10 and 20, 2019, respectively.

A Commission decision concerning the Staff Proposal and the proposed definitions of electric essential service and energy essential service is still pending as of the date of the preparation of this proposed interim Joint Study plan.

C. What Specific Uses Warrant Inclusion in Essential Use?

The Staff Proposal currently identifies the following uses in its proposed definition for energy essential service:

- Home heating and cooling;
- Lighting;
- Cooking;
- Personal hygiene;
- Medical care; and
- Meaningful participation in society, such as operating a computer or charging a mobile device.

The Joint IOUs recommend that the uses to be addressed in the Essential Use Study align with definition of energy essential service expected to be resolved in R.18-07-006.

D. What Customer Segments Should Be Included in This Study?

In D.18-08-013 and D.18-11-027, the Commission states that the model for determining essential use must be able to specify essential usage based on the needs of residential customers uniquely within the following geographic areas:

- Hot climate zone – summer and winter (for PG&E, this represents Baseline Territories R, S, W, and P; for SCE, this represents California Climate Zones 10, 13, 14, and 15, and for SDG&E, this represents Mountain and Desert Climate Zones);

[9] August 20, 2019 ALJ Ruling in R.18-07-006, *Staff Proposal*, p. 5.

- Warm climate zone – summer and winter (for PG&E, this represents Baseline Territories X and Y; for SCE, this represents California Climate Zones 5 and 9, and for SDG&E, this represents the Inland Climate Zone); and
- Cool climate zone – summer and winter (for PG&E, this represents Baseline Territories T, V, and Z; for SCE, this represents California Climate Zones 6, 8, and 16, and for SDG&E, this represents the Coastal Climate Zone).

Given that current baseline quantities for electricity are dependent upon service type (i.e., basic/dual-service and all-electric) in addition to season and climate zone,[10] the Joint IOUs recommend that the segmentation also include differentiation by service type. Other unique segments may be identified over the course of the Study.

E. Joint IOUs Recommend Conducting a Single Essential Use Study

Per OP 14 of D.18-08-013, PG&E is required to submit the plan for an Essential Use Study as part of its next GRC Phase II application. SCE is required to submit such a study plan with its next RDW or GRC Phase II application, whichever comes first.[11] SDG&E is required to "file and serve a document that details SDG&E's timeline for completing development of its essential use model."[12] While PG&E, SDG&E and SCE will satisfy their requirements to file plans for an Essential Use Study in their respective GRC Phase II or RDW proceedings, the Joint IOUs recommend that an Essential Use Study be conducted jointly by PG&E, SCE, and SDG&E. The Joint IOUs believe that conducting an Essential Use Study jointly will provide for several benefits including cost sharing, cost-effectiveness, and consistency in methodology. The Joint IOUs are seeking the ability to track costs associated with the undertaking (detailed in their respective testimonies for PG&E, SCE and SDG&E) and recommend the following cost allocation:

- PG&E, 45 percent

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10 The Center for Accessible Technologies emphasized during the second public meeting that weather variations within climate zones—typically referred to as microclimates—can affect the amounts of electricity required for essential uses and requests that these differences be assessed in this Study.

11 OP 14 per D.18-11-027, p. 74.

12 See ALJ Ruling, dated November 1, 2019, Directing SDG&E to File/Serve Supplemental Information, in R.18-07-006.

- SCE, 43 percent
- SDG&E, 12 percent[13]

F. The Joint IOUs Recommend Consolidation Into a Single Joint IOU Study Proceeding

The Joint IOUs recommend that, following approval of the proposed study plan detailed herein, the Essential Use Study be addressed in a single proceeding. This approach would be an efficient means for allowing all interested parties to participate in the development of the Essential Use Study for the Joint IOUs. Consolidation will allow interested parties to address issues related to essential use for the Joint IOUs once in a single proceeding. Given the merits of a single, coordinated statewide study of essential use, the Joint IOUs recommend the establishment of a special, expedited, consolidated Joint Study proceeding including only PG&E, SCE, and SDG&E, that will be focused on the Essential Use Study as defined herein.

As discussed, the Scoping Memo in the Affordability Order Instituting Rulemaking (OIR) determined that the essential use study plans should be filed in PG&E's GRC Phase II and SCE's RDW, respectively, and both PG&E and SCE will do so.[14] However, with the Joint IOUs' proposal for a single Essential Use Study, the Joint IOUs respectfully request that the Commission consider addressing the Essential Use Study in the Affordability OIR, R.18-07-006. The Joint IOUs acknowledge that the Scoping Memo in the Affordability OIR[15] states that, even though the concept of essential usage is closely related to the concept of affordability, the primary issues in the Affordability Rulemaking "are to identify and define affordability criteria and to develop a framework for assessing affordability impacts across Commission proceedings and utility services." The discussion of essential use also continues to be a critical component to the discussion of affordability, however. In fact, essential use is a key component to the definition of affordability as put forward in the Staff Proposal:

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13 These cost-sharing ratios are consistent with the allocation of expenditures for the statewide residential rate reform marketing, education, and outreach campaign established in OP 8 in D.17-12-023.

14 At the time the Scoping Memo was issued in the Affordability OIR, SDG&E had not been required to conduct an Essential Use Study.

15 See Scoping Memo in R.18-07-006, dated November 19, 2018, at p. 6.

Affordability: the degree to which a household can regularly pay for essential service of each public utility type on a full and timely basis without substantial hardship.

There are several ways the CPUC could accommodate conducting the Essential Use Study. For instance, the Commission could establish a special separate proceeding focused solely on examining essential usage for electricity, which could be done as new, second phase of the Affordability OIR proceeding or as a separate multi-utility proceeding. PG&E proposes that the CPUC bifurcate this issue from PG&E's utility-specific GRC Phase II, to expedite its consideration (since a final decision in this GRC Phase II as a whole is not expected until mid-2021). One benefit of establishing a separate expedited track within the Affordability OIR with a primary focus on the Essential Use Study is that doing so would provide all of the parties who are already involved in the Affordability OIR with the opportunity to weigh in on the Study without having to become a party to a special bifurcated multi-utility proceeding or separate utility-specific proceedings such as PG&E's GRC Phase II and/or SCE's 2019 RDW. As to the latter, even if the Study issue is bifurcated and allowed to proceed quickly in each of these two proceedings, it seems inefficient to have the same study reviewed in multiple, separate utility-specific proceedings. Moreover, the newly-established, bifurcated Joint Study proceeding can move forward at a more expedited pace, to be determined by the Commission. If the Study is not bifurcated from myriad issues being considered in PG&E's 2020 GRC Phase II proceeding, there would be a significant delay in starting execution of the Study, when compared to PG&E's proposed expedited schedule below, because the ultimate 2020 GRC Phase II decision is not expected until at least mid-2021.

G. Leveraging the 2019 Residential Appliance Saturation Survey

In both D.18-08-013 and D.18-11-027, the Commission recognizes the critical role that the 2019 RASS would play in the development of an Essential Use Study. OP 14 of D.18-08-013 states that the Essential Use Study:

> …must be developed using research, both existing (information sources such as the Residential Appliance Saturation Survey and Experian data) and new direct customer surveys, to collect information on household size (in terms of both square footage and number of residents), building features (age, construction materials, insulation, etc.), and appliances (efficiency and

usage) in order to better evaluate the essential electricity needs of PG&E's residential customers.[16]

The 2019 RASS is a large-scale, statewide study that has been conducted periodically over the past few decades to estimate the saturation of typical residential appliances and energy consumption tied to a wide range of common end uses of energy. Utilities participating in the 2019 RASS include: Los Angeles Department of Water and Power, PG&E, SCE, SDG&E, Southern California Gas Company, and the Sacramento Municipal Utilities District. Using both mail- and e-mail-based respondent recruitment techniques, the forecasted completed sample size for the 2019 RASS is approximately 77,000 California households, over 45,000 of which will be in Joint IOU service territories and is the most comprehensive survey of California residents of its kind.

The 2019 RASS will estimate unit energy consumption of specific end-uses of electricity using a conditional demand analysis (CDA), which has been refined over the past 30 years. CDA combines meter data from utilities, survey data on appliances in homes and household demographics, temperature data, and engineering models to estimate average energy usage for specific appliances or end-uses. Household members are surveyed to obtain demographic information, end-use appliances and equipment in the dwelling, and occupant usage habits. This information is combined with end-use engineering estimates to create a bottom-up estimate of each household's energy consumption profile. The results of the statistically-adjusted end-use usage estimates, aggregated over the sample population, produce the segment- and population-level end-use average usage estimates. The 2019 RASS is expected to be completed by March 2020.

The Commission in D.18-08-013 and D.18-11-027 determined that, to better evaluate the essential electricity needs of residential customers, the model for

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16 D.18-08-013, p. 179. Comparable language about the Essential Use Study can also be found in OP 14 of D.18-11-027 for SCE. "The SCE study plan must consider a model that uses research, both existing (information sources such as the Residential Appliance Saturation Survey and Experian data) and new direct customer surveys, to collect information on household size (in terms of both square footage and number of residents), building features (age, construction materials, insulation, etc.), and appliances (efficiency and usage) in order to better evaluate the essential electricity needs of SCE's residential customers." (D.18-11-027, p. 74.)

determining essential use must collect information on the geographic segments listed in Section D above and on the following customer attributes:

- Household size (in terms of both square footage and number of residents);
- Building features (age, construction materials, insulation, etc.); and
- Appliances (efficiency and usage).

Most of these requirements are met with the 2019 RASS questionnaire. A complete listing of the 2019 RASS questions is provided as Table 9A-2 to this document. Table 9A-3 provides cross-references between the 2019 RASS questions and household size and building features. Table 9A-4 provides cross-references between the 2019 RASS questions and appliances.

Further, the Joint IOUs wish to build upon the 2019 RASS by using its respondent pool to fill in any gaps in the existing questionnaire and as the source for new survey respondents for follow-on surveys,[17] when practical.

H. Preliminary Cost Estimate

The California Energy Commission (CEC) used a competitive solicitation process to award the administration of the 2019 RASS Study (initially referred to by the CEC as the "2017 RASS" due to a delay in issuing the contract) to the consultant DNV GL (doing business as KEMA Inc.) based on this firm's experience in conducting prior versions of the RASS study and on the knowledge and skills of the firm's staff in conducting in-depth analyses of household energy consumption patterns. Based in part on DNV GL's deep expertise with administering RASS studies, and based in part on the prior experience that the Joint IOUs have contracting with DNV GL on other research projects, the Joint IOUs intend to issue a directed award for the preliminary design of the Essential Use Study to this consultant, provided that the

[17] In the public meeting, Cal Advocates requested that all new data collected for the Joint IOUs' Essential Use Study be open for inspection by the stakeholders so that it can be validated, can provide for continued engagement, and its interpretation can include multiple perspectives.

Commission has no objections.[18] In doing so, the survey design, data collection, and conditional demand estimates performed for the RASS can be leveraged to expedite the implementation and reduce the costs of producing the Essential Use Study, and ensure the quality of essential energy use estimates.

Based on this proposal and prior studies of similar scope and magnitude, the cost estimate range for the Essential Use Study is between $500,000 and $750,000. The final cost of the Study will be dependent on the extent of stakeholder collaboration, the characteristics of the final Study design, and the timetable for its execution. Proposals for cost recovery would be incorporated in the respective testimonies of PG&E, SCE, and SDG&E.

I. Stakeholder Engagement for Developing the Study Plan

OP 14 of D.18-08-013, and OP 14 of D.18-11-027, require that PG&E and SCE, respectively, "consult with parties to this proceeding, …when developing this study plan,"[19] referencing both PG&E and SCE's GRC Phase II proceedings. The ALJ Ruling issued November 1, 2019 in A.19-03-011, directs SDG&E "to participate in PG&E and SCE's stakeholder process for developing a model of what constitutes essential use for its residential customers, and to develop such a model consistent with the specific directions provided to PG&E in D.18-08-013."[20]

The Joint IOUs have conducted two public meetings to date, one on August 28, 2019 and another on September 6, 2019. Both of these meetings were noticed to parties on the service lists for R.18-07-006 as well as for PG&E and SCE's respective GRC Phase II proceedings.

Parties were also invited to provide comments directly to the study plan through an online document. This Joint IOU interim Study plan proposal

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18 During the public meeting, TURN questioned how a direct award of a contract to DNV GL to conduct the study would benefit stakeholders. The Joint IOUs explained that DNV GL analysts have demonstrated expertise in demand modeling and have knowledge of both the data structure of 2019 RASS and the content of the surveys. Further, the Joint IOUs explained that contracting with a different vendor without familiarity with the data and its modeling would result in having to begin anew and ratepayers being required to pay more to execute the Essential Use Study. After discussion, Cal Advocates and TURN had no major objections to the hiring of DNV GL or to the Joint IOU effort, provided that stakeholders are given information about the scope, scale and cost of the project prior to the awarding of any contracts.

19 OP 14 of D.18-08-013, p. 179; OP 14 of D.18-11-027, p. 76.

20 ALJ Ruling in A.19-03-001, dated November 1, 2019, p. 2.

reflects comments received to date from stakeholders, and the Joint IOUs intend to continue to work with stakeholders further to develop and finalize this Study plan.

Once the Commission approves the proposed Study plan, as detailed herein, the Joint IOUs intend to host a minimum of two public Study design meetings.[21] These meetings will be noticed to the service lists referenced in Section A, above. Following these public meetings, the final Study design will be determined in coordination with interested stakeholders. Further public meetings will be planned and noticed in the same manner as above as the Study is underway. These public meetings will provide additional opportunities for stakeholders to provide comments and suggestions and to ask questions.

J. Study Timeline

This same proposal is being submitted as part of PG&E's November 22, 2019 GRC Phase II application, as part of SCE's 2019 RDW application, and as part of SDG&E's GRC Phase II proceeding. PG&E is requesting that the Commission issue a ruling bifurcating the Essential Use Study issue from the rest of the issues in its 2020 GRC Phase II proceeding. Bifurcating will allow the Essential Use Study plan to be developed and finalized jointly, for consideration and approval in a special, separate, expedited consolidated proceeding that can result in the Joint Study moving forward faster and more efficiently than it otherwise would. Recommendations or any remaining issues concerning the final Study design should also be received and incorporated into the record in that expedited, consolidated Study proceeding. The Commission would then approve a final Study plan in such an expedited joint proceeding. The Joint IOUs provide the following draft timeline, which aims to facilitate a timely, joint implementation of the Commission's envisioned Essential Use Study.

The Joint IOUs are uncertain what the Commission might decide should be the schedule for the Joint Study process, but the following provisional timeline is based on experience with typical public proceedings for such a study, based on the assumption that the Commission approves the Joint IOU request for a bifurcated, consolidated, and expedited process.

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[21] The Utility Consumers' Action Network (UCAN) commented that the initial two public meetings were helpful for understanding the requirements for the Essential Use Study and suggests that additional meetings will be helpful for further discussions.

TABLE C-1
ILLUSTRATIVE SCHEDULE FOR CONSIDERATION OF BIFURCATED JOINT ESSENTIAL USE STUDY

Line No.	Study Activity	Approximate Timeline
1	Ruling Granting Bifurcation	Mid-February 2020
2	Public Study Design Workshops	Mid-March to Mid-May 2020 (3 months after Ruling)
3	Submittal of Final Joint Study Design	Mid-August 2020 (1 month after Design Workshops)
4	Hearings and Briefs (or Public Workshops and Comments)	Mid-November 2020 (3 months after Final Joint Study Design Submittal)
5	Proposed Decision on Study and Cost Recovery Mechanisms	Mid-February 2021 (2 months after Reply Briefs or Reply Comments)
6	Final Decision on Special Expedited, Bifurcated Proceeding on the Study	Mid-March 2021 (1 month after Proposed Decision)
7	Preparation for Study Initiation and Contracting	Mid-June 2021 (3 months after Final Decision)
8	Joint Study Execution	Mid-December 2021 (6 months after Joint Study Initiation)
9	Preparation of Draft Report	Mid-February 2022 (2 months after Joint Study Execution)
10	Public Comments on Draft Report	Mid-March 2022 (1 month after Draft Report Completion)
11	Completion of Final Report and Submittal of Tier 2 Advice Letter	Mid-April 2022 (1 month after Public Comment Period)
12	Approval of Advice Letter	Mid-May 2022 (1 month after Advice Letter Submittal)

The estimated dates in the timeline above are dependent upon the following assumptions: (1) the RASS Study is completed by March 2020; (2) the CPUC issues a ruling authorizing the Essential Use Study to be conducted as a bifurcated, expedited single, statewide study; (3) consensus can be timely reached among the stakeholders regarding the final Joint Study design; (4) the

CPUC timely approves the directed award to the contractor completing the RASS Study; and (5) the CPUC timely approves the final Study design proposed by the Joint IOUs. If there are changes in any of these assumptions, the estimated schedule above could be lengthened.

TABLE C-2
2019 RASS QUESTION LIST

Home and Lifestyle	
A1	What type of building exists at the service address on the front cover of this survey?
A2	Do you own or rent this home?
A3	How long have you lived at this address?
A4	Which of the following best describes this residence? (permanent/vacation)
A5	If this is a partial-year or vacation home, please indicate the months this home is typically occupied.
A6	Approximately what year was this residence built?
A7	How many bedrooms are in your home?
A8	How many square feet of living space are there in your residence
A9	Are your home's exterior (outside) walls insulated?
A10	Is your home's attic/ceiling insulated?
A11	If yes estimate the number of inches of attic/ceiling insulation.
A12	Choose the statements that best describe your windows.
A13	Has your home been remodeled in the past 12 months?
A14	If yes, what type of remodel did you do?
A15	For each of the following age groups, how many people including yourself usually live in this home?
A16	Generally speaking, how often does a member of this household use any major electrical appliances or equipment (e.g. clothes washer, electric range, dishwasher, air conditioner etc.) on weekdays from 12 noon to 6 pm?
A17	Is natural gas service from underground pipes from the gas utility available in your neighborhood?
A18	Do you have a natural gas line or hook-up to any part of your home?
A19	What utility do you pay for natural gas service to your home?
Electric Vehicles	
A20	Does anyone in your household currently own or lease a plug-in battery electric vehicle or plug-in hybrid electric vehicle?
A21	How many electric vehicles does your household own or lease?
A22	On an average day, how many total miles do you drive your electric vehicles?
A23	How often do you charge your electric vehicle(s) at home work or somewhere else?
A24	Is your primary charger used at home a level 1 (120V) or level 2 (240V)?
A25	When is/are the EV(s) normally charged using this primary charger?

TABLE C-2
2019 RASS QUESTION LIST
(CONTINUED)

Space Heating	
B1	Do you pay to heat your home?
B2	What type of heating system do you use to heat this home?
B3	If your heating system(s) uses natural gas for fuel indicate whether it has a pilot light(s).
B4	How old is your main heating system?
B5	What type of thermostat does your main heating system(s) use?
B6	If your main heating system is controlled by a thermostat what is the average thermostat temperature usually set for each time period during the heating season?
B7	Has maintenance been performed on your main heating system in the past
B8	How many electric (plug-in) portable heaters do you use?
B9	How often do you use any additional heating system(s)
Space Cooling	
	CENTRAL AIR CONDITIONING/COOLING
C1	Do you pay for central air conditioning/cooling for your home?
C2	What type and how many central air conditioning/cooling system(s) do you have in your home?
C3	How old is your main central air conditioning/cooling unit?
C4	What type of thermostat does your main air conditioning/cooling system(s) use?
C5	What is the typical thermostat temperature setting of your main central cooling system for each time period during the cooling season?
C6	Has maintenance been performed on your central air conditioning system in the past 12 months?
	ROOM AIR CONDITIONING/COOLING (Window/Wall Units)
C7	Please tell us the characteristics of each room air conditioning/cooling unit below.
C8	Please indicate how often your room air conditioning/cooling unit(s) is/are turned on during the cooling season.
Water Heating	
D1	Do you pay for heating water at your residence?
D2	What type of water heating systems do you use in your home?
D3	What is the typical hot water heater temperature setting?

TABLE C-2
2019 RASS QUESTION LIST
(CONTINUED)

Space Heating	
D4	How old is your primary water heating system?
D5	How many total showers and baths are taken in your home on a typical day?
D6	Do you have low-flow showerheads installed in the shower(s)?
D7	Do the faucets in your home have water-saving aerators?
Laundry	
E1	Do you have the use of laundry equipment in your home?
E2	What type of clothes washer do you have?
E4	For each wash temperature below, how many loads of clothes do you wash in your home during a typical week?
E5	What type of clothes dryer do you have?
E6	How old is your clothes dryer?
E7	For each dry temperature below how many loads of clothes do you dry in your home during a typical week?
Food Preparation	
F1	Which of the following cooking appliances are used in your home?
F2	During a typical week how often do you use the following cooking appliances?
F3	Do you have a dishwasher?
F4	How old is your dishwasher?
F5	How many dishwasher loads are run in a typical week?
Refrigerators	
G1	How many refrigerators do you have plugged in?
G2	Please tell us the characteristics of each refrigerator in the table below.
	Door Style
Freezers	
H1	How many stand-alone freezers do you have plugged in?
H2	Please tell us the characteristics for each stand-alone freezer in the table below. (Style, size, age)
Spas and Hot Tubs	
I1	Do you have the use of a spa or hot tub at your home?
I2	What fuel do you use to heat the spa or hot tub?
I3	How large is the spa or hot tub?
I4	Where is the spa located?

TABLE C-2
2019 RASS QUESTION LIST
(CONTINUED)

Spas and Hot Tubs	
I5	Do you have an insulated cover on your spa or hot tub?
I6	How often do you run the filter pump on your spa or hot tub?
I7	Please indicate how often you heat your spa or hot tub in the winter and summer.
Pools	
J1	Do you have the use of a swimming pool at your home?
J2	How large is your pool? (An average-size pool is about 5 ft. deep by 40 ft. long by
J3	How many hours per day do you operate your swimming pool filter?
J4	Which fuel do you use to heat your pool?
J5	Please indicate how often you heat your pool in the summer and winter.
J6	Which of the following attributes does your pool have? (Choose all that apply.)
Entertainment and Technology	
K1	How many televisions and accessories do you use in this home?
K2	How many combined total hours are your televisions on each day?
K3	How many personal computer(s) (PC, Macintosh, etc.) do you use in this home?
K4	If you have one or more computer(s) in this home how many combined total hours are they turned on each day?
K5	Do you or someone else in your home operate a business and/or work from your home?
K7	How many of the following products do you use in this home?
	Printer, Scanner, Copier or Multifunction machine
	Tablet computer or e-reader (iPad or Kindle)
	Hubs controllers (Amazon Echo, Google home, Apple HomeKit)
	Smart home devices
	“Smart” cell phone (iPhone or Android)
	Other cell phone (flip phone candy bar phone)
	High-speed modem for Internet (DSL/cable/satellite)
	Home network (wired or wireless)
	Uninterrupted Power Supply (UPS power backup)

TABLE C-2
2019 RASS QUESTION LIST
(CONTINUED)

Lighting	
L1	What portion of light bulbs installed in the ceiling fixtures and lamps inside your home are the following types?
L2	How many lights inside your home are turned on during the following times of day?
L3	How many of the following lighting products do you use inside your home?
L4	How many of the following lighting products do you use outside your home?
Misc. Appliances	
M1	How many of each of the following appliances or equipment do you use in your home?
M2	Do you use an electric well water pump to provide water for your home?
M3	Does your home also have access to city/county water?
M4	How do you use your well water?
M5	Select fuel type for any of the equipment that is used three or more hours per week
	Sump pump, Shop tools, Electric welding equipment, Electric air compressor, Charger for large battery, Kiln for ceramics and pottery, Medical equipment (e.g., respirator)
M6	Do you have an electric bicycle, skateboard, wheelchair or golf cart at your home?
M7	Do you charge your electric wheelchair, cart, skateboard or bicycle at home?
M8	Do you use any other equipment or large appliance that consumes a significant amount of electricity or natural gas in your home?
M9	Please indicate if you have added any of the following appliances in the past 12 months. If the new item replaced an existing unit
M10	Please indicate if you have discarded any of the following appliances in the past 12 months. Include both items that were replaced and those that were discarded without being replaced.
Renewable Energy Technologies	
M11	Which of the following renewable energy technologies are currently used at this residence?
	No renewable energy technologies
	Solar electricity/photovoltaic (PV) cells
	Solar water heating (In-home water heated)
	Battery storage connected to solar
	Wind generator

TABLE C-2
2019 RASS QUESTION LIST
(CONTINUED)

Renewable Energy Technologies	
	Fuel cells
M12	In the next two years do you plan to install any of the following renewable technologies?
Household Information	
N1	In addition to the home described in this survey do you own any other home in California that is occupied on a part-time basis by your family or as a vacation rental?
N2	Please provide the following information for your seasonal or vacation home that you own in California?
N3	What was the highest level of education completed by any head of household in the home?
N4	What is the primary language spoken in this home?
N5	Are any of the occupants of your home permanently disabled?
N6	Which of the following ethnic groups are represented by your head(s) of household?
N7	Please check the range that best describes your household's total annual income.

TABLE C-3
2019 RASS DWELLING CLASSIFICATION QUESTIONS

Essential Use Model Decision Guidelines					
Household Size					
		Square Footage	Number of residents		Additional
A7	How many bedrooms are in your home?				X
A8	How many square feet of living space are there in your residence	X			
A15	For each of the following age groups, how many people including yourself usually live in this home?		X		
Building Features					
		Age	Construction Materials	Insulation	Additional
A9	Are your home's exterior (outside) walls insulated?			X	
A10	Is your home's attic/ceiling insulated?			X	
A11	If yes estimate the number of inches of attic/ceiling insulation.		X		
A12	Choose the statements that best describe your windows. [PANE TYPE (number of layers of glass)]		X		
A6	Approximately what year was this residence built?	X			

TABLE C-4
2019 RASS QUESTION MATRIX

	2019 RASS Survey Questions	Essential Use Model Decision Guidelines	
		Appliances	
		Efficiency	Usage
	Electric Vehicles		
A21	How many electric vehicles does your household own or lease?		X
	Space Heating		X
B2	What type of heating system do you use to heat this home?		X
B4	How old is your main heating system?	X	
B5	What type of thermostat does your main heating system(s) use?	X	
	Space Cooling		
	CENTRAL AIR CONDITIONING/COOLING		X
C2	What type and how many central air conditioning/cooling system(s) do you have in your home?		X
C3	How old is your main central air conditioning/cooling unit?	X	
C4	What type of thermostat does your main air conditioning/cooling system(s) use?	X	
	ROOM AIR CONDITIONING/COOLING (Window/Wall Units)		X
C7	Please tell us the characteristics of each room air conditioning/cooling unit below.		X
	Water Heating		
D2	What type of water heating systems do you use in your home?		X
D4	How old is your primary water heating system?	X	
	Laundry		
E2	What type of clothes washer do you have?		X
E5	What type of clothes dryer do you have?		X
E6	How old is your clothes dryer?	X	
	Food Preparation		
F1	Which of the following cooking appliances are used in your home?		X
F3	Do you have a dishwasher?		X
F4	How old is your dishwasher?	X	
	Refrigerators		
G1	How many refrigerators do you have plugged in?		X
	Age of your Refrigerator	X	

TABLE C-4
2019 RASS QUESTION MATRIX
(CONTINUED)

	2019 RASS Survey Questions	Essential Use Model Decision Guidelines	
		Appliances	
		Efficiency	Usage
	Freezers		
H1	How many stand-alone freezers do you have plugged in?		X
	Age of your Freezer	X	
	Spas and Hot Tubs		X
I1	Do you have the use of a spa or hot tub at your home?		X
I5	Do you have an insulated cover on your spa or hot tub?	X	
	Pools		
J1	Do you have the use of a swimming pool at your home?		X
	Entertainment and Technology		
K1	How many televisions and accessories do you use in this home?		X
K3	How many personal computer(s) (PC, Macintosh, etc.) do you use in this home?		X
K7	How many of the following products do you use in this home?		
	Printer, Scanner, Copier or Multifunction machine		X
	Tablet computer or e-reader (iPad or Kindle)		
	Hubs controllers (Amazon Echo, Google home, Apple HomeKit)		X
	Smart home devices		X
	“Smart” cell phone (iPhone or Android)		X
	Other cell phone (flip phone candy bar phone)		X
	High-speed modem for Internet (DSL/cable/satellite)		X
	Home network (wired or wireless)		X
	Uninterrupted Power Supply (UPS power backup)		X
	Lighting		
L1	What portion of light bulbs installed in the ceiling fixtures and lamps inside your home are the following types?		
	Incandescent	X	
	CFLs	X	
	LEDs	X	

TABLE C-4
2019 RASS QUESTION MATRIX
(CONTINUED)

	2019 RASS Survey Questions	Essential Use Model Decision Guidelines	
		Appliances	
		Efficiency	Usage
L2	How many lights inside your home are turned on during the following times of day?		
	Morning		X
	Day		X
	Evening		X
	Night		
L3	How many of the following lighting products do you use **inside** your home?		
	Fixtures on timers		X
	Fixtures on motion detectors or occupancy sensors		X
	Fixtures on a dimming switch		X
	"Smart" (connected) light bulbs		X
	HID (sodium vapor, metal halide) fixture		X
	Night lights		
L4	How many of the following lighting products do you use **outside** your home?		
	Exterior incandescent fixtures		X
	Exterior compact fluorescent fixtures		X
	Exterior LED fixtures		X
	Low voltage landscape lighting system		X
	HID (sodium vapor, metal halide) fixture		X
	Fixtures on timers		X
	Fixtures on dusk-to-dawn sensors		X
	Fixtures on motion detectors		X
	Miscellaneous Appliances		
M1	How many of each of the following appliances or equipment do you use in your home?		X

TABLE C-4
2019 RASS QUESTION MATRIX
(CONTINUED)

2019 RASS Survey Questions		Essential Use Model Decision Guidelines	
		Appliances	
		Efficiency	Usage
M2	Do you use an electric well water pump to provide water for your home?		X
M5	Select fuel type for any of the equipment that is used three or more hours per week		
	Sump pump, Shop tools, Electric welding equipment, Electric air compressor, Charger for large battery, Kiln for ceramics and pottery, Medical equipment (e.g., respirator)		X
M6	Do you have an electric bicycle, skateboard, wheelchair or golf cart at your home?		X
M7	Do you charge your electric wheelchair, cart, skateboard or bicycle at home?		X
	Renewable Energy Technologies		
M11	Which of the following renewable energy technologies are currently used at this residence?		X
	No renewable energy technologies		X
	Solar electricity/photovoltaic (PV) cells		X
	Solar water heating (In-home water heated)		X
	Battery storage connected to solar		X
	Wind generator		X
	Fuel cells		X

Appendix E

Average Basic Customer Load (kWh) and Estimated Heat Pump Water Heater Load (kWh) and Relative Size (%)

	Mild Climate Zones					Moderate Climate Zones				Hot Climate Zones		
Month	05	06	08	16	HPWH	09	13	14	HPWH	10	15	HPWH
1	661	432	397	557	67	448	491	561	70	468	457	72
2	673	378	340	487	68	419	418	511	69	417	404	74
3	732	402	360	516	56	441	436	520	56	450	460	57
4	550	366	354	466	53	419	446	473	52	446	637	53
5	639	375	379	488	48	458	578	528	46	488	722	46
6	615	386	451	603	46	560	878	807	43	656	1,103	42
7	721	612	854	920	45	1,031	1,270	1,241	41	1,226	1,648	40
8	692	628	823	804	45	961	1,082	1,088	40	1,114	1,561	39
9	536	457	555	622	43	644	779	800	39	804	1,247	39
10	549	416	449	488	50	497	490	473	49	514	628	49
11	589	394	388	478	57	451	455	464	56	452	416	58
12	651	457	442	581	80	517	559	572	79	534	443	84
Annual	7,609	5,303	5,793	7,011	658	6,845	7,883	8,039	642	7,567	9,725	654
1	10%	16%	17%	12%		16%	14%	12%		15%	16%	
2	10%	18%	20%	14%		17%	17%	14%		18%	18%	
3	8%	14%	15%	11%		13%	13%	11%		13%	12%	
4	10%	14%	15%	11%		12%	12%	11%		12%	8%	
5	8%	13%	13%	10%		10%	8%	9%		9%	6%	
6	7%	12%	10%	8%		8%	5%	5%		6%	4%	
7	6%	7%	5%	5%		4%	3%	3%		3%	2%	
8	7%	7%	6%	6%		4%	4%	4%		4%	3%	
9	8%	9%	8%	7%		6%	5%	5%		5%	3%	
10	9%	12%	11%	10%		10%	10%	10%		9%	8%	
11	10%	14%	15%	12%		12%	12%	12%		13%	14%	
12	12%	17%	18%	14%		15%	14%	14%		16%	19%	
Annual	9%	12%	11%	9%		9%	8%	8%		9%	7%	

Appendix F

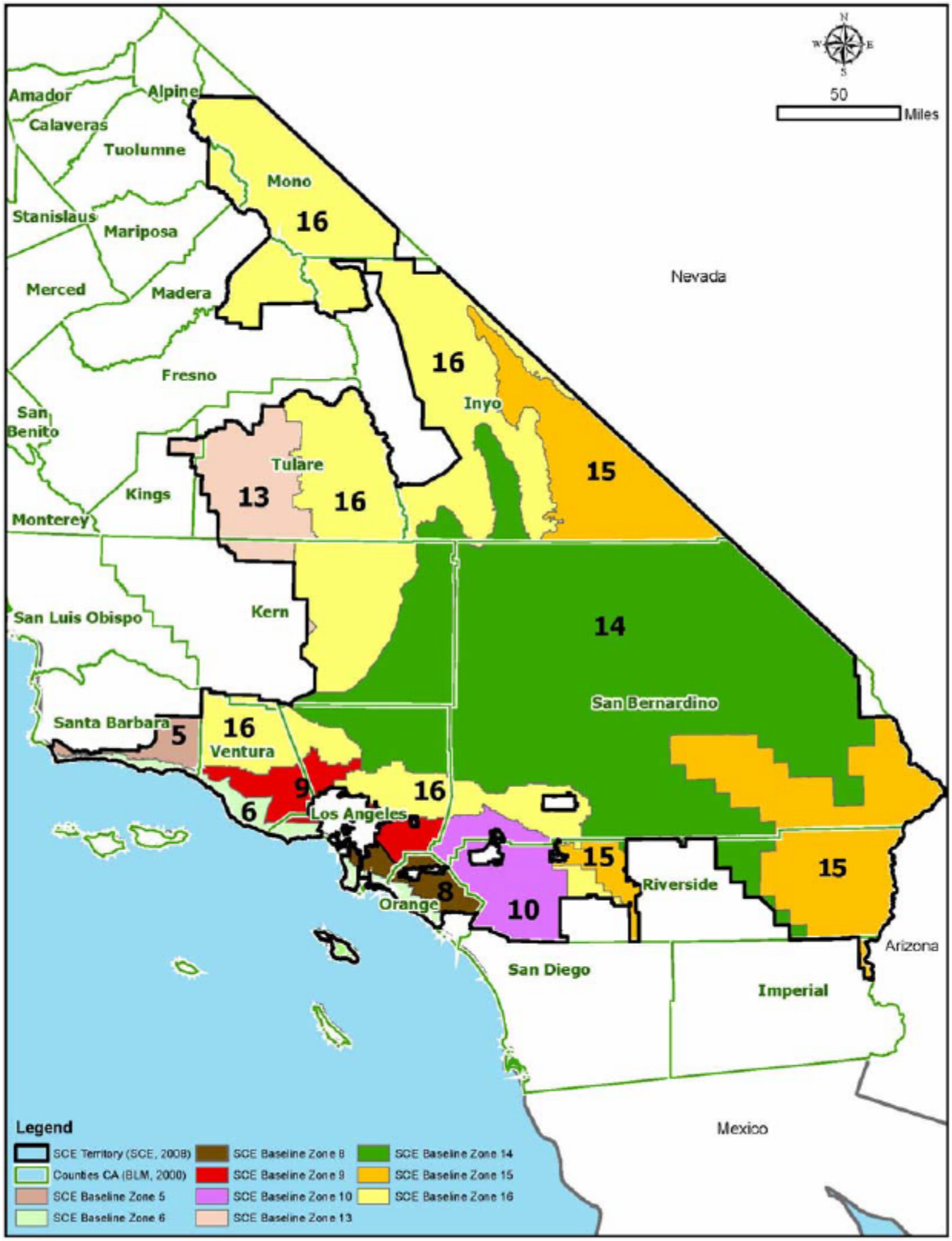
Current and Alternative Baseline Quantities (kWh/day)

	Current DBA		Subgroup with HPWH DBA @ 60%		Subgroup with HPWH DBA @ 70%*		Subgroup with HPWH Rate Indifferent DBA	
Basic								
ZONE	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
05	17.2	18.7	17.1	18.7	23.5	25.4	18.0	20.0
06	11.4	11.3	11.6	11.8	15.0	15.1	12.2	12.6
08	12.6	10.6	13.0	11.1	16.5	14.0	13.4	11.9
09	16.5	12.3	16.9	13.0	21.6	16.4	17.2	13.6
10	18.9	12.5	19.4	13.2	24.3	16.5	19.6	13.8
13	22.0	12.6	22.4	13.2	27.9	16.5	22.7	13.9
14	18.7	12.0	19.3	12.8	24.1	15.8	19.4	13.3
15	46.4	9.9	46.8	10.1	59.7	12.8	47.1	11.2
16	14.4	12.6	14.7	13.1	18.9	16.5	15.2	13.9
All Electric								
05	17.9	29.1	17.8	29.1	24.6	29.1	18.7	30.4
06	8.8	13.0	9.3	13.6	11.7	13.6	9.6	14.3
08	9.8	12.7	10.4	13.4	13.0	13.4	10.6	14.0
09	12.4	14.3	12.8	14.9	16.3	14.9	13.1	15.6
10	15.8	17.0	16.3	17.2	20.7	17.2	16.5	18.3
13	24.6	24.3	25.0	24.7	31.6	24.7	25.3	25.6
14	18.3	21.3	18.8	21.8	23.7	21.8	19.0	22.6
15	24.1	18.2	24.5	18.5	31.2	18.5	24.8	19.5
16	13.5	23.1	13.8	23.7	17.7	23.7	14.3	24.4

* In both summer and winter

Appendix G

Map of SCE Baseline Regions


Amador
Alpine
Calaveras
Tuolumne
Stanislaus
Mariposa
Merced
Madera
Fresno
San Benito
Kings
Monterey
San Luis Obispo
Kern
Tulare
Mono
Inyo
Nevada
Santa Barbara
Ventura
Los Angeles
Orange
San Bernardino
Riverside
San Diego
Imperial
Arizona
Mexico
16
13
15
14
5
9
6
8
10
50
Miles
Legend
SCE Territory (SCE, 2008)
Counties CA (BLM, 2000)
SCE Baseline Zone 5
SCE Baseline Zone 6
SCE Baseline Zone 8
SCE Baseline Zone 9
SCE Baseline Zone 10
SCE Baseline Zone 13
SCE Baseline Zone 14
SCE Baseline Zone 15
SCE Baseline Zone 16