

Rulemaking: 20-11-003
Date: September 1, 2021
Exhibits Nos.: _____
Witness: Aaron Berndt

OPENING PHASE II PREPARED TESTIMONY AND EXHIBITS OF
AARON BERNDT
ON BEHALF OF
GOOGLE LLC

Summary of the Google LLC Recommendations

Google LLC's recommendations to the Commission are as follows:

1. The Commission should approve the "Front Load" scenario of PG&E's proposed Power Saver Rewards pilot program to drive greater customer recruitment in the early years of the Pilot and maximize available megawatts (MW) as quickly as possible.
2. The Commission should adopt the smart communicating thermostat (SCT) recommendations from the August 16th Energy Division Staff Concept Paper with the simple modifications outlined below:
 - a. Target hot climate zones for SCT measure deployment while continuing to promote SCE measure deployment across the entire state:
 - i. SCT measures should be available for any California resident with controllable AC load, regardless of their climate zones. These are the customers for whom the energy efficiency (EE) and demand response (DR) benefits of installing a SCT are greatest and the customers whose cooling loads spike during extreme weather events.
 - ii. IOUs should conduct additional targeted marketing and program outreach for SCT measures in the hottest climate zones and have the flexibility to offer increased incentives or installation programs in these zones.
 - b. Require enrollment in a demand response program with any smart thermostat incentive with priority given to paid, automated DR programs:
 - i. Customers receiving a smart thermostat incentive should be defaulted into an automated DR program (either a third-party program, an IOU program such as SDG&E's AC Saver or SCE's Smart Energy Program, or pilots such as PG&E's proposed Power Saver Rewards program) unless they specifically request another program or choose to opt-out and not receive the demand response enrollment incentives.
 - ii. Customers who satisfy the demand response program enrollment requirement through enrolling in a program such as the Residential ELRP option that requires manual intervention should be marketed to and encouraged to enroll in the paid, automated programs described above.
 - iii. If the Commission adopts an opt-in for the Residential ELRP, this program and the associated incentives should stack on top of existing supply-side DR programs, regardless of whether those programs are market-integrated or not.
 - c. Consider either a new statewide program to encompass these changes, or leverage updated energy savings from the forthcoming SCT workpaper, SWHC039-04, and allow Program Administrators to more easily stack EE incentives with existing DR program incentives
 - i. To accelerate the development of the program described by Energy Division with the modifications proposed by Google Nest, the Commission should also permit the utilities to modify their existing thermostat rebate and DR

programs instead of requiring a new program to be created.

d. Use the Combine EE-DR Cost Effectiveness Tests to account for the cost-effectiveness of thermostats in the Energy Efficiency portfolios

i. The Energy Division proposal to use the updated cost-effectiveness tests should be adopted in full.

1 **Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND OCCUPATION.**

2 A. My name is Aaron Berndt. My business address is 2051 Stierlin Ct, Mountain
3 View, CA 94043. I am employed by Google LLC. as Head of Energy Industry
4 Partnerships for the Americas.

5 **Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS DOCKET?**

6 A. I am testifying on behalf of Google LLC as a representative of its Google Nest
7 thermostat division.

8 **Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY BEFORE THE
9 PUBLIC UTILITIES COMMISSION?**

10 A. Yes. I was one of three witnesses that sponsored testimony in this Docket No. R.20-
11 11-003, entitled the Opening Prepared Testimony of the DR Coalition (California
12 Efficiency + Demand Management Council, Google LLC, Leapfrog Power, Inc., NRG
13 Energy, Inc., OhmConnect Inc., Oracle, Tesla, Voltus, Inc., and Willdan).

14 **Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY BEFORE OTHER
15 STATE REGULATORY COMMISSIONS?**

16 A No.

17 **Q. ARE YOU SPONSORING EXHIBITS IN YOUR TESTIMONY?**

18 A. Yes, I am sponsoring the following exhibits:
19 Appendix A, my Statement of Qualifications and Appendix B, the redlined Energy
20 Division Staff Concept Papers – Proposal for 2022 and 2023 Reliability Enhancements.

21 **Q. PLEASE BRIEFLY DESCRIBE GOOGLE NEST'S OPERATIONS IN
22 CALIFORNIA.**

23 A. The Nest energy devices include the Google Nest Learning Thermostat, the Google

1 Nest Thermostat E, and the new Google Nest Thermostat, which are equipped with
2 sensors, Wi-Fi capability, and smart-phone grade processing, to help customers
3 consume less energy. Google Nest thermostats learn occupant preferences, turn the
4 temperature down when the house is empty, and automatically lower air conditioning
5 (“A/C”) runtime when humidity conditions permit, thereby helping people lower their
6 energy use without sacrificing comfort. Google Nest thermostats also contribute to
7 reducing peak demand by allowing residential customers to participate in demand
8 response programs run by utilities or third-party aggregators.

9 Last summer, Google Nest’s utility and third-party partners called seven Rush Hour
10 Rewards events on August 14th and 15th, the two days when the Stage 3 system
11 emergencies triggered rolling blackouts in California. Nest customers enrolled in these
12 utility programs shifted approximately 60 MW of load during this two-day grid
13 emergency.

14 **Q. PLEASE BRIEFLY DESCRIBE HOW GOOGLE NEST’S PRODUCTS AND**
15 **SERVICES AND SMART COMMUNICATING THERMOSTATS IN**
16 **GENERAL COULD HELP ADDRESS RELIABILITY NEEDS AT NET PEAK.**

17 A. Due to the number of eligible households and relative cost, SCTs are the most scalable
18 distributed technology for residential households. There are over 7.5 million homes
19 with central A/C in California – the exact systems where installing a thermostat could
20 enable meaningful load reductions during periods of peak demand.¹ Based on third-
21 party estimates and available market data, over one million of these homes currently

¹ See, US Census Bureau, American Housing Survey, 2017: https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html?s_areas=00006&s_year=2017&s_tablename=TABLE3&s_bygroup1=3&s_bygroup2=1&s_filtergroup1=1&s_filtergroup2=1

1 have smart thermostats already installed.² However, only a small fraction of these
2 homes participate in demand response programs.

3 SCTs have a demonstrated potential to reduce residential load during net peak. The
4 latest investor-owned utility (“IOU”) load impact protocol (“LIP”) reports for
5 residential thermostat DR programs show load reductions of 0.54 kW to 0.59 kW per
6 household, on average.³ Based on current LIP reports, enrolling all of the estimated 1
7 million existing thermostats in these programs could yield between 540 MW and 590
8 MW of capacity.

9 Third-party demand response providers have reported similar numbers, with
10 OhmConnect stating in its 2020 LIP report that customers with automation technology
11 like WiFi thermostats provide 0.68 kW of average impacts.⁴ This is over four times
12 greater load reduction during DR events as compared to customers without thermostats.

13 Through coordination with IOUs and third-party DR providers and the presence of
14 sufficient enrollment and annual incentives, there is the potential to add tens-of-
15 thousands of additional thermostats to California’s IOU or third-party demand response
16 programs ahead of Summer 2022, which in turn could result in hundreds of MW of
17 demand reduction..

18 **Q. PLEASE SUMMARIZE GOOGLE NEST’S RECOMMENDATIONS TO THE**
19 **COMMISSION.**

² Based on Park Associates estimates of 13% smart meter penetration in January 2018:
<http://www.parksassociates.com/blog/article/pr-06142017#:~:text=New%20Parks%20Associates%20research%20shows,by%20the%20end%20of%202017>

³ See “2020 Load Impact Evaluation for Pacific Gas & Electric Company’s SmartAC Program,” at p.2 and
“SCE 2020 Demand Response Executive Summary,” at p. A-33.

⁴ See “2020 Load Impact Evaluation for OhmConnect’s DR Resource Final Report”, at p.9

- 1 A. Google Nest’s recommendations to the Commission are as follows:
- 2 1. The Commission should approve the “Front Load” scenario of PG&E’s
- 3 proposed Power Saver Rewards pilot program to drive greater customer
- 4 recruitment in the early years of the Pilot and maximize available MW as
- 5 quickly as possible.
- 6 2. The Commission should adopt the SCT recommendations from the August 16th
- 7 Energy Division Staff Concept Paper with the simple modifications outlined
- 8 below:
- 9 a. Target hot climate zones for SCT measure deployment while
- 10 continuing to promote SCT measure deployment across the entire
- 11 state
- 12 b. Require enrollment in a demand response program with any smart
- 13 thermostat incentive with priority given to paid, automated DR
- 14 programs
- 15 c. Consider either a new statewide program to encompass these
- 16 changes, or leverage updated energy savings from the forthcoming
- 17 SCT workpaper, SWHC039-04, and allow Program Administrators
- 18 to more easily stack EE incentives with existing DR program
- 19 incentives
- 20 d. Use the combined EE-DR Cost Effectiveness Tests to account for
- 21 the cost-effectiveness of thermostats in the energy efficiency
- 22 portfolios.
- 23

1 **Q. WHAT SPECIFIC CHANGES TO THE AUGUST 16th ENERGY DIVISION**
2 **STAFF CONCEPT PROPOSALS DOES GOOGLE NEST PROPOSE?**

3 **A.** The attached Exhibit B provides Google Nest’s redlined suggested revisions to Section
4 B, Smart Thermostats, contained in the August 16 *Energy Division Staff Concept Paper*
5 - *Proposals for Summer 2022 and 2023 Reliability Enhancements*. The Staff Concepts
6 Paper offers a strong framework for utilizing SCTs to address the state’s reliability
7 goals. With the additional modifications suggested by Google Nest in Exhibit B, the
8 Commission could take a very positive step to reduce demand during peak periods.
9 Google Nest offers its recommendations in this redlined format as a convenient way
10 for the Commission to adopt the modified staff proposal for inclusion in the proposed
11 decision scheduled to be issued on October 29.

12 **Q. WHY DO YOU BELIEVE THESE CHANGES REPRESENT AN**
13 **IMPROVEMENT TO THE STAFF PROPOSAL?**

14 **A:** The changes recommended by Google Nest maintain the intent and purpose of the Staff
15 proposal while increasing the enrollment potential of SCTs in DR programs and
16 maximizing their ability to achieve reductions at net peak ahead of Summer 2022. The
17 modifications recommended by Google Nest can be bucketed into three categories: cost
18 effectiveness testing, geographic targeting, and DR program enrollment.

19 **Q. WHAT CHANGES TO COST EFFECTIVENESS TESTING IN THE STAFF**
20 **PROPOSAL DOES GOOGLE NEST RECOMMEND?**

21 **A:** Google Nest concurs with Staff’s recommendation to “Utilize Combine[d] EE-DR Cost
22 Effectiveness Tests to increase the Cost Effectiveness of Smart thermostats for Energy
23 Efficiency Programs.” Google Nest further recommends that IOUs and other Program

1 Administrators use the updated energy savings from the forthcoming Residential SCT
2 workpaper, SWHC039-04. This workpaper considers increased savings from new
3 thermostat optimization (TO) features that are now a standard feature included in all
4 Google Nest and ecobee thermostats. The added TO savings are based on California-
5 specific participation numbers provided by Google Nest, a previous PG&E Seasonal
6 Savings study,⁵ prior studies of Google Nest TO deployments in California and
7 evaluated persistence of TO savings from out of state IOU programs.⁶

8 Specific updates to cost effectiveness language are included in the redlined Staff
9 Proposal in the attached Exhibit B.

10 **Q. WHAT CHANGES TO GEOGRAPHIC TARGETING IN THE STAFF**
11 **PROPOSAL DOES GOOGLE NEST RECOMMEND?**

12 A: Staff identifies the hottest climate zones in California and recommends that SCT
13 measures only be installed there. The zones identified represent about one quarter of
14 the California population, meaning the proposal would categorically exclude the
15 roughly three fourths of California residents outside of these zones, even if they have
16 high AC load. I agree that measures should prioritize targeting customers with the
17 greatest load reduction potential but find this approach to be overly restrictive with the
18 potential to leave many 100s of MWs of residential DR capacity off the table and not
19 utilized to meet the state’s goals during the summers of 2022 and 2023..

20 The Commission should not limit SCT measures to specific climate zones. Instead,

5 “Seasonal Savings and Peak Aware Program Impacts.” <https://www.etcc-ca.com/reports/seasonal-savings-and-peak-aware-program-impacts>

6 Guidehouse ComEd TO study showing persistence into year 2 and stacking savings.

https://s3.amazonaws.com/ilsag/ComEd_Seasonal_Savings_CY2018_Cooling_Season_Impact_Evaluation_Report_2018-04-08_Final.pdf

1 Google Nest recommends that SCT measures target all of the 7.6 million California
2 residents with controllable A/C load, regardless of their climate zones. These are the
3 customers for whom the EE and DR benefits of installing a SCT are greatest and the
4 customers whose cooling loads spike during extreme weather events. Additionally, if
5 Staff’s recommendation to combine EE and DR benefits for cost effectiveness testing
6 is adopted, it will likely render all climate zones to be cost effective.

7 The alternative approach proposed by Google Nest allows for SCT measures to be
8 installed across the state but gives IOUs flexibility to target the hottest climate zones
9 identified by Staff by conducting additional marketing and program outreach, and by
10 offering increased incentives or installation programs.

11 Specific updates to geographic targeting are included in the redlined Staff Proposal
12 in the attached Exhibit B.

13 **Q. WHAT CHANGES TO DR PROGRAM ENROLLMENT IN THE STAFF**
14 **PROPOSAL DOES GOOGLE NEST RECOMMEND?**

15 A: Google Nest agrees with Staff’s proposal to require enrollment in a demand response
16 program with any thermostat incentive. Staff notes that “to satisfy the DR enrollment
17 requirement, the customer could choose to enroll in the Residential ELRP option.”
18 Earlier, in their modified ELRP proposal, Staff suggests that the ELRP would be a
19 standalone program for residential customers, saying: “IOUs and third-party DR
20 Providers would still be permitted to target Residential ELRP customers to enroll them
21 into their respective supply-side DR program, in which case the customer is removed
22 from ELRP.” Putting these two together, it appears that Energy Division proposes that

1 all customers, including those with smart thermostats but not currently enrolled in a
2 DR program, would be moved into the ELRP.

3 I foresee two issues with this approach. First, it would inadvertently drive
4 customers into the ELRP as opposed to other supply-side DR programs since the
5 enrollment requirements for the ELRP are lower. Second, it would potentially cause
6 “lock-in” into the ELRP program by requiring customers to be removed in order to
7 enroll in another supply-side DR program. Taken together, these two issues have the
8 potential to inadvertently prioritize the ELRP in favor of other market-integrated DR
9 programs offered by IOUs and third-parties with greater demonstrated load reduction
10 capabilities.

11 For these reasons, Google Nest encourages the Commission to prioritize customer
12 enrollment in paid, automated DR programs in order to maximize the DR potential of
13 SCTs. This can be achieved by defaulting customers into an automated DR program
14 unless they specifically request another program or choose to opt-out and not receive
15 the demand response enrollment incentives. Eligible programs would include either a
16 third-party program, an IOU program such as SDG&E's AC Saver or SCE's Smart
17 Energy Program, or pilots such as PG&E's proposed Power Saver Rewards program.

18 Furthermore, customers who satisfy the demand response program enrollment
19 requirement through enrolling in a program such as the Residential ELRP option that
20 requires manual intervention should be marketed to and encouraged to enroll in paid,
21 automated programs.

22 Finally, if the Commission adopts an opt-in for the updated Residential ELRP, this
23 program and the associated incentives should stack on top of existing supply-side DR

1 programs, regardless of whether they are market-integrated or not, rather than serving
2 as a standalone program.

3 Specific updates to DR program enrollment are included in the redlined Staff
4 Proposal in the attached Exhibit B.

5 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

6 A: Yes

APPENDIX A

STATEMENT OF QUALIFICATIONS

Aaron Berndt

EXPERIENCE

Oct '15-Present **Google - Nest**
Palo Alto, CA

Working to help launch impactful energy programs leveraging the Nest Thermostat

Head of Energy Industry Partnerships

- Lead a world class sales and account management team of 10 to accelerate the adoption of Nest thermostats and energy services with channel partners and utilities throughout North America
- Led end-to-end project management of partner transition and recontracting to finalize commercial agreements as part of the Nest to Google integration for Industry Partnerships team

Head of Central Region Energy Partnerships

- Low Income Programs - Developed initial set of low income program pilots utilizing low-cost refurbished Nest Thermostats laying the foundation for our work with utilities across the country now utilizing the thermostat E in their income qualified programs
- Gas Demand Response - Developed, Scoped, and Launched Nest's first gas demand response program with SoCalGas to help Southern CA respond to gas system constraints
- New Market Development - Explored and developed a new regulated partnership opportunity within the sustainable / efficient housing market. Formed two major new partnerships opportunities executing on single family and multi-family dwellings.

Energy Partnerships - West

- California - Key lead in drafting and coordinating all smart thermostat workpaper related work across all stakeholder groups
- Arizona - Established and Expanded smart thermostat programs with each of the three major utilities in AZ to help achieve their EE and DR goals.

May'10-Oct' 15 **Pacific Gas & Electric Company**
San Francisco, CA

High performing Customer Care leader with experience in strategic planning, portfolio management, regulatory engagement, and product and solution development and delivery

Manager, Step Up and Power Down

- Formulated concept proposal and secured approval to fund and launch a leading edge energy efficiency marketing and customer engagement program to reduce energy waste in partnership with San Francisco and San Jose Project/team lead driving the design, development, and commercialization of Step Up and Power Down. Coordinating large cross-functional project team including 20 PG&E teams and 23 external organizations
- Assembled Step Up and Power Down specific sales and account team. Secured early key partnerships and customers. Supported sales team to help close additional large participants

Manager, Commercial and Finance EE Programs

- P&L responsibility for achieving annual energy savings of ~50MW/250GWH/10MMtherms while managing commercial EE program budget of ~\$110M
- Helped integrate PG&E's finance offerings - \$50M On Bill Finance program and \$35M Finance Pilots
- 16 FTE direct reporting chain of program managers, key project leads, and business analysts

Manager, Information Products

- Successfully lead team of 10 product and project managers on development of key initiatives and program activities supporting 2013-14 energy efficiency portfolio

Principle, Energy Information Platforms

- Responsible for the successful planning, deployment and optimization of energy information platforms (Opower and C3 Energy) spanning residential and business customers (~2.5M enrolled users)
- Concept to launch ownership of new industry leading small and medium business platform - solution vision, team development, budget, contract negotiation, and project management
- Led and managed extended project team of 60+ spanning multiple teams within the utility

Senior Product Manager, Energy management Systems

- Conducted strategic mapping of C&I energy management software and systems market
- Developed product roadmap, identified market drivers, conducted detailed vendor and product analysis
- Deployment lead of enterprise scale sales enablement tool for commercial and industrial customers

Summer '09 **Serious Energy**, Energy Management Products and Services
Sunnyvale, CA

Product Marketing Summer Associate

- Developed methodology to calculate project specific ROI and high level assessment tool used for deal support, product management, and competitive analysis. Supported the CTO

2002-2008 **Adam Aircraft**, VC Backed Start-up, Very Light Jet Aircraft Manufacturer
Denver, CO

Core team member of a fast paced start-up. Grew company from 80 to over 900 employees

Manager (AAI Acquisition Incorporated, Formerly Adam Aircraft)

- 1 of 50, from previous 900 employees, contracted to restart company operations under new ownership

Program Manager

- Owned project management of critical outsourcing program for all non-core composite components. Constituted roughly \$20M/year in business for chosen supplier and saved \$175,000 per airplane at rate. Coordinated team efforts at all levels of the project life cycle.

Manufacturing Business Analyst

- Created a business strategy and manufacturing plan to accelerate the production rate by 36X

Lead Materials and Process Engineer

- Developed, documented, and trained advanced composite manufacturing procedures. Mentored engineers and skilled technicians on precision machining, testing, and repair of composite materials
- Managed the composite testing laboratory. Supervised a team of 6 people.

Engineer – Materials

- Created systems for material receiving and testing. Maintained material and process specs.

EDUCATION **University of California at Berkeley**, Walter A. Haas School of Business
Master of Business Administration, May 2010

University of Minnesota-Twin Cities, Institute of Technology
Bachelor of Mechanical Engineering, June 2002 GPA: 3.5

ADDITIONAL Awarded Eagle Scout by Boy Scouts of America in 1996

APPENDIX B

REDLINED STAFF PROPOSAL

The August 16, 2021, email ruling of ALJ Stevens attached the *Energy Division Staff Concept Paper - Proposals for Summer 2022 and 2023 Reliability Enhancements*. The following is a redline of Section B, Smart Thermostats that was contained in the Staff Concept Paper:

B. Smart Thermostats

There are multiple Energy Efficiency (EE) and Demand Response (DR) programs that promote the use of smart controllable thermostats (Smart Thermostats or SCTs) for load reduction. There are also thousands of SCTs installed in California that are not enrolled in programs that would enable them to be used to promote targeted load reduction at net peak times. Energy Division staff offers a proposal concept that would involve the CPUC making changes to the existing programs, expanding the reach of these programs and coordinating better between the programs to best enable incentives for SCTs in Energy Efficiency, Energy Savings Assistance (ESA) and Demand Response budget to maximize net peak demand reductions during summer high heat events.

As shown in Tables 1-3 below, in 2020, 18 IOU administered EE programs offered smart thermostat measures for a total of 63,000 units installed. In 2020, ESA installed 22,000 units. There are a variety of non-IOU SCT programs.

The average rebate for smart thermostats across the IOU EE incentive programs was \$59 per thermostat (ranging from \$50–\$215 depending on the program). However, the average budget per thermostat installed was \$222 across all IOU EE programs. This budget includes the costs of the rebate, administration, and labor to implement the program. Slightly less than one third of EE smart thermostat measures were installed through direct install programs (in which a trained installer provides the installation at a customer's site).

Additionally, according to a 2018 SCT study, 24 percent of all SCTs offered through IOU EE programs have been installed in the three coolest regions that have relatively few “cooling days” when air conditioning is contributing to high net peak demand. Therefore, SCTs in these coastal areas may not be able to help reduce electric demand summertime net peaks. (See: Impact Evaluation of Smart thermostats - Residential Sector Program Year 2018, California Public Utilities Commission, March 2020, page 6. Available at <https://pda.energydataweb.com/#!/documents/2339/view>.)

Finally, the IOUs have not yet estimated the number of smart thermostats expected to be installed through EE programs in the upcoming program years. However, in ESA, the IOUs have forecasted that they expect to install an additional 100,000 thermostats between 2021 and 2023.

Table 1. 2020 EE Smart Thermostat Savings

IOU	Program Name	Units	Budget	First Year kWh Savings	First Year Therm Savings
Pacific Gas and Electric Company (PG&E)	Residential Energy Fitness Program	33	-303,457	3,435	355
PG&E	Residential Energy Efficiency	10,718	3,040,543	556,033	137,437
PG&E	Enhance Time Delay Relay	5,424	1,419,974	582,506	25,107
PG&E	Direct Install for Manufactured and Mobile Homes	1,391	768,493	266,937	14,198
Southern California Edison (SCE)	Plug Load and Appliances Program	15	1,671	1,775	179
SCE	Multifamily Energy Efficiency Rebate Program	404	210,435	36,792	6
SCE	Residential Direct Install Program	8,958	2,181,169	1,438,590	89,994
SCE	Comprehensive Manufactured Homes	1,844	350,487	459,777	10,777
Southern California Gas Company (SCG)	Residential Energy Efficiency Program	13,635	1,931,133	783,769	60,794
SCG	Plug Load and Appliances	39	3,820	3,630	164
SCG	Community Language Efficiency Outreach Program	130	104,840	9,937	678
SCG	Multifamily Direct Therm Savings	7,881	2,065,513	223,719	37,636
SCG	Manufactured Mobile Home	2,072	517,582	523,919	12,161
SCG	Residential Direct Install Program	1,954	266,180	13,965	16,089

SCG	Residential Joint Los Angeles Department of Water and Power (LADWP) Heating Ventilation and Air Conditioning (HVAC) Program	1,699	86,636	-	12,985
SCG	Residential Single-Family Solicitation	343	144,861	31,259	2,177
San Diego Gas & Electric Company (SDG&E)	Plug Load and Appliances	5,913	989,407	383,200	26,414
SDG&E	Comprehensive Manufactured Mobile Home	1,259	347,277	228,476	5,404
<i>Sum</i>		<i>63,712</i>	<i>14,126,564</i>	<i>5,547,719</i>	<i>452,555</i>

Table 2. 2020 ESA Smart Thermostat Savings

	Units	Budget	First Year kWh Savings	First Year Therm Savings
ESA	22,142	6,343,828	3,614,921	341,930
ESA-Common Area Measures	16	7,036	915	133
<i>Sum</i>	<i>22,158</i>	<i>6,350,864</i>	<i>3,615,836</i>	<i>342,063</i>

1. SCT Related Modifications to Energy Efficiency Programs

Under this staff concept, Staff offers that several changes could be made to energy efficiency program rules to better target new installations of SCTs in 2021 and 2022 to the regions of the state and to the specific customer that will lead to greatest load reductions at net peak. Parties should be aware that a ruling was issued in the CPUC's energy efficiency proceeding (R.13-11-005) to consider measures and rule changes in energy efficiency programs that will help

increase load reduction in 2021 and some of the staff proposals in this paper could also be part of proposals and changes in that proceeding.

- a. Targeting hot climate zones. ~~SCT measures should only be installed~~ IOUs should conduct additional marketing and program outreach in the hottest climate zones that have demonstrated the highest potential energy savings for smart thermostat measures. IOUs should have the flexibility to offer increased incentives or installation programs in these zones to encourage increased adoption rates.

As shown in Table 3, in 2018 climate zones 10, 11, 13, 14, and 15 had significantly higher Cooling Degree Days (CDD) and electric consumption than most other California climate zones. It was found in the 2018 smart thermostat study that smart thermostats installed in these climate zones also showed the largest energy savings. (See: Impact Evaluation of Smart thermostats - Residential Sector Program Year 2018, California Public Utilities Commission, March 2020, <https://pda.energydataweb.com/#!/documents/2339/view>)

Table 3. CA Climate Zones and Cooling Degree Days

Climate Zone	Cooling Degree Days	Total number of 2018 residential customers	Average 2018 annual electric consumption (kWh)
2	414	335,819	6,380
3	299	1,339,683	4,527
4	294	626,998	5,567
5	375	244,403	4,631
6	866	1,536,725	5,745
7	889	717,178	4,587
8	982	2,116,032	5,883
9	1,402	2,439,293	7,083
10	1,822	1,880,786	7,452
11	1,873	373,864	7,483
12	1,360	1,495,654	6,753
13	2,308	922,882	7,566
14	3,109	381,822	8,091
15	4,945	324,021	10,336
16	1,771	251,134	5,951

Along with targeting Climate Zones with the highest CDD needs, the IOUs should also consider targeted SCT installation and DR enrollment in climate zones within their service territories that include customers with high AC usage. The IOUs and other EE program administrators could leverage load disaggregation tools to facilitate this customer targeting. The IOUs could also work with manufacturers to determine the installed base of SCT (rebate, non-rebated, etc.).

b. Require enrollment in a demand response program with any smart thermostat incentive. For EE programs, smart thermostats have been shown to provide limited energy efficiency savings in most climate zones in California. EE program administrators do not currently claim demand savings for smart thermostat measures. However, these programs have the potential to provide significant demand savings when paired with existing demand response programs. By focusing smart thermostat installations to climate zones that have demonstrated the highest energy savings and pairing them with a DR program, a higher amount of savings and reliability is expected. To satisfy the DR enrollment requirement, the customer could choose to enroll in Residential ELRP option (assuming this program is authorized) or any of the existing supply-side DR programs offered by the IOUs or third-party DR Providers or other designated pilot programs offered by IOUs.

Customers should be enrolled into an automated DR program by default (either a third-party program, an IOU program such as SDG&E's AC Saver or SCE's Smart Energy Program, or pilots such as PG&E's proposed Power Saver Rewards program) unless they specifically request enrollment in another program or choose to opt-out and not receive the demand response enrollment incentives.

Customers who satisfy the demand response program enrollment requirement through enrolling in a program such as the Residential ELRP option that requires manual intervention should be marketed to and encouraged to enroll in paid, automated programs including many of the existing supply-side DR programs offered by the IOUs or third-party DR Providers and designed pilot programs offered by the IOUs.

If the Commission adopts an opt-in for the Residential ELRP, this program and the associated incentives should stack on top of existing supply-side DR programs, regardless of whether those programs are market-integrated or not. This will ensure equitable treatment of customers across DR programs and will prevent any switching costs or "lock-in" that could occur if a customer is required to "move" between a dedicated Residential ELRP program and other supply-side DR programs.

c. Consider either a new statewide program to encompass these changes, or direct the IOUs and other EE program administrators to, at a minimum, maintain the budgets for their current programs leverage updated energy savings from the forthcoming SCT workpaper, SWHC039-04, and allow Program Administrators to more easily stack EE incentives with existing DR program incentives. Due to the limited energy efficiency savings of smart thermostat measures, IOUs, at least, if not other EE program administrators have been scaling down the installation of smart thermostats through their energy efficiency programs. This may limit the effectiveness of the proposal as there will be fewer smart thermostat measures installed going forward. ED recommends considering directing the IOUs and other EE program administrators to develop a statewide program following the suggestions above. The program should make recommendations on the most effective delivery channel and program design to maximize smart thermostat adoption and DR program enrollment.

d. Utilize Combine EE-DR Cost Effectiveness Tests to increase the Cost Effectiveness of Smart thermostats for Energy Efficiency Programs. At this time smart thermostat measures are not cost effective in the Energy Efficiency portfolio leading to the IOUs removing smart thermostat measures from the portfolio. CPUC Energy Division is in the process of developing a Cost Effectiveness tool for EE-DR that encompasses the load shapes for the dual EE-DR programs. Including energy savings from this dual cost effectiveness test will increase the cost effectiveness of these measures, making it more likely for the IOUs and other EE program administrators to offer these measures.

2. SCT Modifications to Energy Savings Assistance (ESA) Programs

a. Continue to allow smart thermostats in all climate zones with potential voluntary participation in the DR program. ESA makes smart thermostats available to all eligible customers across all climate zones for PG&E, Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E) service territory. Due to the program design, it is recommended that this be allowed to continue.

b. For hotter climate zones that currently allow central Air Conditioning (AC) measures (and potentially paired with insulation measures) as well as smart thermostats, include voluntary participation in the DR program. ESA delineates certain hot climate zones that can receive Central AC measures in order to increase cost-effectiveness and minimize use of ratepayer funds. These climate zones overlap with the five top climate zones identified in the EE proposal. Energy Division offers for consideration a program concept that customers who have SCT installed in these climate zones either in conjunction with central AC measures or separately be set up to automatically participate in the ELRP program.

AFFIDAVIT

I, Aaron Berndt, Head of Energy Industry Partnerships for the Americas for Google LLC, am authorized to make this Affidavit. I declare under penalty of perjury that the statements in the foregoing *Testimony of Aaron Berndt on behalf Google LLC* are true of my own knowledge, except as to matters which are therein stated on information or belief, and as to those matters I believe them to be true.

Executed on September 1, 2021, at Mountain View, California.

A handwritten signature in black ink, appearing to be 'A. Berndt', written over a horizontal line.

Aaron Berndt