

Application: A.22-05-XXX

Exhibit No.: SDGE-4B

Witness: Lizzette Garcia-Rodriguez

**PREPARED DIRECT TESTIMONY OF  
LIZZETTE GARCIA-RODRIGUEZ – CHAPTER 4B  
ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY**

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**



**MAY 2, 2022**

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**PREPARED DIRECT TESTIMONY OF  
LIZZETTE GARCIA-RODRIGUEZ  
CHAPTER 4B**

**I. INTRODUCTION**

The purpose of this testimony is to present the Program Year (PY) 2020 and 2021 ex-post load impacts as well as the 2024-2027 ex-ante load impacts of San Diego Gas & Electric Company's (SDG&E) supply side demand response (DR) programs. Ex-post load impacts measures after-the-fact program performance for event-based activities and they are reported in the April 1<sup>st</sup> Annual Load Impact Report filing.<sup>1</sup> Ex-ante load impacts are forecasts of the expected load impacts from future DR programs and are primarily informed by historical DR performance, weather conditions, and customer enrollments. Also, the testimony contains the proposed budget for the Measurement and Evaluation of the DR programs, DR pilots, and SDG&E's Electric Rule 32.<sup>2</sup>

**II. BACKGROUND**

On April 24, 2008, the Commission issued Decision (D.) 08-04-050 (the "Decision") adopting protocols for estimating the impact of DR activities on electric load as well as a forecast of expected load impacts. The Decision requires evaluating the DR programs and dynamic rates every year. In addition, it provides that load impact reports should be filed with the Commission on April 1<sup>st</sup> of each year. The Decision grouped the 27 protocols into the following categories:<sup>3</sup>

- *Evaluation Planning – Protocols 1 through 3;*
- *Ex-post Evaluation for Event Based DR Resources – Protocols 4 through 10;*
- *Ex-post Evaluation for Non-Event Based DR Resource – Protocols 11 through 16;*
- *Ex-ante Estimation of DR Resource Load Impacts – Protocols 17 through 23;*
- *Impact Estimation of DR Portfolios – Protocol 24;*
- *Sampling Methods – Protocol 25;*
- *Reporting Requirements – Protocol 26; and*
- *Process Review – Protocol 27.*

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<sup>1</sup> April 1 Annual Load Impact Reports. Available at <http://www.sdge.com/regulatory-filing/10486/oir-enhance-role-dr-meeting-state-resource-planning-ops-reqmt>

<sup>2</sup> See Prepared Direct Testimony of Lizette Garcia-Rodriguez Chapter 2A for my direct testimony supporting SDG&E's budget request to support the Measurement and Evaluation of the DR programs, DR pilots, and SDG&E's Electric Rule 32 for 2023.

<sup>3</sup> D.08-04-050, p. 8.

1 On April 8, 2010, D.10-04-006 modified the Decision, and requires filing of an annual  
 2 load impact executive summary report along with summary tables that contain aggregated  
 3 average ex-ante load impacts.

4 In D.14-03-026, the Commission established that all event-based DR programs must be  
 5 market integrated. That is, beyond the specified exceptions, event-based load-modifying DR  
 6 programs are not eligible for capacity determination.

7 In D.16-04-050, the Commission granted an exemption from the LIPs for all market-  
 8 integrated third-party DR resources for the 2017-2019 Resource Adequacy (RA) compliance  
 9 years. This means, third-party Demand Response Providers (DRPs) could use contract capacity  
 10 instead of LIPs, to set up the RA capacity values.

11 In D.19-06-0265, the Commission acknowledged the expiration of this exemption and  
 12 established that LIPs were required to determine the qualified capacity (QC) values for all  
 13 market-integrated DR resources whether third-party or Utility-managed. The exception to this  
 14 requirement is for the Demand Response Auction Mechanism (DRAM).

15 **III. EX-POST LOAD IMPACTS 2020 AND 2021**

16 This section addresses the ex-post load impacts of SDG&E’s DR programs. The purpose  
 17 of the ex-post analysis is to develop hourly and daily load impact estimates for every demand  
 18 response event in the 2020 and 2021 program years. Historical ex-post load impacts inform the  
 19 ex-ante load impact estimates. For some programs the events hours change across the year, so  
 20 the ex-post load impact results for each program were created by calculating the average during  
 21 the event hours of each event date and then averaging across all the event dates. Table LG-1  
 22 below presents a summary of the 2020 ex-post results originated in the 2020 measurement and  
 23 evaluation reports filed April 1, 2021.

24 **Table LG-1 Ex-Post Load Impact Results (MW) - PY2020**

Program name	Estimated Load Impact on a typical event date (MW)	Total enrolled accounts on a typical event date	Number of events	Max Temp (Miramar)
AC Saver Day-Ahead Commercial	0.44	941	20	85
AC Saver Day-Ahead Residential	4.55	15,137	20	83
AC Saver Day-Of Commercial	0.15	3,124	20	83
AC Saver Day-Of Residential	0.94	6,975		85
Base Interruptible Program (BIP)	0.42	4	5	93
CBP Day-Ahead (Including products 11am-7pm)	0.02	4	16	99

CBP Day-Ahead (Including products 1pm-9pm)	0.39	19	25	85
CBP Day-Of (Including products 11am-7pm)	0.15	67	18	88
CBP Day-Of (Including products 1pm-9pm)	2.03	91	22	85

Table LG-2 below includes a summary of the 2021 ex-post results originated in the 2021 measurement and evaluation reports filed April 1, 2022.

**Table LG-2 Ex-Post Load Impact Results (MW) - PY2021**

Program name	Estimated Load Impact on a typical event date (MW)	Total enrolled accounts on a typical event date	Number of events	Max Temp (Miramar)
AC Saver Day-Ahead Commercial	N/A*	N/A*	0	N/A*
AC Saver Day-Ahead Residential	6.02	14,839	5	87
AC Saver Day-Of Commercial	0.22	2,312	7	83
AC Saver Day-Of Residential	0.44	7,798		84
Base Interruptible Program (BIP)	0.07	1	1	81
CBP Day-Ahead (Including products 11am-7pm)	0.20	22	26	83
CBP Day-Ahead (Including products 1pm-9pm)	0.06	24	11	76
CBP Day-Of (Including products 11am-7pm)	0.06	11	12	82
CBP Day-Of (Including products 1pm-9pm)	0.97	122	20	80

\*SDG&E did not trigger the AC Saver Day-Ahead Commercial program in 2021.

**IV. SUMMARY OF LOAD IMPACT AND CUSTOMER FORECAST FOR 2024-2027**

Tables LG-3 and LG-4 contain a summary of the forecast load impacts and enrollment customer forecast respectively of SDG&E’s DR activities for 2024-2027 based on PY21 SDG&E 1-in-2 weather conditions for August monthly peak day filed April 1<sup>st</sup>, 2022. In 2024, SDG&E is proposing to rename the AC Saver Day-Ahead program as “Smart Energy Program” and therefore, this program will be referred to as the Smart Energy Program for the remainder of the testimony.

**Table LG-3 Ex-Ante Load Impact Results (MW) - PY2021 for the years of 2024-2027  
SDG&E Weather Scenario 1-in-2 Portfolio - August\***

Program name	2024	2025	2026	2027
Smart Energy Program Day-Of Commercial (Thermostats)	0.51	0.48	0.44	0.41
Smart Energy Program Day-Of Residential (Thermostats)	5.39	6.41	7.48	8.58
AC Saver Day-Of Commercial (Switches)	0.17	0.12	0.09	0.07
AC Saver Day-Of Residential (Switches)	1.42	1.33	1.25	1.17
Base Interruptible Program (BIP)	0.07	0.07	0.07	0.07
CBP Day-Ahead Non-Elect product (1pm-9pm product)	0.00	0.00	0.00	0.00
CBP Day-Of Non-Elect product (1pm-9pm product)	0.00	0.00	0.00	0.00
CBP Day-Ahead Non-Elect product (11am-7pm product)	0.05	0.05	0.05	0.05
CBP Day-Of Non-Elect product (11am-7pm product)	0.02	0.02	0.02	0.02

CBP Day-Ahead Elect product (1pm-9pm product)	2.36	2.41	2.45	2.50
CBP Day-Of Elect product (1pm-9pm product)	3.61	3.68	3.75	3.83

\*The 2023 Load Impact (MW) are based on RA window 4pm-9pm, this means (HE17-HE21)

**Table LG-4 Customer Enrolled Forecast - PY2021 for the years of 2024-2027  
SDG&E Weather Scenario 1-in-2 Portfolio - August**

Program name	2024	2025	2026	2027
Smart Energy Program Day-Of Commercial (Thermostats)	576	542	511	481
Smart Energy Program Day-Of Residential (Thermostats)	29,990	36,019	42,397	49,109
AC Saver Day-Of Commercial (Switches)	1,072	792	585	432
AC Saver Day-Of Residential (Switches)	6,240	5,828	5,446	5,091
Base Interruptible Program (BIP)	1	1	1	1
CBP Day-Ahead Non-Elect product (1pm-9pm product)	0	0	0	0
CBP Day-Of Non-Elect product (1pm-9pm product)	0	0	0	0
CBP Day-Ahead Non-Elect product (11am-7pm product)	11	12	12	12
CBP Day-Of Non-Elect product (11am-7pm product)	9	10	10	10
CBP Day-Ahead Elect product (1pm-9pm product)	98	100	102	104
CBP Day-Of Elect product (1pm-9pm product)	205	209	213	218

Tables LG-5 and LG-6 contain a summary of the update load impact and enrollment customer forecast respectively based on the proposed DR programs changes described on SDG&E's 2024-2027 DR Application. The update estimates are based on SDG&E 1-in-2 weather conditions for PY21 August monthly peak and described in detail in section V.

**Table LG-5 Update Ex-Ante Load Impact Results (MW) –  
PY2021 for the years of 2024-2027  
SDG&E Weather Scenario 1-in-2 Portfolio – August\***

Program name	2024	2025	2026	2027
Smart Energy Program Day-Of Commercial (Thermostats)	0.59	0.55	0.51	0.47
Smart Energy Program Day-Of Residential (Thermostats)	6.14	7.14	8.18	9.27
AC Saver Day-Of Commercial (Switches)**	N/A	N/A	N/A	N/A
AC Saver Day-Of Residential (Switches)**	N/A	N/A	N/A	N/A
Base Interruptible Program (BIP)**	N/A	N/A	N/A	N/A
CBP Day-Ahead Non-Elect product (1pm-9pm product)**	N/A	N/A	N/A	N/A
CBP Day-Of Non-Elect product (1pm-9pm product)**	N/A	N/A	N/A	N/A
CBP Day-Ahead Non-Elect product (11am-7pm product)**	N/A	N/A	N/A	N/A
CBP Day-Of Non-Elect product (11am-7pm product)**	N/A	N/A	N/A	N/A
CBP Day-Ahead Elect product (1pm-9pm product)	2.36	2.41	2.45	2.50
CBP Day-Of Elect product (1pm-9pm product)	3.61	3.68	3.75	3.83

\*The 2023 Load Impact (MW) are based on RA window 4pm-9pm, this means (HE17-HE21)

\*\*SDG&E propose to sunset these DR Programs

**Table LG-6 Update Customer Enrolled Forecast –  
 PY2021 for the years of 2024-2027  
 SDG&E Weather Scenario 1-in-2 Portfolio – August**

<b>Program name</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>
Smart Energy Program Day-Of Commercial (Thermostats)	916	865	816	771
Smart Energy Program Day-Of Residential (Thermostats)	32,499	38,608	45,098	51,956
AC Saver Day-Of Commercial (Switches)*	N/A	N/A	N/A	N/A
AC Saver Day-Of Residential (Switches)*	N/A	N/A	N/A	N/A
Base Interruptible Program (BIP)*	N/A	N/A	N/A	N/A
CBP Day-Ahead Non-Elect product (1pm-9pm product)*	N/A	N/A	N/A	N/A
CBP Day-Of Non-Elect product (1pm-9pm product)*	N/A	N/A	N/A	N/A
CBP Day-Ahead Non-Elect product (11am-7pm product)*	N/A	N/A	N/A	N/A
CBP Day-Of Non-Elect product (11am-7pm product)*	N/A	N/A	N/A	N/A
CBP Day-Ahead Elect product (1pm-9pm product)	98	100	102	104
CBP Day-Of Elect product (1pm-9pm product)	205	209	213	218

\*SDG&E propose to sunset these DR Programs

**V. EX-ANTE FORECAST DETAILS**

**A. Smart Energy Program**

Smart Energy Program participants will receive event dispatch signals via a thermostat or other devices. The Smart Energy Program Day-Of program is described in detail in the prepared direct testimony of E Bradford Mantz (Chapter 1B).

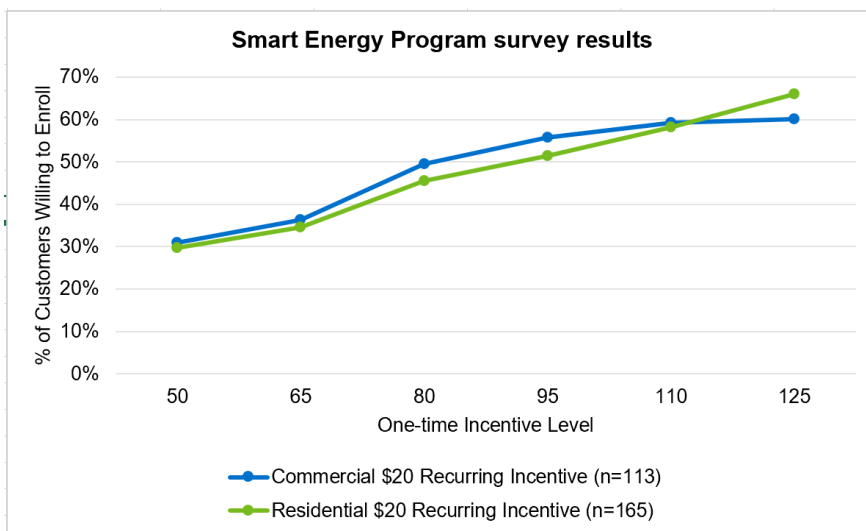
Although the Smart Energy Program as proposed will be open to devices other than thermostats there is not enough information available on which new devices may become eligible for the program to create a forecast for these new devices. Therefore, the load impact forecast for the Smart Energy Program only includes customers with thermostats. The Smart Energy Program update of the ex-ante estimates incorporates the following assumptions about the number of customers with thermostats expected to enroll in the SEP.

- a) Increase a projection of 1,000 residential thermostat customers per year due to Net Energy Metering (NEM) customer are eligible to participate.<sup>4</sup>
- b) Incorporate new participant forecast for residential thermostat customers, i.e., projected to be 5,408 based on average new enrollments from 2017 through 2020.
- c) Thermostat market share of smart thermostats assumed to grow by 10% a year from 2023 through 2026, conservative application of market forecast projecting

<sup>4</sup> D.2103056 states SDG&E shall modify the AC Saver tariff to allow participation by residential NEM customers.

1 18% annual growth<sup>5</sup>. Enrollment growth is ramped to mirror this market share  
2 growth.

3 d) SDG&E performed a survey<sup>6</sup> to identify participant interest in switching over to  
4 the Smart Energy Program Day-Of program. In PY21 the average of AC Saver  
5 Day-Of Residential was 7,798 and 2,312 AC Saver Day-Of Non-Residential  
6 customers enrolled in the program. A random sample of 2,800 eligible residential  
7 customers was drawn to receive the survey and for commercial customer the  
8 survey was sent to 1,300 customers, where 349 residential and 113 non-residential  
9 customers responded to the survey. Respondents were asked if they would be  
10 willing to join the Thermostat Program at different incentive levels. At \$100  
11 incentive level, 55% of the customers are willing to enroll Smart Energy Program  
12 Day-Of program. For the purpose of the load impact ex-ante estimates, the  
13 enrollment forecast is based on the proposed \$75 enrollment incentive level and  
14 \$20 annual incentive.



Source: 2021 Process Evaluation of San Diego Gas and Electric's Demand Response Programs by Nexant October 2021, page 27.

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18  
<sup>5</sup> <https://www.freedoniagroup.com/industry-study/smart-and-connected-thermostats-3659.htm>.

<sup>6</sup> 2021 Process Evaluation of San Diego Gas and Electric's Demand Response Programs by Nexant October 2021.

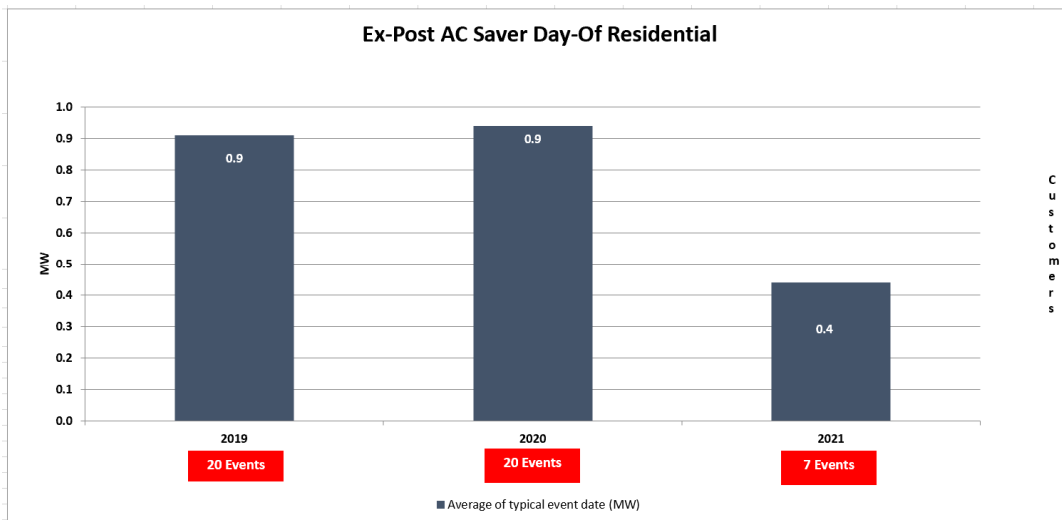


1 **B. AC Saver Day-Of Option**

2 The AC Saver Day-Of has been available to both residential and non-residential  
3 customers with technology capable of curtailing AC use within 20 minutes. This section does  
4 not include the AC Saver Day-Of forecast because SDG&E is proposing to sunset the AC Saver  
5 Day-Of option, which is tied to the need to retire the direct load control switches in 2024. This  
6 program is described in the prepared direct testimony of E Bradford Mantz (Chapter 1B),  
7 submitted with this application.

8 Over the past 3 years, the AC Saver Day-Of Residential program has experienced a  
9 decreased of 52% in terms of the load reduction. The primary reasons the fact that no additional  
10 marketing campaign or recruitment was performed as the switches began to fail and as SDG&E  
11 recruited these participants to other viable DR programs. SDG&E’s NEM customers were also  
12 ineligible for the program due to CAISO metering rules in 2019 and 2020. In addition, the  
13 decrease is attributable to customer fatigue due to 20 events being triggered in these years.  
14 Finally, some of the residential customers with legacy AC Saver Day-Of switches that were  
15 intended to be added in spring 2020 did not receive the activation signal to be able to participate  
16 in the program in 2020.<sup>7</sup>

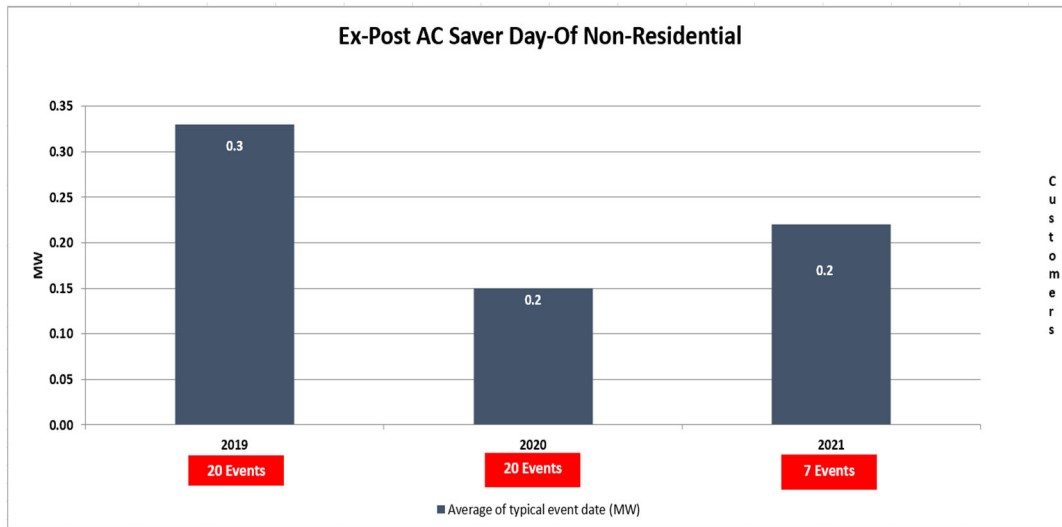
17 **Figure LG-1 Historical Ex-post AC Saver Day-Of Residential results**



18  
19  
<sup>7</sup> 2020 Load Impact Evaluation of San Diego Gas and Electric’s AC Saver Day-Of Program dated as April 1, 2021, p. 10.

1 Over the past 3 years, the AC Saver Day-Of Non-Residential program has also  
 2 experienced a decreased 60% in terms of the load reduction. The decrease is mainly attributable  
 3 to the fact that SDG&E did not perform marketing campaigns and instead recruited the  
 4 participants to other viable DR programs. In addition, customers experienced fatigue due to 20  
 5 events being triggered in 2019 and 2020.

6 **Figure LG-2 Historical Ex-post AC Saver Day-Of Non-Residential**



7  
 8 **C. Base Interruptible Program (BIP)**

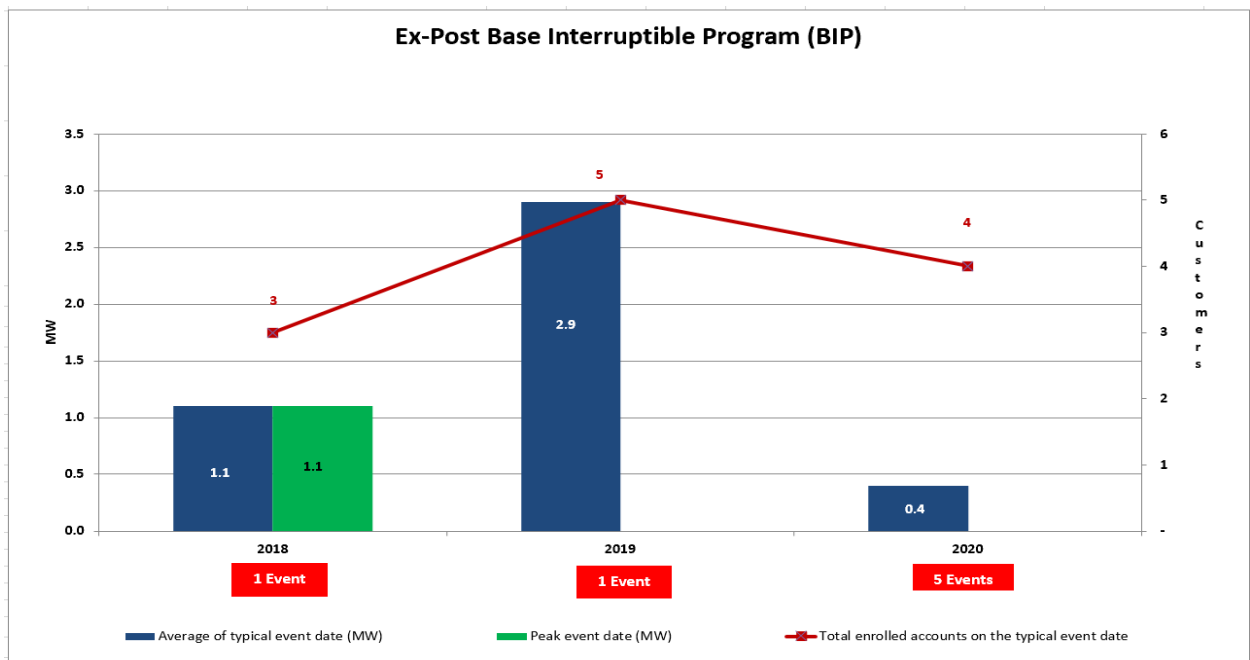
9 SDG&E’s BIP is a voluntary program that offers participants a monthly capacity bill  
 10 credit in exchange for committing to reduce their demand to a contracted firm service level on  
 11 short notice during emergency situations. SDG&E is proposing to retire the program in 2024,  
 12 therefore there is no forecast for the years of 2024-2027. Over the past 3 years, the BIP program  
 13 has experienced a decrease of 86% in terms of load reduction. The primary reason for the  
 14 decrease is that SDG&E unenrolled the few remaining customers because they no longer met the  
 15 minimum load reduction requirement of 100kW. In 2020 there were 4 accounts enrolled in this  
 16 program. However, three accounts unenrolled with an effective date of April 1, 2021. The BIP  
 17 program currently has no accounts enrolled. SDG&E did not trigger the program on SDG&E’s  
 18 peak day in 2020 and 2021.<sup>8</sup>

<sup>8</sup> SDG&E did not trigger the BIP program because per SDG&E BIP tariff, “The Utility may call a BIP event in any of the following cases: a. When the California Independent System Operator (CAISO) has called for Interruptible Load under CAISO Operating Procedure 4420 and b. When extreme temperature conditions are impacting system demand”.

**Figure LG-3 Historical Ex-post BIP results**

SDG&E’s BIP is a voluntary program that offers participants a monthly capacity bill credit in exchange for committing to reduce their demand to a contracted firm service level on short notice during emergency situations. SDG&E is proposing to retire the program in 2024, therefore there is no forecast for the years of 2024-2027. Over the past 3 years, the BIP program has experienced a decrease of 86% in terms of load reduction. The primary reason for the decrease is that SDG&E unenrolled the few remaining customers because they no longer met the minimum load reduction requirement of 100kW. In 2020 there were 4 accounts enrolled in this program. However, three accounts unenrolled with an effective date of April 1, 2021. The BIP program currently has no accounts enrolled. SDG&E did not trigger the program on SDG&E’s peak day in 2020 and 2021<sup>9</sup>.

**Figure LG-3 Historical Ex-post BIP results**



The proposed program changes are described in the prepared direct testimony of E Bradford Mantz (Chapter 1B), submitted with this application.

<sup>9</sup> SDG&E did not trigger the BIP program because per SDG&E BIP tariff, “The Utility may call a BIP event in any of the following cases: a. When the California Independent System Operator (CAISO) has called for Interruptible Load under CAISO Operating Procedure 4420 and b. When extreme temperature conditions are impacting system demand.”

1 **D. Capacity Bidding Program (CBP)**

2 SDG&E proposes to retire the Day-Ahead and Day-Of 11am-7pm non-elect option in  
3 2024. Table LG-7 lists the current CBP products in 2022. The proposed program changes are  
4 described in the prepared direct testimony of E Bradford Mantz (Chapter 1B), submitted with  
5 this application.

6 **Table LG-7: 2022 CBP Current Products**

Notice	Limit	Hours
CBP Day-Ahead	2-4 hours	11:00 a.m. – 7:00 p.m.
CBP Day-Ahead	2-4 hours	1:00 p.m. – 9:00 p.m.
CBP Day-Of	2-4 hours	11:00 a.m. – 7:00 p.m.
CBP Day-Of	2-4 hours	1:00 p.m. – 9:00 p.m.
CBP Day-Ahead Elect option	2-4 hours	1:00 p.m. – 9:00 p.m.
CBP Day-Of Elect option	2-4 hours	1:00 p.m. – 9:00 p.m.

7  
8 The CBP update ex-ante estimates incorporate the following assumptions to the load  
9 impact forecast for the DR application:

- 10 a) SDG&E’s enrollment forecast for the Day-Ahead and Day-Of products assume  
11 the customer enrollment will increase by 2% per year starting in 2023 through  
12 2027 due to the CBP program improvements proposed by SDG&E. The  
13 enrollment forecasts for the Day-Ahead and Day-Of products after 2027 and  
14 through 2032 show a flat trend at the 2027 values.
- 15 b) SDG&E performed a survey with aggregators to identify participant interest in  
16 switching from the non-elect 11-7 product to the elect 1-9 product.<sup>10</sup> Aggregator  
17 1 and 2 stated that they are willing to move all their customers from non-elect 11-  
18 7 product to elect 1-9 product. Aggregator 3 stated that 40% of their customers  
19 will switch to from Day-Ahead non-elect 11-7 product to Day-Ahead 1-9 and  
20 20% of their customers will transfer to from Day-Of non-elect 11-7 product to  
21 Day-Of elect 1-9 product. Aggregator 4 stated that all nominations are currently  
22 for the Day-Of 1-9 product. In addition, one of aggregators mentioned that 113  
23 customers currently enrolled under other DR programs are likely to switch over  
24 the CBP Elect products in 2022. These assumptions were incorporated into the  
25 enrollment forecast.

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<sup>10</sup> In 2021, SDG&E performed a survey to aggregators under the traditional CBP non-elect products to determine aggregators interest in moving from the non-elect 11-7 products to the elect 1-9 products in 2022.

1 **VI. 2024-2027 MEASUREMENT AND EVALUATION BUDGET FOR DR**  
2 **PROGRAMS**

3 Measurement and Evaluation (M&E) is an important tool to design a program, establish  
4 the eligibility of the resources, measure the performance, forecasting, and planning purposes to  
5 achieve the DR goals. The M&E budget has three categories related to programs described  
6 below:

- 7 a) Load Impact Evaluations for DR Programs: In D.08-04-50, the Commission  
8 adopted the load impact protocols requiring that the evaluation of the demand  
9 response programs must include ex-post load impacts that are useful to evaluate  
10 past event performance. The decision requires producing hourly ex-post load  
11 impact results for DR Programs.<sup>11</sup> In addition, the decision also requires  
12 producing 10-year forecast load impacts based on 1-in-2 and 1-in-10 weather  
13 scenarios.<sup>12</sup> The ex-ante results are necessary for long-term resource planning and  
14 for the cost-effectiveness analysis of DR programs.

15 The hourly ex-ante forecasts have been used as an input to produce SDG&E's  
16 internal hourly short-term forecasts that are required to be sent daily to SDG&E's  
17 electric procurement group, the CAISO, the California Energy Commission and  
18 the Energy Division during the summer, and weekly during the winter. Also,  
19 when SDG&E triggers a program, the internal short-term forecast is used as a  
20 point of comparison with the preliminary event performance.

21 Furthermore, this category includes the budget for the demand response forecast  
22 application development for the ongoing costs of maintaining the demand  
23 response forecasting software. This application is a tool to produce SDG&E's DR  
24 daily short-term forecast.

- 25 b) Customer Research: SDG&E proposes to conduct customer research in the form  
26 of process evaluations or other survey-based research during the 2024 to 2027  
27 program cycle. For instance, it plans to perform survey research for AC Saver

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<sup>11</sup> D.08-04-051, p. 10.

<sup>12</sup> *Id.* at pp. 25-26.

1 due to SDG&E’s proposal to transition AC Saver Day-Of customers into the AC  
 2 Saver Day-Ahead program.

3 c) Miscellaneous research, analytical support, and labor support: SDG&E is  
 4 proposing to utilize additional funds for unplanned research needs. For instance,  
 5 in 2021 Energy Division directed the IOUs to conduct a workshop to discuss  
 6 differences in CBP retail and wholesale baselines, and perform a baseline analysis  
 7 and produce a report. This CBP baseline analysis was not planned for and the  
 8 IOUs needed to hire a consultant to carry out the analysis. Also, in 2021 Energy  
 9 Division directed the IOUs to conduct workshop for the QC methodology.  
 10 SDG&E believes these types of requests will continue and their costs are included  
 11 in the budget as miscellaneous research and analytical support. Also, the budget  
 12 takes into account the labor costs to perform the DR load impact evaluation and  
 13 other analytical support. Furthermore, SDG&E is planning to perform a market  
 14 integration study and bottoms up DR potential study in 2024 and 2025. The 2018-  
 15 2022 Measurement and Evaluation Budget did not include the budget for Electric  
 16 Rule 32 measurement and evaluation support and only included the budget for  
 17 one DR pilot. Section VII and VIII below include the budget in detail for R32 and  
 18 five new DR Pilots (Residential CBP, Battery Storage, Grid Isolation Controls  
 19 Pilot (GICP), Electric Vehicle (EV), and Direct Participation Pilot (DDP) pilots).  
 20 The ELRP and Residential ELRP pilots are not included in this budget. However,  
 21 the EM&V plans are included in appendix A.

22 **Table LG-8: 2024-2027 Measurement and Evaluation Budget for DR Programs**

<b>SDG&amp;E M&amp;E Activities</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>
Load Impact Evaluations for DR Programs and forecasting software	\$390,000	\$460,000	\$480,000	\$490,000
Customer Research for DR Programs	\$200,000	\$0	\$150,000	\$150,000
Miscellaneous:				
Analytical support, and loaded labor support for DR Programs	\$550,000	\$570,000	\$580,000	\$600,000
Market integration study and bottoms up DR potential study	\$600,000	\$600,000	\$0	\$0
<b>Total M&amp;E related costs for DR Programs</b>	<b>\$1,740,000</b>	<b>\$1,630,000</b>	<b>\$1,210,000</b>	<b>\$1,240,000</b>

23

1 **VII. 2024-2027 MEASUREMENT AND EVALUATION BUDGET FOR DR PILOTS**

2 SDG&E is requesting additional funds to support the Load Impacts Evaluation for DR  
3 Pilots and Customer Research described below:

- 4 a) Load Impacts Evaluation for DR Pilots: According with the DR protocols described  
5 in D.08-04-50, SDG&E is proposing to conduct load impact evaluation for DR pilots.  
6 The primary objective is to evaluate the effectiveness of and customer perceptions  
7 about the Battery Storage, Grid Isolation Controls Pilot (GICP), Electric Vehicle  
8 (EV), and Direct Participation Pilot (DDP) pilots. The Residential Capacity Bidding  
9 Pilot load impact evaluation will be included in the Statewide Non-Residential  
10 Capacity Bidding Program load impact evaluation. The M&E plans in support of the  
11 prepared direct testimony of E Bradford Mantz at (Chapter 1A) can be found on  
12 Appendix A.
- 13 b) Customer Research: SDG&E proposes to conduct customer research for Direct  
14 Participation Pilot (DDP), Electric Vehicle (EV), Battery Storage, and Grid Isolation  
15 Controls Pilots (GICP) in the form of process evaluations and other survey-based  
16 research. The surveys will be conducted during the 2024 to 2027 program cycle to  
17 have a better understating about customer experience, preferences and whether  
18 SDG&E potential transition the pilots to a program. For instance, perform a process  
19 evaluation for EV pilot to assess which customers will be successful to participate in  
20 this program and assess customer satisfaction. In addition, a process evaluation for  
21 DDP to assess whether the “pay for performance” pilot with no penalties will  
22 motivate commercial and industrial customers to participate in demand response  
23 events, determine effectiveness of third-party marketing and recruitment strategies,  
24 and measure customer retention fundamental to its short-term success of the pilot, and  
25 interview a sample of participants regarding their experience with the pilot. The  
26 loaded labor costs are included in this budget to support the DR Pilots. Appendix A  
27 includes details of the process evaluation/surveys for the DR Pilots.

**Table LG-9: 2024-2027 Measurement and Evaluation Budget for DR Pilots**

<b>SDG&amp;E M&amp;E Activities</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>
Load Impact Evaluations for DR Pilots	\$320,000	\$340,000	\$370,000	\$480,000
Customer Research (process evaluation and surveys) for DR Pilots	\$0	\$300,000	\$300,000	\$0
Loaded labor support for DR Pilots	\$77,194	\$79,247	\$81,458	\$83,771
<b>Total M&amp;E related costs for DR Pilots</b>	<b>\$397,194</b>	<b>\$719,247</b>	<b>\$751,458</b>	<b>\$563,771</b>

**VIII. 2024-2027 MEASUREMENT AND EVALUATION BUDGET FOR R32**

SDG&E believes it is prudent to budget additional funds to support Rule 32 data requests.

**Table LG-10: 2024-2027 Measurement and Evaluation Budget for R32**

<b>SDG&amp;E M&amp;E Activities</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>
R32 (loaded labor only)	\$77,194	\$79,247	\$81,458	\$83,771
<b>Total M&amp;E related costs for R32</b>	<b>\$77,194</b>	<b>\$79,247</b>	<b>\$81,458</b>	<b>\$83,771</b>

**IX. 2024-2027 COMMISSION DIRECTED BUDGET**

Finally, SDG&E believes it is prudent to request funds to cover any additional Commission Directed Research necessary to support Demand Response Potential studies. The Commission has directed SDG&E to conduct additional research on a National Assessment of Demand Response Potential in previous years and we reasonably expect similar requests for these types of studies to continue in 2024-2027.

**Table LG-11: 2024-2027 Commission Directed Research Budget**

<b>Commission Directed Research Activities</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>
Commission Directed Research	\$200,000	\$200,000	\$200,000	\$200,000
<b>Total Commission Directed Research</b>	<b>\$200,000</b>	<b>\$200,000</b>	<b>\$200,000</b>	<b>\$200,000</b>

**X. DR INTERIM GOAL REPORT**

In the Joint Proposal approved in D.14-12-024, as modified by D.15-02-007, parties agreed to an interim collective, statewide DR goal of 5 percent of the sum of the peak demands of the IOU by 2020. This interim DR goal would remain in effect until superseded by firm DR goals approved by the Commission that would be informed by a DR potential study.

SDG&E proposes to retire the DR interim goal report beginning in 2024, because the DR interim goal report is no longer relevant for its original purpose. The Joint Proposal, which



1 prescribed the DR interim goal report, was intended to address issues before the implementation  
2 of bifurcation of DR programs. One of the issue areas identified by the Joint Proposal was DR  
3 goals. Using a 5% statewide goal assumed at the time, the DR interim goal report was designed  
4 to measure the progress of IOU DR programs toward meeting that goal. When adopting the  
5 reporting requirement of the DR interim goal report, D.14-12-024 also directed Energy Division  
6 staff to complete a Demand Response Potential Study, with an objective to rigorously determine  
7 MW goals for DR. Now, the DR Potential Study has been long completed and the bifurcation of  
8 DR programs has been implemented for years. Considering the development of DR in the last  
9 few years, the 5 percent interim goal is outdated, which makes the DR interim goal report no  
10 longer necessary.

11 Also, the limited scope of the DR interim goal report minimizes the informational value  
12 of data contained in the report. Pursuant to D.14-12-024, the report only counts the load impacts  
13 of certain IOU DR programs, leaving out the load reduction of the Demand Response Auction  
14 Mechanism (DRAM), and the load reduction third-party aggregators provide to other load  
15 serving entities. Given the omission of non-IOU DR resources, the report is hardly relevant for  
16 its original purpose now, and only presents the reader with an incomplete picture of how much  
17 total DR capacity is available during the time of the system peak.

## 18 **XI. CONCLUSION**

19 This concludes my prepared direct testimony.

1 **XII. QUALIFICATIONS**

2 My name is Lizzette Garcia-Rodriguez. My business address is 8306 Century Park  
3 Court, San Diego, California 92123. I am employed by SDG&E as Load Analysis Project  
4 Manager III in the Customer Pricing Department. In my current position, I am responsible for  
5 managing and conducting load and energy research analysis.

6 I attended National Autonomous University of Mexico, where I graduated with a  
7 Bachelor of Actuarial Science in 1996. I continued to attend University of Phoenix where I  
8 graduated with an MBA in 2015. In 2009, I was employed by SDG&E to work in the Load  
9 Research Section of the Marketing Department as a Business Economic Analyst II. Over the  
10 past 12 years I have held positions of increasing responsibility within the company that have  
11 included Load and Energy Research.

12 I have not previously testified before the Commission.

**APPENDIX A**  
**EVALUATION, MEASUREMENT, AND VERIFICATION (EM&V)**  
**PLANS FOR DR PILOTS**

SDG&E is proposing to conduct a Measurement and Evaluation Load Impact Studies conform to the Load Impact Protocols adopted by the CPUC in Decision (“D.”) 08-04-050 for Direct Participation Pilot (DDP), Electric Vehicle (EV), Emergency Load Reduction Program (ELRP), Residential Emergency Load Reduction Program (ELRP), Battery Storage, and Grid Isolation Controls Pilot (GICP).<sup>13</sup> For the purpose of the EM&V plans, SDG&E assumes customer participation in all of these pilots, however the methodology described on the EM&V plans could change depending on the number of customers that join the pilot and/or if customers don’t desire to participate. The methodology will conform with the DR Load Impact Protocols.

The proposed pilots are described in the prepared direct testimony of E Bradford Mantz (Chapter 1B), submitted with this application.

- a) **Direct Participation Pilot (DDP) EM&V Plan:** The Program has four specific objectives to be evaluated:

Objective 1: Which pilot notification strategies are preferred by participants?

Recommended Metrics

1. Number of customers enrolling in each notification option compared to the total number of customers to whom the program was marketed.
2. The number of customers that switched notification options or targeted load reduction amounts during the pilot.
3. The relative frequency of different DR technology participating in each notification option
4. Number and percentage of participants de-enrolling during the course of the pilot.

Evaluation Methodology

The analysis of this objective will rely on examining enrollment statistics at the beginning of the pilot and throughout the pilot’s operation. By comparing the number of customers offered to participate compared to the number that actually enroll, and in which notification strategy, SDG&E can learn about the preferences of commercial

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<sup>13</sup> Pilot Implementation Plans by Demand Side Analytics August 2021.

customers. Similarly, assessing the technology types that each participant has within the notification strategies will support SDG&E in understanding participant preferences and improve marketing and outreach efforts. During the pilot, participants will have the opportunity to switch notification strategies at fixed points. Participants can switch their notification strategies during the first week of the month, however they must stay on the new strategy for the entire month. The number of customers who switch or de-enroll in the pilot will inform pilot performance overall.

Objective 2: What amount of demand reduction can be achieved by participants?

Recommended Metrics

1. Average customer load impacts per event by customer type, size and event weather conditions.
2. Assess whether Day-Ahead or Day-Of load responses are similar or different.
3. Estimate total load reduction for each event and test event.

Evaluation Methodology

Load impacts for this objective will rely on regression analysis of individual premise load patterns, including a control group of non-participants to inform what customers would have done in the absence of dispatch. This regression should rely on variables such as customer hourly or sub-hourly loads, Day-Of week, month and weather variables. Results for individual customers may be aggregated to dispatch type and other segment of interest.

Objective 3: Can customers meet their targeted load reduction and can that reduction be accurately measured by a CBL?

Recommended Metrics

1. Baseline-calculated load reduction for each participant and event.
2. Participant load impact achievement rate (participant load impacts from Objective 1 divided by their target reduction).
3. Participant baseline achievement rate (baseline-calculated load reduction divided by their target reduction).
4. Average achievement rates by event day, dispatch type, weather conditions or other factors.

5. Percentage of non-achievement rates (achievement rate of 10% or less) by event day, dispatch type, weather conditions or other factors.
6. Accuracy and precision of customer impacts calculated using baseline method on placebo event days.
7. Accuracy and precision of customer incentive payments calculated using baseline method on placebo event days.

#### Evaluation Methodology

Using participant interval data, event data, and weather data, customer baseline-calculated impacts will be compared to the participant-level load impacts estimated in Objective 1. The achievement rate of customer reductions compared to their target reduction will inform how successful customers can be at producing load reductions when dispatched. This objective will also assess how well the settlement baseline method can accurately quantify the load impacts provided by participants on both a per-kWh and dollar basis. The accuracy and precision of load impacts can be quantified by running a baseline accuracy study, whereby participant interval data is used to simulate placebo events (where no dispatch was given) and calculate the ability of the baseline method to yield the expected 0 impacts.

Objective 4: What are the drivers of program participation, retention and product selection?

#### Recommended Metrics

1. Did the lack of performance penalties influence customer enrollment?
2. Determine effectiveness of third-party marketing and recruitment strategies.

#### Evaluation Methodology

Qualitative drivers of program participation and customer satisfaction will be assessed via a process evaluation that will include participant surveys and interviews with program staff. The enrollment survey will assess what program characteristics led the customers to choose to enroll, and by which method they learned about the program itself. A survey of participants at the end of the pilot will assess customer satisfaction with incentive levels, notification strategies, lack of penalties, and other experiences with the events and dispatch.

b) **EV EM&V Plan:** The program has four specific objectives to be evaluated:

Objective 1: What is the dispatchable load reduction potential during the RA window (4 pm-9 pm) and the potential to absorb excess solar during 10 am – 2 pm?

Recommended Metrics

1. Average observed loads with and without load reduction events for participants during RA window, by month, weekday, and weekend.
2. Average observed load with and without load building events from 10am to 2pm.
3. Average change in load by event type, start time, event duration, amount of advance notice, and weather conditions.

Evaluation Methodology

To evaluate the pilot's success in meeting this objective, SDG&E will conduct a load impact evaluation to understand the impacts of using electric vehicles to deliver demand response resources. If there is sufficient number of participants, the evaluation should rely on the random assignment of participants to treatment and control groups (A/B groups). As part of the pilot, SDG&E will explicitly test operations for different event start times, with different event durations, amount of advanced notice, and staggered charge times. The method used for this evaluation should be a regression-based difference-in-differences method, and include variables such as time of day, weather, or month, as appropriate. Finally, load impacts will be evaluated using both AMI and vehicle end-use data (if available).

Objective 2: How are customers charging electric vehicles on their own?

Recommended Metrics

1. Average EV consumption profiles by hour, month, and vehicle type (BEV and PHEV) for customers who are and are not on EV TOU rates.
2. Data on vehicle miles traveled.
3. Share of charging at home, work, and public stations.
4. Share of charging using Level 1, Level 2, and Direct Current (DC) Fast charging<sup>14</sup>.

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<sup>14</sup> Per the National Renewable Energy Laboratory, when vehicles are plugged in, Level 2 chargers can draw up to 6.7 kW per hour, and Level 1 chargers draw up to 1.9kW. DC Fast Charging can draw 50kW of load.

5. Relationship between distance from DC fast charging locations and share of charging at DC fast charging locations.

#### Evaluation Methodology

A key element for estimating the flexible load potential (and for grid planning) is understanding when, where, how often, and how long customers charge electric vehicles, and the loads those vehicles place on the grid. The information on electric vehicle loads often has limitations. Electric vehicle load shapes are often based on highly self-selected samples (e.g., individuals who pay for separate metering for their electric vehicle), large-scale surveys of vehicle driving combined with simulation, or small samples of customers who agree to have their home chargers logged. These approaches often do not measure charging at public chargers or how proximity to Fast DC charging influences charging behavior.

As part of the pilot, SDG&E will test the use of vehicle telematics for delivering demand response and for gathering data on electric vehicle use and charging patterns. Rather than metering the chargers, data is requested, and instructions are delivered directly to vehicle on-board computers (via the original equipment manufacturers) via an application programming interface (API), with the customer's agreement. The API can be used to gather information on the electric vehicle charging, vehicle miles driven, location of charge (home, work, public charging), speed of charge, and timing of charging, and other details. For all sites, SDG&E will collect vehicle data and their charger type (Level 1, Level2, DC Fast Charging) over a baseline period before load management operations start. The data will be used to produce EV load profiles and analyze charging patterns.

Objective 3: Can charge start times be staggered to manage loads and avoid all sites coming online at the same time?

#### Recommended Metrics

1. Average EV profiles without managed charging
2. Average EV profile with managed charging but without staggered EV charge start times
3. Average EV profile with managed charging with staggering strategies tested

#### Evaluation Methodology

The pilot would explicitly test different strategies to stagger when EV's start charging after an event or TOU period. Implementing the test will require:

1. Defining multiple strategies for staggering EV charge start times (staggering strategies)
2. Developing an operation plan to explicitly test different staggering strategies, including no staggering of charge start times
3. Estimating the change in loads with different staggering strategies in place
4. Assessing which of the staggering strategies is best at avoiding a secondary peak while ensuring customers vehicle charge by the time the customer needs transportation

The different staggering strategies can be implemented side-by-side or for different events. The load profiles will be developed using the end-use data if available. In addition, the evaluator should estimate the load impacts of different staggering strategies using a regression-based difference-in-differences method that includes weather, time of day, and day type variables.

Objective 4: What electric vehicle load management technologies are currently viable?

Recommended Metrics

1. Customer satisfaction with technology solution by technology type
2. Enrollment rates by technology type
3. Load impacts by technology type
4. Time to complete enrollment by technology type
5. Application to enrollment attrition by technology type
6. De-enrollment rates by technology type
7. Share of enrollment applications that qualify for technology

Evaluation Methodology

A key outcome of the pilot is deciding if SDG&E should offer electric vehicle charger control, managed charging via telematics, or both. The evaluator will implement a difference in means or difference in proportion statistical test for metrics 1-7 to estimate if the two technologies yield statistically significant differences.



- c) **ELRP EM&V Plan:** The primary four objectives to be evaluated for group A (non-residential customers and aggregators not participating in DR programs) and group B (market-integrated PDR resources) are:

Objective 1: What are the ex-post and ex-ante load impacts for each program year?

Recommended Metrics

1. What were the demand reductions due to program events for each year – for each event day and hour and for the average event?
2. How do load impacts differ for each eligibility group?
3. How do weather and event conditions influence the magnitude of demand response?
4. What is the ex-ante load reduction capability for 1-in-2 and 1-in-10 weather conditions? How well do these reductions align with ex-post results and prior ex-ante forecasts?
5. What concrete steps can be undertaken to improve program performance?

Evaluation Methodology

The evaluation of ex-post and ex-ante impacts will conform to the California Demand Response Load Impact Protocols<sup>15</sup>. The evaluation methodology will rely on regression analysis of participants and may include a control group. Variables included in the regression analysis may include month, Day-Of week, and hour indicators along with one or more temperature variables.

Objective 2: What is the participation and performance for each eligibility group?

Recommended Metrics

1. What is the participation rate (nominated capacity) as a function of typical peak demand for enrolled participants (enrolled customers in each eligibility group) during eligible hours? Essentially, what portion of their peak load did participants nominate? For example, did the customer use Cogen, or BUGs in addition to load reduction.

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<sup>15</sup> [http://www.calmac.org/events/finaldecision\\_attachementa.pdf](http://www.calmac.org/events/finaldecision_attachementa.pdf)

2. What is the participation rate, e.g., typical peak load for participants as a portion of total typical peak demand for *all eligible* customers (all customers in each eligibility group) during eligible hours? Essentially, what portion of total customer peak load does participant peak load represent.
3. What is performance as a function of evaluated reductions (measured load reductions divided by nominated reductions)? How does this compare to performance determined based on settlements?
4. How does performance differ for each eligibility group?
5. What concrete steps can be undertaken to improve program performance?

#### Evaluation Methodology

Calculation of metrics will combine evaluation impacts calculated for objective 1, nominated capacities for each participant, and total peak loads for all eligible customers.

This will inform future program forecasts by addressing the following: how much of peak load do participants nominate and deliver? What portion of total eligible market resources are currently enrolled and how has this grown each year?

Objective 3: Do participants in market-based programs (BIP, CBP, or DRP) provide reductions incremental to those provided in the market framework?

#### Recommended Metrics

1. For BIP participants: what are load reductions relative to the firm service level? <sup>16</sup>
2. How do reductions and performance for CBP participants compare for economic and emergency dispatched events? How do they compare after adjusting for weather?

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<sup>16</sup> “In the case of overlapping BIP and ELRP events, only the incremental reduction below the customer’s pre-committed firm service level (FSL) is counted in ILR.” ELRP Joint IOU Trigger Advice Letter 3802-E. Page 11

3. What is the market award for DRPs after subtracting Day-Ahead Market (DAM) and Real-Time Market (RTM) performance?<sup>17</sup>

Evaluation Methodology

Calculation of metrics will combine evaluation impacts calculated for objective 1, BIP FSL for each participant, and CBP impacts for non-emergency events. Linear adjustments will be made to adjust for weather differences between emergency and non-emergency events. DR Providers must provide the market award values from metric #3 above to inform whether this program provides incremental load reductions. To calculate incremental reductions in all cases, the impacts calculated in Objective 1 will be subtracted from the nominated kW (for CBP), impact from reference load to FSL (for BIP) or impacts above the amount calculated for CAISO performance according to CAISO rules (for other DRPs).

Objective 4: To what extent are Prohibited Resources (back-up generation) used by participants?

Recommended Metrics

1. What is the share of resources (nominated and delivered) compared to nominated Prohibited resources (e.g., the share of nominated resources reported to come from Prohibited Resources)?
2. How does this vary by eligibility group and by program year?

Evaluation Methodology

Calculation of metrics will tabulate total and prohibited resources by eligibility group and program year.

**d) Residential ELRP EM&V Plan:** The primary two objectives to be evaluated are:

Objective 1: What are the ex-post and ex-ante load impacts for each program year?

Recommended Metrics:

1. What were the demand reductions due to program events for each year – for each event day and hour and for the average event?

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<sup>17</sup> As described in R.20.11.003, Attachment 1, page 14. The calculation will be performed by participating DRPs and validated by SDG&E. Reporting would summarize the results of this calculation along with the proposed BIP and CBP metrics to inform performance for each market based program.

2. How do load impacts differ for each eligibility group?
3. How do weather and event conditions influence the magnitude of demand response?
4. What is the ex-ante load reduction capability for 1-in-2 and 1-in-10 weather conditions?
  - a. How well do these reductions align with ex-post results and prior ex-ante forecasts?
5. What concrete steps can be undertaken to improve program performance?

Evaluation Methodology: The evaluation of ex-post and ex-ante impacts will conform to the California Demand Response Load Impact Protocols<sup>18</sup>. The evaluation methodology will rely on regression analysis of participants and may include a control group. Variables included in the regression analysis may include month, Day-Of week, and hour indicators along with one or more temperature variables. As described in the table below, key considerations include segmentation, sampling, control group methodology, and comparison of evaluated to settlement MW.

Consideration	Proposed Approach
<b>Segmentation</b>	<p>We assume that the primary results reported in the results template will be based on an aggregate analysis across populations. Results can also be reported separately in the accompanying memo by the following segments. As determined in collaboration with the SDG&amp;E team we can also analyze key segments separately though we do not recommend analyzing the full intersection (up to 24 total segment blocks<sup>19</sup>):</p> <ul style="list-style-type: none"> <li>✓ Eligibility group: BDR, CARE, Opt-in</li> <li>✓ Notification: Received vs not received</li> <li>✓ Climate zone: Coastal vs Inland</li> <li>✓ NEM status: Solar vs non-solar</li> </ul>
<b>Sampling</b>	<p>The participant population is expected to include over half of SDG&amp;E's 1.2 million residential accounts (520k BDR + 150k incremental CARE<sup>20</sup> + 30k incremental</p>

<sup>18</sup> [http://www.calmac.org/events/finaldecision\\_attachementa.pdf](http://www.calmac.org/events/finaldecision_attachementa.pdf)

<sup>19</sup> Feasibility of sub-segmentation the HER population will be determined in collaboration with the SDG&E team

<sup>20</sup> Estimated based on SDG&E analysis of eligible customers in each group

<b>Consideration</b>	<b>Proposed Approach</b>
	<p>self-enroll eligible<sup>21</sup>). As such, sampling will be implemented for the analysis to ensure data requests and analysis are targeted and to keep the customer data request under 350 thousand total, to avoid triggering supplemental privacy green light requirements. BDR study and other population weights will be used to ensure aggregate results are representative. We propose to request and analyze a stratified sample of participants within the study segments defined above, with the following exceptions:</p> <ul style="list-style-type: none"> <li>✓ <u>BDR</u>: Construct a balanced panel using the full control group and a sample of the treatment sites. Our assumption is that the control group represents a relatively small portion of the BDR RCT study population so we will sample one treatment site for every one control site. For example, if there is one control for every 10 treatment sites (across the 500k population) we would request all ~50k control sites and a 50k sample of treatment sites.</li> <li>✓ <u>Notification</u>: Analyze the full population of self-enroll participants opting into notifications. This is estimated to be up to 5% of the total population based on the 2012-2017 PTR evaluations</li> <li>✓ <u>Solar</u>: Oversample population for sites with solar</li> </ul>
<b>Control Group Methodology</b>	<p>Each eligibility group has unique considerations and requires a different methodological approach:</p> <ul style="list-style-type: none"> <li>✓ <u>BDR non-CARE</u>: Construct a balanced panel using the full control group and a sample of the treatment sites using the randomized control group already developed and maintained for BDR energy efficiency evaluation.</li> <li>✓ <u>CARE</u>: Select a matched control group from the subset of CARE customers that opted out of ELRP. Though this control pool population is self-selected it is likely the most adjacent population. If need be, we can also explore selecting matches or developing synthetic controls from the FERA population or former CARE accounts at the same location.</li> <li>✓ <u>Self-enroll</u>: Select a matched control group from the population that did not opt-in to ELRP and were not defaulted onto ELRP.</li> </ul>
<b>Comparison of Evaluation to Settlement MW</b>	<p>The ELRP program bases compensation on individual customer baselines. The biases inherent in using individual baselines for residential customers has been well studied and documented by the experts on our team.<sup>22</sup> We expect that the evaluated MW will diverge substantially from the aggregate MW used for baseline settlements. We suggest that this comparison be made in the ex-post portion of the PY 2022 evaluation memo.</p>

<sup>21</sup> Estimated based on a 5% opt-in rate across 550k eligible customers, a similar opt-in rate observed for RYUPTR

<sup>22</sup> “2012 San Diego Gas & Electric Peak Time Rebate Baseline Evaluation”; George, Bode, Berghman. “Residential CBP Pilot Baseline Accuracy Memo;” Bode, Ciccone, Noll.

Objective 2: What is the participation and performance for each eligibility group?

Recommended Metrics:

1. What is the participation rate (opt-out for auto-enrolled groups, opt-in for self-enrolled)?
2. What is average per customer reductions (on an average event kW and percentage basis)? How does this compare to reductions determined based on settlements?
3. How does performance differ for each eligibility group?
4. What concrete steps can be undertaken to improve program performance?

Evaluation Methodology: Calculation of metrics will combine evaluation impacts calculated for objective 1, nominated capacities for each participant, and total peak loads for all eligible customers. This will inform future program forecasts by addressing the following: how much of peak load do participants nominate and deliver? What portion of total eligible customers are currently enrolled and how has this changed each year?

e) **Battery Storage Pilot EM&V Plan:** The primary four objectives are:

Objective 1: How are battery storage customers in the pilot using their storage on their own?

Recommended Metrics

1. Relative frequency of participant battery settings pre-intervention (e.g., operation mode, amount of energy reserved for backup), by battery provider, EV and/or Solar size, climate zone, average peak demand by premise.
2. Average battery consumption profiles by month, battery provider, EV and/or Solar size, climate zone, average peak demand by premise.

Evaluation Methodology

Operational profiles for batteries prior to the intervention can provide valuable insight into the benefits of providing customers batteries, separate from their operation. This can also help SDG&E understand the amount of available capacity for these batteries, and how participation in the pilot can affect consumption patterns. To assess these metrics, SDG&E will analyze pre-intervention battery settings and charge/discharge patterns. This descriptive analysis will summarize the relative frequencies of different usage strategies and settings, as well as the availability of battery capacity in an 8,760 or similar profile.

Objective 2: What is the dispatchable load reduction potential during the RA window (4pm-9pm)?

Recommended Metrics

1. Number of participants enrolled by year and month
2. Average observed loads of participants during RA window, by month, weekday and weekend
3. Average load impact by event type, event duration, month, weather conditions, and weekday and weekend events.

Evaluation Methodology

To evaluate the success of the pilot in meeting this objective, SDG&E will conduct a load impact evaluation to understand the impacts of using battery storage to produce demand response, both in an event-based format and for impacts associated with day-ahead market price response. If the pilot recruits a sufficient number of participants, the evaluation will rely on assignment of participants to randomized treatment and control groups (A/B groups). If participation is less than expected, an alternating treatment design should be implemented, where all participants are dispatched according to a schedule of control days and event days. As part of the pilot, SDG&E will explicitly test operations under different weather conditions, with different event durations, and amount of advanced notice. The method used for this evaluation should be a regression-based difference-in-differences method, and include other variables such as time of day, weather, or month, as appropriate. Finally, the evaluation of participant impacts will be done using both AMI and battery-level consumption data.

Objective 3: What is the optimal incentive structure and amount?

Recommended Metrics

1. Enrollment rate by incentive level and structure (measured as the % of customers offered an incentive who subsequently enroll)
2. Marginal benefits and costs of each implemented incentive strategy and top two alternatives from the conjoint study.

### Evaluation Methodology

The design of the pilot will be done in two phases. In the planning phase, a survey will be undertaken to assess the effects of program attributes (e.g., incentive structure, incentive amounts, penalty amounts, event frequency, duration, amount of advanced notice, etc.) on customer choices. The results of this study will inform the pilot design and incentive levels to be tested. Within the pilot, varying incentive levels (though not incentive structures) will be tested to understand which are most attractive to participants.

Evaluation of these incentive levels will be done on the basis of a marginal cost-benefit study to assess which incentive levels maximize net benefits.

Objective 4: Can SDG&E use battery storage to respond to Day-Ahead market prices?

### Recommended Metrics

1. Whether each battery vendor can receive and adjust consumption in response to price signals
2. What load increases and load reductions can be achieved per kW of installed capacity?

### Evaluation Methodology

The ability of batteries to dynamically respond to pricing signals can provide substantial benefits to SDG&E. The evaluation of this objective will rely on a qualitative summary of the technological hurdles required to dispatch batteries in this fashion. Load impact estimates of the price response may also be calculated in the same fashion as the load impacts from Objective 1, relying on the treatment and control groups already established.

Objective 5: What baseline/settlement methods work best for battery storage?

### Recommended Metrics

1. Accuracy and precision of each settlement method tested for all modes of battery demand response operation (load reductions/discharging and load increases/charging)
2. Accuracy and precision of recommended settlement method for key customer segments of interest.



### Evaluation Methodology

Measuring the impact of battery storage for demand response can be challenging, as using the battery normally during peak periods can depress the baseline reference load, reducing the impact of the battery. Current settlement rules were developed for more traditional demand response resources and may not accurately capture the impacts of battery charging or discharging. The evaluation of this objective will rely on a placebo-day accuracy assessment, whereby the ability of a series of settlement methods will be assessed on their ability to accurately estimate loads when no events are called. This allows SDG&E to determine which methods systematically over or understate loads, leading to inaccurate estimates of battery capability. This accuracy assessment should be done on the full pilot level, for residential and commercial participants separately.

**f) Grid Isolation Controls Pilot EM&V Plan:** The primary four objectives are:

**Objective 1:** Can participants effectively and safely isolate from the grid in response to a signal from the utility?

### Recommended Metrics

1. Number of participants engaged in the pilot.
2. Percentage of customers that successfully isolated from the grid during each event. Subset by event, location, event notice & duration, and technology type.
3. Did the length of the events or amount of advanced notice impact whether customers could remain isolated from the grid?
4. Number and percentage of participants not successfully isolating and to what degree and why.
5. Number of participants exiting the pilot and why.

### Evaluation Methodology

This objective will be assessed using whole-building delivered and received electricity consumption on event and non-event days. One metric of interest will be the average absolute amount of delivered or received load, measured on an hourly or 15-minute basis at each premise during the event period to determine whether a customer successfully isolated during the event. This value can then be summarized by premise (i.e., what is the average and distribution of load demanded from the grid), zip code, event duration or amount of advanced notice. The second metric of interest is the number of premises that

successfully isolate from the grid itself (have a mean absolute average delivered or received load be 0 for a given premise and event).

To assess customer experience with the pilot, including customer satisfaction with the enrollment, notification and isolation tests, SDG&E will survey participants as part of a process evaluation. The specific questions addressed in the process evaluation will assess the customer's experience with having their solar / batteries islanded, customer comfort during events, customer comfort during various event lengths and reasons for de-enrolling from the pilot, in addition to assessing the ability of SDG&E to successfully activate the devices.

Objective 2: What is the change in loads due to grid isolation technologies? How do load impact vary by time of day and event duration?

Recommended Metrics

1. Load in pre-event hour (delivered or received) by premise and event
2. Premise load impacts for each participating premise and event, further summarized by average participant load impacts per event, by participant type and size.
3. Estimate total load reduction for each event and test event(s).

Evaluation Methodology

Load impacts for this objective will rely on regression analysis of individual premise load patterns. These regressions will rely on variables such as customer loads, weather, and month, day, and hour variables to construct an estimate of what participants would have done in the absence of dispatch. As part of the study SDG&E will design an operations plan to explicitly test different event start times and event durations.

Objective 3: Can the technology be dispatched for granular locations such as circuit or zip code?

Recommended Metrics

1. Assess if locational dispatch model is effective.
  - a. By circuit ID
  - b. By zip code
  - c. Outage dispatch block?

### Evaluation Methodology

This evaluation objective will require assessing the capability of premises to isolate from the grid in using the same methods as Objective 1. SDG&E will assess the viability of each dispatch strategy listed above and summarize any procedural challenges with granular dispatch

Objective 4: What are the characteristics of customers are willing to adopt grid isolation technology?

#### Recommended Metrics

1. Number of customers that are offered grid isolation technology.
2. Share of customers who received offers that install grid isolation technology.
3. Report on the opt out rates.

### Evaluation Methodology

To evaluate the success of the pilot in meeting this objective, SDG&E will:

- Provide information on the characteristics of customers who were offered the technology
- Provide information on the characteristics of customer who installed the technology
- Assess the relationship between participation rates and various customer characteristics
- Develop a propensity model to quantify the relationship between enrollment rates and various customer characteristics
- Analyze opt-out rates and analyze how opt out rates vary as a function of customer characteristics

SDG&E will use the information to optimize targeting if and when the pilot is scaled into a program.