BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of San Diego Gas & Electric Company (U 902-E) Requesting Approval and Funding for 2018-2022 Demand Response Portfolio in compliance with Decision 16-09-056.	Application No. A.17-01-_____ (Filed January 17, 2017)

CHAPTER 4

PREPARED DIRECT TESTIMONY

OF LESLIE WILLOUGHBY

ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY

JANUARY 17, 2017

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I. PURPOSE

This testimony presents the ex-post and ex-ante load impacts of San Diego Gas & Electric Company's (SDG&E) demand response programs. Ex-post load impacts are a historical estimate and they are calculated every year and reported in the April 1st Demand Response (DR) filing.[1] Ex-post load impacts are the actual load reductions that SDG&E saw from its DR activities. Ex-ante load impacts are forecasts of the expected load impacts from future DR programs and are primarily based on historical program performance, weather conditions, and customer enrollments. In addition, this testimony includes the budget for the measurement and evaluation of these DR programs.

II. BACKGROUND

On April 24, 2008, the Commission issued Decision (D.) 08-04-050 (the "decision") adopting protocols for estimating the impact of demand response 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 1st of each year. The decision grouped the 27 protocols into the following categories:[2]

- *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;*

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[1] 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

[2] D.08-04-050 at 8.

- *Sampling Methods – Protocol 25;*
- *Reporting Requirements – Protocol 26; and*
- *Process Review – Protocol 27.*

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

III. EX-POST LOAD IMPACTS 2014 AND 2015

This section addresses the ex-post load impacts of the demand response programs. The purpose of the ex-post analysis is to develop hourly and daily load impact estimates for every demand response event in the 2014 and 2015 program years. For some programs the events hours change across the year, so the ex-post load impact results for each program were created by calculating the average during the event hours of each event date and then averaging across all the event dates. Table LW-1 below presents a summary of the 2014 ex-post results originated in the 2014 measurement and evaluation reports filed April 1, 2015.

Table LW-1. Ex-Post Load Impact Results (MW) Year: 2014

Program	Estimated Load Impact	Percentage reduction average event day	Number of events
Base Interruptible Program (BIP)	0.95	37.05%	3
BIP dual participation with CPP	0.01	2.86%	
Base Interruptible Program (BIP) non CPP	0.95	42.97%	
Capacity Bidding Program (CBP) – Day-Ahead	9.71	23.65%	14
Capacity Bidding Program (CBP) – Day-Ahead dual enrolled	0.65	10.56%	
Capacity Bidding Program (CBP) – Day-Of	8.77	16.21%	7
Capacity Bidding Program (CBP) – Day-Of with dual enrolled	2.24	78.43%	
SCTD-Residential	0.85	18.53%	4
SCTD- Commercial	0.66	4.90%	4
Summer Saver Commercial	2.79	6.80%	8
Summer Saver Residential	11.78	23.58%	8

Table LW-2 below includes a summary of the 2015 ex-post results originated in the 2015 measurement and evaluation reports filed in April of 2016.

Table LW-2. Ex-Post Load Impact Results (MW) Year: 2015			
Program	**Estimated Load Impact**	**Percentage Reduction Average event day**	**Number of events**
Base Interruptible Program (BIP)	1.55	54.32%	1
BIP dual participation with CPP	0.01	1.92%	
Base Interruptible Program (BIP) non CPP	1.54	62.25%	
Capacity Bidding Program (CBP) – Day-Ahead	7.86	43.75%	42
Capacity Bidding Program (CBP) – Day-Ahead dual enrolled	0.01	14.59%	
Capacity Bidding Program (CBP) – Day-Of	5.70	12.28%	24
Capacity Bidding Program (CBP) – Day-Of dual enrolled	0.93	22.88%	
SCTD-Residential	1.86	21.37%	4
SCTD- Commercial	3.09	6.27%	4
Summer Saver Commercial	1.33	3.29%	15
Summer Saver Residential	11.82	24.58%	15

IV. SUMMARY OF LOAD IMPACT FORECAST FOR 2018-2022

Tables LW-3 contains a summary of the forecast load impacts of SDG&E's demand response activities for 2018-2022 for August monthly peak day in a 1-in-2 weather year.

Table LW-3. 2018-2022 Ex-Ante Load Impact Results (MW)					
SDGE Weather Scenario 1-in-2 Portfolio - August					
Program	**2018**	**2019**	**2020**	**2021**	**2022**
AC Saver Day-Ahead – Non-Residential	2.9	2.8	2.7	2.6	2.5
AC Saver Day-Ahead - Residential	7.4	8.6	10.4	12.8	15.4
AC Saver Day-Of – Non-Residential	2.2	2.2	2.1	2.1	2.1
AC Saver Day-Of - Residential	8.0	7.7	7.4	7.2	6.9
Armed Forces Pilot	2.3	2.9	3.7	4.7	6.0
BIP	6.7	6.8	6.9	7.2	7.1
CBP Day Ahead (11am-7pm)	7.7	7.9	8.1	8.4	8.6
CBP Day Of 20 minute (11am-7pm)	4.6	5.0	5.5	6.1	6.7
Permanent Load Shifting (PLS)	2.3	2.9	3.7	4.7	6.0

V. EX-ANTE FORECAST DETAILS

A. AC (Air Conditioning) Saver

SDG&E is proposing to modify its current Summer Saver program (now renamed to AC Saver) to include both a day-ahead and a day-of option and to be open to all SDG&E customers with approved technologies capable of curtailing air conditioning use.

The SDG&E AC Saver Day-Ahead option is available to both current customers who received a thermostat from SDG&E's current Small Customer Technology Deployment (SCTD) program, and future customers who will receive an enrollment incentive from the modified Technology Deployment program. The forecast for AC Saver is calculated separately for residential and non-residential customers.

Residential Forecast: From 2014 through 2016 SDG&E provided ecobee Smart SI thermostats free of charge to eligible residential customers who received bill credits through the Peak Time Rebate (PTR) program. These thermostats are currently signaled by SDG&E through the customer's Wi-Fi. Two cycling strategies were tested in 2014 and 2015. The first strategy was a four degree thermostat setback and the second was a 50% AC cycling strategy. Customers were randomly assigned to one of the two strategies. Although PTR events are seven hours long, SCTD participants' thermostats were curtailed for 4 hours, typically from 2 p.m. – 6 p.m. In 2017, the free thermostat offer will remain in place while supplies last and a $50 enrollment incentive is being offered to customers who buy their own qualifying thermostats.

The residential ex-ante forecast provided incorporates the following changes to the load impact forecast. Since the 4 degree cycling strategy provided higher load impacts than the 50% cycling strategy in 2014 and 2015, SDG&E plans to use a 4 degree or other comparable cycling strategy in the future. Therefore, the load impact forecast is based on the load impacts per customer from the 4 degree setback. The load impact for thermostats with ZigBee chips were

increased by 10% to reflect SDG&E's plan to signal the thermostats that cannot be signaled though Wi-Fi because they are offline.

The minimum required load impact per account from Contracts with vendors was used when applicable. Forecasted number of customers is updated to reflect trends in thermostat purchases and the results of the potential study for a basic marketing approach with a $50 incentive.[3]

Non-Residential Forecast: SDG&E's commercial thermostat program provides non-residential customers with programmable communicating thermostats (PCTs). The load impacts for 2014 and 2015 for the 50% cycling and a 4 degree temperature offset strategies were similar for non-residential customers. Therefore the load impacts per customer for both strategies were used in the forecast. More than half of these customers were enrolled in a Critical Peak Pricing (CPP) tariff[4] as of December 2016. For 2017, the following eligibility criteria was added for commercial customers who wish to receive the PCTs and basic installation for free: Customers will need to sign up for a CPP/TOU+ rate, or enroll in a demand response program. In 2018 customers will not receive a free installation or thermostat.

The load impacts per customer are the same as those in the most recent previous April 1 filing for this customer group. The enrollment forecast was updated to take into account a reduction in load impacts from current customers as thermostats go offline and a modest increase

[3] 2015 California Demand Response Potential Study, Charting California's Demand Response Future, Phase 2 Appendices A-J, November 14, 2016, Appendix F: propensity score model, pp. 90-91. Available at http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0ahUKEwiahu7QnL3RAhXqxFQKHR9dD2oQFggdMAE&url=http%3A%2F%2Fwww.cpuc.ca.gov%2FWorkArea%2FDownloadAsset.aspx%3Fid%3D6442451542&usg=AFQjCNFosunLnpLFYXk8Osebp765rXeLAQ&bvm=bv.144210762,d.cGw

[4] This CPP percentage includes both customer on schedule CPP-D and TOU-A-P.

in new customers coming though the Technology Deployment program. The net effect of these two inputs is to keep enrollments flat over the timeframe 2017-2022.

B. AC Saver Day-Of Option

The proposed Summer Saver Program was renamed as SDG&E's AC Saver Day-Of program. The AC Day-Of is available to both residential and non-residential customers with technology capable of curtailing AC use within 20 minutes. Due to current limitations on signaling speed, the load impact forecast for the day-of option includes only customers with switches on their air-conditioners. This program is described in the prepared direct testimony of E Bradford Mantz at EMB-6, submitted with this application.

The AC Saver Day-Of Residential ex-ante load impact per customer forecast was updated to reflect the changes to the program approved in 2017, the proposed 2018 changes, and to account for customer attrition. The Commission approved SDG&E's request to drop the lowest performing thirty percent of its residential customers in 2017 in terms of load impact,[5] in an effort to make the program cost effective. In addition, NEM customers were removed from the ex-ante enrollment forecast because SDG&E is proposing to make NEM customers ineligible for the program due to California Independent System Operator (CAISO) metering rules.

The AC Saver Day-Of Non-Residential forecast filed in April of 2016 was updated based on the new enrollment forecast that better takes into account customer attrition. Also, D.16-06-029 approved SDG&E to reduce the commercial incentives by 50% in 2017, and the updated forecast shows a decrease in participation in both 2017 and 2018 due to this change. The 2019-2022 enrollment forecast decreases by the opt-out percentage that was observed in 2015 and 2016.

[5] D.16-06-029 allowed SDG&E to drop the lowest load impact customers on similar non-event days.

SDG&E Weather Forecast

SDG&E's weather assumptions were updated to include more recent weather trends. The weather analysis used the most recent 10 years of weather data. Residential DR programs like AC Saver Day-Of, and AC Saver Day-Ahead are affected by the updated weather conditions.

C. Armed Forces Pilot (AFP)

The 2018-2022 Armed Forces Pilot is a day-of demand response pilot that offers a monthly capacity payment to branches of the armed forces for reducing energy consumption when requested by SDG&E. This pilot is described in the prepared direct testimony of E Bradford Mantz, Chapter 1, at EBM-34, submitted with this application.

Based on input from the armed forces, the AFP forecast assumes a load impact target of approximately 6 MW by 2022, which supports the armed forces' goal of automating more buildings and increase participation in demand response programs.

D. Base Interruptible Program (BIP)

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. This program is described in the prepared direct testimony of E Bradford Mantz at EBM-15, submitted with this application. The BIP program currently has six customers. The ex-ante load impacts were updated to include four new BIP customers who are in the process of joining the program. For 2018-2022, the BIP forecast presented in this testimony assumes a load impact increase of 6 MWs in 2018 that persist through 2022, and increases by 0.1 MW on an annual basis starting in 2018, which is the minimum load drop required for a customer to participate in the program.

E. Capacity Bidding Program (CBP)

SDG&E proposes to reduce the notification time for CBP day-of from 2 hours to 20 minutes and to offer products with different hour windows that events can be called. The first is from 11:00 a.m. to 7:00 p.m. and the second is from 1:00 p.m. to 9:00 p.m. Table LW-4 lists the proposed CBP products.

Table LW-4: CBP Products

Notice	Limit	Hours
Day Ahead	2-4 hours	11:00 a.m. – 7:00 p.m.
Day Of – 20 min.	2-4 hours	11:00 a.m. – 7:00 p.m.
Day Ahead	2-4 hours	1:00 p.m. – 9:00 p.m.
Day Of – 20 min.	2-4 hours	1:00 p.m. – 9:00 p.m.

Table LW-5 shows the 2018-2022 CBP forecasts for the month of August using a 1-in-2 year weather scenario. The 2018 forecast presented in table LW-5 is the same forecast that was filed in April 2016. For the CBP Day-Ahead and Day-Of programs the forecast assumes the load impact increase by 3% per year starting in 2019 due to the CBP program improvements proposed by SDG&E in this application for 2018-2022. In addition, SDG&E forecasts that the load impacts from the CBP Day-Of program will increase by 7% per year starting in 2019 due to growth in the Technical Incentives (TI) program. The TI program is described in the prepared direct testimony of E Bradford Mantz at EBM-27, submitted with this application.

SDG&E has discussed the 1:00 p.m. to 9:00 p.m product with aggregators, but participation is uncertain because not all customers have load they can reduce during evening hours. Therefore, the load impact forecast assumes customers remain on the 11:00 a.m. to 7:00 p.m. products. The forecast also predicts that customers will remain on their current Day-Ahead or Day-Of products. Given that the notification time has been reduced, it is possible that some customers will move from the day-of to the day-ahead option. Therefore, scenarios have been

run in the cost-effectiveness testimony in chapter 5. The CBP program cost-effectiveness results remain similar regardless of which products CBP customers choose.

Table LW-5: 2018-2022 CBP Ex-Ante Load Impact Results (MW)					
August SDGE Weather Scenario 1-in-2 Portfolio					
Program	**2018**	**2019**	**2020**	**2021**	**2022**
CBP Day-Ahead (11am-7pm)	7.67	7.90	8.14	8.38	8.63
CBP Day-Of 20 minute (11am-7pm)	4.55	4.69	4.83	4.97	5.12

F. Permanent Load Shifting (PLS)

The PLS program provides a one-time incentive payment of ($875/kW) to customers who install qualifying PLS technology on chilled water cooling units (which differ substantially from typical central air conditioning units. The PLS program is described in the prepared direct testimony of E Bradford Mantz at EBM-23. The PLS ex-ante forecast presented in this testimony assumes the load impact a target of 6 MW approximately by 2022. As of December of 2016, SDG&E has completed three PLS projects delivering roughly 2 MWs. Additionally, in 2016, SDG&E received inquiries into the program for projects and it is anticipated that those projects will add an additional 1.7 MW. Based on the level of interest, SDG&E finds that a total of 6 MW of participation by 2022 is reasonable.

VI. MEASUREMENT AND EVALUATION BUDGET FOR 2018-2022

Load Impacts are a valuable tool for evaluating SDG&E's Demand Response Program's performance; they are used to attain the Demand Response goals by determining how much money can be spent on different elements of the operation. Measurement and Evaluation (M&E) is a process that helps improve performance and achieve results. Its goal is to improve current and future management of outputs, outcomes and impact. For budget planning there are three categories related to programs described below:

a) Load Impact Evaluations: In D.08-04-50, the Commission adopted the load impact protocols requiring that the evaluation of the demand response programs must include ex-post load impacts that are useful to evaluate past event performance. The Decision requires producing hourly ex-post load impact results for DR Programs.[6] In addition, the ex-ante results are required and relevant to long-term resource planning and useful for evaluation of proposed future activities. The decision also requires producing 10-year forecast load impacts based on 1-in-2 and 1-in-10 weather scenarios.[7]

The hourly ex-ante forecasts have been used to develop SDG&E's internal hourly short-term forecasts that are required to be sent daily to SDG&E's electric procurement group, the CAISO, the California Energy Commission and the Energy Division during the summer, and weekly during the winter. Updates are also provided to the above parties when demand response events are called.

b) Customer Research: SDG&E proposes to conduct customer research in the form of process evaluations or other survey-based research during the 2018 to 2022 program cycle. This research would focus on customers receiving enabling technology since these programs are being substantially redesigned. Customer perceptions and understanding of the benefits of the various devices are important for the success of the programs. The timing of the research will be determined and most likely will occur in time for the mid-cycle review.

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[6] D.08-04-051 at 10.

[7] *Id*. at 25-26.

c) Miscellaneous research and analytical support: In addition, SDG&E believes it is prudent to budget additional funds that will be available for ad hoc research needs as they arise. For example, during the 2015-2016 program cycle, the energy division as well as other parties made, multiple requests of the IOUs for additional weather and baseline analysis. SDG&E believes these requests will continue and their costs are included in the budget for miscellaneous research and analysis. Finally, the budget includes the labor cost necessary to support these demand response program evaluations and other analytical support.

Table LW-6
2018-2022 Measurement and Evaluation Budget

SDG&E M&E Activities	2018	2019	2020	2021	2022
Load Impact Evaluations Total	$550,000	$580,000	$550,000	$580,000	$550,000
Customer Research	$0	$250,000	$0	$0	$0
Miscellaneous research, analytical support, and Labor support	$653,927	$664,545	$675,481	$686,745	$698,348
Total M&E related costs	**$1,203,927**	**$1,494,545**	**$1,225,481**	**$1,266,745**	**$1,248,348**

VII. QUALIFICATIONS

My name is Leslie Willoughby. My business address is 8306 Century Park Court, San Diego, California 92123. I am employed by SDG&E as Electric Load Analysis Manager in the Customer Pricing Department. In my current position, I am responsible for managing and conducting load and energy research analysis.

I attended San Diego State University in San Diego, CA, where I graduated with a Bachelor of Science in Business Administration in 1983. I continued to attend San Diego State University where I graduated with an MA in Economics in 1989. In 1990, I was employed by SDG&E to work in the Load Research Section of the Marketing Department as an Associate

Economic Analyst. Over the past 25 years I have held positions of increasing responsibility within the company that have included Load and Energy Research.

I have previously testified before the Commission.

This concludes my prepared direct testimony.