Application: A.18-10-

Exhibit: SDGE-

DIRECT TESTIMONY OF

JERRY STEWART

ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

OCTOBER 19, 2018

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I. INTRODUCTION

Resolution E-4906, Ordering Paragraph (OP) 37 directed the Utilities[1] "to file separate Applications with the Commission to allow appropriate consideration and allow for evidence development on the issue of loggers and meters." OP 37 requests information on San Diego Gas & Electric's (SDG&E's) Demand Response (DR) programs and how to monitor third-party-aggregated customers' use of Backup Generators (BUGs), the technology available, and the associated costs.

The responses provided below having to do with meters, loggers, and unit/installation costs are based on SDG&E's experience performing measurement and verification of distributed generation (DG) within SDG&E's service territory, as well as input from SDG&E's metering vendor, Itron, Inc (Itron). SDG&E's entire advanced metering infrastructure (AMI) system is provided by Itron, which consists of approximately 1.3 million electric smart meters and approximately 900,000 smart gas modules. In addition, Itron has extensive experience performing measurement and verification of DG and DR programs throughout the country. Also, in preparing this testimony, I necessarily consulted with my SDG&E colleagues that are subject matter experts in customer data and incentive levels.

SDG&E provides estimates of installation costs for the equipment and hardware identified in the applicable questions below. However, actual costs may vary depending on site conditions, metering objectives, and other internal and external factors. Such other factors that affect costs may include, but are not limited to, communication requirements, panel and circuit

[1] Southern California Edison Company (SCE), Pacific Gas and Electric Company (PG&E), and San Diego Gas & Electric Company (SDG&E) are the "Utilities."

modifications, and permitting and inspections by the authority having jurisdiction. When evaluating final cost estimates, the California Public Utilities Commission (Commission) should take notice of the completeness of the estimates and whether they take into account site location, overall project management, ongoing maintenance, and meter installation and removal cost, as all of these can have a significant impact on the total cost.

II. RESPONSES TO ORDERING PARAGRAPH 37

Each section below retains the organizational structure of the requests in E-4906 OP 37. Section a responds to OP 37(a), and so on. The headings for each section are taken directly from OP 37.

A. OP 37(a): Non revenue-grade and settlement-quality interval generator meters

1. OP 37(a)(1) The full range of models, along with their functionalities, and associated unit and installation costs

There are multiple non-revenue grade electric submeters available on the market. Some of the more common meter manufacturers include DENT Instruments, Veris Industries, Eaton, Spectrum, Sensus, Acuvim, Integrated Metering Systems, and Ohio Semtronics. For added depth, our consultant Itron chose two meters to provide more detailed explanations on: the DENT Instrument ELITEpro and Veris Industries meters.

First, the DENT Instruments ELITEpro XC Portable Power Data Logger[2][3] is capable of measuring, storing, and analyzing electric consumption data, which is derived from voltage and current inputs. The ELITEpro XC data logger uses direct connections to each phase of the

[2] DENT Instruments, *Products, available at* https://shop.dentinstruments.com/collections/test-measurement/products/elitepro-xc-power-meter.

[3] Even though this is called a "logger," it is a non-revenue-grade meter that can capture energy quantities such as kWh/kW.

voltage and various interchangeable current sensor options such as split-core, clamp-on, or flexible Rogowski RoCoil current transformers (designed for large loads or large cables and busbars) to monitor current on each phase. The ELITEpro XC Portable Power Data Logger can capture kilowatt-hour/kilowatt (kWh/kW) energy and demand data as well as virtually all relevant energy parameters for diagnostics and monitoring on three-phase or single-phase circuit installations. Electrical load diagnostic parameters, such as power factor (both Apparent and Displacement), are captured in addition to energy and demand values. In addition to recording kWh/kW data, the ELITEpro XC data logger also features four analog input channels, which can be configured for voltage or current input used in any combination among channels.

The ELITEpro XC data logger comes standard with USB and an ethernet port that allows communication with a local network for convenient remote data download. Other optional communications are also available in Wi-Fi and Bluetooth, which will require customer's wireless network.

The ELITEpro XC data logger is currently quoted for $1,500 per unit, excluding install. Additional costs with an external cellular modem, personal computer (PC) and other external devices necessary to communicate wirelessly start at $2,000 per unit.

Installation costs vary depending on access to the service panel, access to power and the required metering service. In general, an electrical submeter can be installed and commissioned by a licensed electrician in several hours if there are no complications. Installation and commissioning costs without complications should not exceed $1,200. Difficult installations can take much longer depending on the situation. There are sites that would require coordination with the customer for access and scheduling power shutdown to do the work. Some sites may lack access to the service panel, or lack available power. Additional work may include running

an electrical conduit to provide power, installing a new service panel, site surveys, and obtaining permits. Installations and commissioning cost with complications typically start at $5,000.

Veris Industries X51C3A[4] is a bi-directional Modbus[5] remote terminal unit (RTU) Meter with data logger. This device uses direct connection to each phase of the voltage and current sensors using flexible Rogowski RoCoil current transformers. The bi-directional monitoring feature is designed to measure power imported from the utility grid as well as power exported from any energy source. The Veris Industries X51C3A can be easily installed on standard DIN rail, surface mounted, or contained in a panel. The front-panel display makes device installation and setup easy and provides local access to the full set of detailed measurements. The unit provides real energy (Watt-Hours) pulse and alarm outputs.

The Veris X51C3A uses serial communication via Modbus RTU, which provides complete accessibility of all measurements to an Energy Management system. The data logging capability protects data in the event of a power failure.

The Veris X51C3A, including three flexible Rogowski ropes, currently starts at $2,100 per unit, and installation costs are comparable to the DENT Elite device described above.

2. OP 37(a)(2) Description of customers whose resource usage patterns and scenarios are best evaluated with this meter installation

The metering technology choice is a function of the type of information required for verification rather than the customer class. In general, a non-revenue grade meter can be used when the intent is to record when the metered BUG is operating and the magnitude of the generation during the recording time. Sub meters such as DENT's ELITEpro XC Portable

[4] Veris Industries, *Power Energy/Monitoring*, *available at* https://www.veris.com/Item/E51C3A.aspx.

[5] A Modbus is a serial communication protocol that enables multiple electronic devices to be connected to the same network and communicates to a computer.

Power Data Logger is appropriate for use for most residential and small to medium sized non-residential customers. Current transformers (CTs) sold directly from DENT Instruments and the ampacity range varies depending on the size of the generator. In particular, a non-revenue-grade data logger should not be used if there is a requirement to accurately determine the magnitude of the BUG generation as these meters are not tested to the standard of accuracy set by the American National Standards Institute (ANSI).

B. OP 37(b) Revenue-grade and settlement-quality interval generator meters

1. OP 37(b)(1) The full range of models, along with their functionalities, and associated unit and installation costs

The revenue-grade meters measure the amount of electric energy and these meters meet the accuracy requirement standards set by the ANSI. Itron is one of the companies that manufactures revenue grade smart meters. Other companies manufacturing revenue grade electric meters include GE, Landis+Gyr, Elster, and Scheider Electric. The Itron SENTINEL Meter is an example of a revenue-grade meter as described below:

The Itron SENTINEL Meter[6] is a solid-state, electronic, multi-measurement, polyphase meter and this meter is available on self-contained or transformer-rated type. The self-contained meter can generally handle currents up to 200 amps and voltages up to 480 volts (V), which is designed for use in residential and small commercial applications. The transformer-rated meter is typically rated at 20 amps, and the meter is applied for sites with load currents above 200 amps and/or voltages above 480V used with current transformer and/or voltage transformer. This is designed for large commercial and industrial customers, and substations. The Itron SENTINEL meter is capable of measuring electric energy quantities such as kilowatts, kilowatt-hours, volt-

[6] Itron, *SENTINEL Commercial and Industrial Meter, available at* https://www.itron.com/na/-/media/itron/integration/brochure/100242br07sentinelsolidstatemeter.pdf.

amperes, volts, and currents, which can be configured easily to meet customer's needs. This meter can also measure net energy (delivered power minus received power in kilo-hours), and be able to show the single value on meter display. This meter is capable of storing load profile data and events log such as power outages, and time changes. Data can be pulled from the meter locally using a laptop with the meter's software application and an optical probe. In addition, the meter is equipped with a communication board that can be configured for point-to-point communication for a variety of communication equipment, including various external wireless modem technologies.

The SENTINEL meter, including an optical probe, is quoted at around $1500 per unit. Additional costs with an external cellular modem, PC and other external devices necessary to communicate wirelessly start at $2,000 per unit.

Itron's most recent quote from a subcontractor for installation of an Itron SENTINEL meter is $1,300 for the meter. Other installation costs to consider include travel and miscellaneous truck stock (*e.g.*, nuts, bolts, washers), and additional overhead time for project management and procurement.

Another revenue grade meter that is available in the market is the Landis + Gyr MAXsys Elite Power and Energy Revenue Meter.[7] This meter contains advanced power quality features, can have real time peer-to-peer communications and can be reconfigured to suit the customer's needs. The MAXsys elite can provide up to 7 channels of load profile recording and the typical measurements include kilowatt-hours (kWh) delivered, kWh received, kilo-Volt-Ampere-Reactive-hours (kVARh) delivered, kVARh received, phase voltage, kilo-Volt-Ampere (kVa)

[7] Landis + Gyr, *E850 MAXsys Elite, available at* https://www.landisgyr.com/webfoo/wp-content/uploads/product-files/Maxsys_ProductSheet_W.pdf.

delivered and kVA received. This meter also captures site diagnotics, multiple levels of sags and swells, and waveforms. This meter has graphical display that can show power quality data, vector diagrams, communication port, and various display information that are available on the meter. A data file from the meter can be obtained locally using a laptop with the meter's software application and an optical probe. The MAXsys Elite is equipped with serial communication ports that can be configured for point-to-point communication for a variety of communication equipment, including various external wireless modem technology.

The MAXsys Elite, including an optical probe, is quoted for $3500 per unit. Additional costs for external cellular modem, PC and other external devices necessary to communicate wirelessly can be considered for at least $2,000. Installation cost of this meter is similar to the SENTINEL meter, as mentioned above.

2. OP 37(b)(2) Description of customers whose resource usage patterns and scenarios are best evaluated with this meter installation

Revenue-grade meters offer a greater level of accuracy, typically required for settling financial transactions. The Itron self-contained SENTINEL meter is mostly used for residential and small to medium sized non-residential customers. The transformer rated SENTINEL meter is typically used for large Commercial and Industrial customers. The cellular communication capabilities of revenue grade meters make the technology suitable to resources where it is not possible to leverage the local communication network. Revenue grade meters can also be integrated into a utility's mesh network, which would reduce overall communication costs. Larger BUGs operating at high voltages might also be better suited for revenue grade meters.

C. OP 37(c) Cumulative data loggers

1. OP 37(c)(1) Range of models, along with their functionalities, and associated unit and installation costs

Cumulative data loggers are devices that gather information over a period of time either with a built-in or external instrument or sensor. Some of the cumulative data loggers available in the market are manufactured by Continental Control Systems, Campbell Scientifics, and Omega. For added depth, our consultant Itron arbitrarily chose two data loggers to provide more detailed explanations on, the Continental Control Systems WattNode Pulse meter and Campbell Scientific CR310.

The Continental Control Systems WattNode Pulse meter[8] is a bi-directional watt-hour transducer with pulse output (solid state relay closure) proportional to kWh consumed or produced. The WattNode pulse measures per-phase voltage and per-phase current. Pricing for the WattNode Pulse meter starts at approximately $200 depending on the features specified (*e.g.*, voltage level).

The WattNode Pulse meter must be paired with a data logger in order to collect and transmit the information. In the past, Itron has paired the WattNode Pulse meter with the Obvius AcquiSuite data acquisition server.[9] Obvius' AcquiSuite is a flexible data acquisition server allowing users to collect energy data from meters and environmental sensors. The AcquiSuite is designed to connect to internet protocol (IP) based applications such as software dashboards and kiosks, enterprise energy management applications, as well as demand response and smart grid programs. The AcquiSuite collects and logs data from connected (wired or wireless) devices based on user selected intervals. Data from downstream devices are time stamped and stored

[8] Continental Control Systems, LLC, *WattNode Pulse, available at* https://ctlsys.com/product/wattnode-pulse/.

[9] Obvius, *AcquiSuite, available at* http://www.obvius.com/Products/A8812.

locally in non-volatile memory until the next scheduled upload or manual download. Using an integrated modem or Ethernet connection, it is possible to push or pull data via HTTP, XML, FTP or any custom protocol utilizing the AcquiSuite Module to build a customized application, including integrated cellular communication options. Itron's most recent price for an Obvius AcquiSuite is quoted at approximately $1,500 per unit. The Obvius AcquiSuite requires a subscription to manage and transmit the data. An additional setup fee might also be incurred per logger.

The overall unit cost for the Watthour node and the Obvius AcquiSuite is at least $1,700. Additional costs for data subscription and setup fees are not included. The installation cost for this device is comparable to the DENT Industries device, as described above.

Another data logging option is the CR310 data logger manufactured by Campbell Scientific.[10] This data logger is a compact, multi-purpose measurement that includes Ethernet port and removable terminal connectors. This data logger contains analog inputs that can be configured for voltage and current measurement. It also consists of up to seven terminals for digital input or output. This data logger is ideal for small applications and can communicate with a laptop via its USB port.

The CR310 data logger unit cost is quoted for approximately $300, and the installation cost is comparable to the DENT Industries device described above.

2. OP 37(c)(2) Description of customers whose resource usage patterns and scenarios are best evaluated with a meter installation

Cumulative data meters are a low-cost solution, but the lack of logging and communication capabilities gives them limited use. They must be paired with a data logger and

[10] Campbell Scientific, *CR310 Datalogger with Ethernet, available at* https://www.campbellsci.com/cr310.

cellular communications, otherwise the data is not usable without frequent on-site visits. After adding logging and communications capabilities, the cost of a cumulative data logger is comparable to a revenue grade meter. There are limited situations where a cumulative meter is advantageous relative to a revenue grade or non-revenue grade meter. These cumulative data meters can be used for residential and small to medium sized non-residential customers.

D. OP 37(d) Customer load reduction and incentive profiles for each affected DR program; and range of meter or logger unit plus installation costs, under the prescribed scenarios in the below section.

The response to OP 37(d) was put together with the input from my SDG&E colleagues that are subject matter experts in customer data and incentive levels. For the Base Interruptible Program (BIP), *see* Attachment A. For the Capacity Bidding Program (CBP), *see* Attachment B.

E. OP 37(e) Percentage of customers providing the below-listed levels of demand response capacity (peak demand minus firm service level, expressed by "x") and the corresponding range (lowest to highest), mean, and median incentive levels. We provide the below table as a request for information on values below 1 MW, and require the same information in 1 MW increments for output and load reductions from 1 MW to 20 MW.

The response to OP 37(e) was put together with the input from my SDG&E colleagues that are subject matter experts in customer data and incentive levels. For the Base Interruptible Program (BIP), *see* Attachment A. For the Capacity Bidding Program (CBP), *see* Attachment B.

F. OP 37(f) Provide and describe functionalities and associated costs of data loggers that could, in addition to recording the date, time and cumulative hours of operation, provide kW output of the resource, as mentioned by the consultant in its Plan

All of the data loggers described in this document are able to record the date, time, and kW output of the resource, except for a data logger paired with an exhaust temperature probe, as described in section g, below.

G. OP 37(g) Provide and describe functionalities and associated costs of other types of measurement devices that could act as a proxy to the use of an underlying prohibited resource. Explain whether such a unit could provide sufficiently granular information to determine compliance or violation. (For example, could a building's retail meter capture a resource's output on event and nonevent days?)

In addition to directly measuring the output of the generator, other solutions might be able to serve as a proxy for the actual output of the system. For example, a data logger paired with an exhaust temperature probe would be able to detect the operation of the generator within a few minutes (once the exhaust temperature has increased above ambient temperature). This solution might be prudent if for some reason direct measurement of the generator output is not feasible. In total, this solution would cost approximately $400 in hardware.

The customer's retail meter would also be able to detect the operation of the prohibited resource, but it would not be straightforward to detect when the resource was energized. Customers have many ways of responding to DR events including behavioral changes and energy storage. Discharge from an energy storage device that charges from renewable sources would be indistinguishable from an equally sized diesel generator. However, the customer's retail meter would provide useful information for overall verification when paired with additional metering.

H. OP 37(h) Provide the approximate percentage of demand response participants whose usage pattern or resource type may require multiple installations of a measuring device, whether meters or loggers

SDG&E has only one DR customer that could require multiple installations of a metering device, which represents 0.0004% of total DR customers, 0.51% of affected DR customers (*i.e.*, BIP and CBP customers), and 14.29% of DR customers with prohibited resources.

III. CONCLUSION

In conclusion, the final objectives of this initiative will drive the selection of either a revenue or non-revenue grade metering solution. While SDG&E is more familiar with managing revenue grade metering solutions, individual field or site-specific scenarios may warrant a variety of solutions. In addition, labor and hardware cost estimates provided in our responses, typically do not account for data collection, storage, and presentment costs. These costs will be determined once the overall objectives and meter vendors are selected.

This concludes my prepared direct testimony.

IV. STATEMENT OF QUALIFICATIONS

My name is Jerry Stewart. I am employed by SDG&E as its Smart Meter Operations Manager. My business address is 4949 Greencraig Lane, San Diego, California, 92123. My current responsibilities include overseeing SDG&E's Smart Meter applications, Smart Meter Daily Operations Team, Electric Meter Engineering Team, and the Network Operations and Engineering Team. I assumed my current position in 2011. I have been employed by SDG&E since 2003 and have held positions of increasing responsibility in Project Management, Electric Metering Operations, and Smart Meter Operations. I received a Bachelor of Science degree in Business Management, and a Master of Business Administration with an emphasis in Energy Management from the University of Phoenix. I have testified previously before the California Public Utilities Commission.

ATTACHMENT A

CUSTOMER INCENTIVES AND LOAD PROFILES FOR THE BASE INTERRUPTIBLE PROGRAM

ATTACHMENT A

CUSTOMER INCENTIVES AND LOAD PROFILES FOR THE BASE INTERRUPTIBLE PROGRAM (BIP)

Below are SDG&E's responses to the information requested in Resolution E-4906 OP 37(d) and OP 37(e).

	100 kW < x ≤ 500 kW	500 kW < x ≤ 1 MW	1 MW < x ≤ 2 MW
Incentive Range[1]	$1.80 - $10.80/kW	$1.80 - $10.80/kW	$1.80 - $10.80/kW
Incentive Mean[2]	N/A; see footnote 2, below	N/A; see footnote 2, below	N/A; see footnote 2, below
Incentive Median[3]	N/A; see footnote 3, below	N/A; see footnote 3, below	N/A; see footnote 3, below
% of Customers Providing Reduction	20%	20%	60%
Range of Non-Revenue Grade and Settlement Quality Meter Cost[4] (per Resource Unit)	Elite XC Data Logger: $1,500 Veris Industries X51C3: $2,100	Elite XC Data Logger: $1,500 Veris Industries X51C3: $2,100	Elite XC Data Logger: $1,500 Veris Industries X51C3: $2,100
Range of Non-Revenue Grade and Settlement Quality Meter Installation Cost[5] (per Resource Unit)	$1,200	$1,200	$1,200
Range of Revenue-Grade and Settlement-Quality Meter Cost[6] (per Resource Unit)	Itron Sentinel Meter: $1,500 Maxsys Elite: $3500	Itron Sentinel Meter: $1,500 Maxsys Elite: $3500	Itron Sentinel Meter: $1,500 Maxsys Elite: $3500

[1] The incentive range is a capacity payment that remains the same regardless of the customer load reduction. The capacity incentive is based on the committed load available by a customer. The range is $1.80 during November thru April and $10.80 during May thru October. (committed load = peak demand minus firm service level).

[2] The incentive mean is not meaningful because SDG&E's committed load is different at different times of year.

[3] The incentive median is not meaningful because SDG&E's committed load is different at different times of year.

[4] Meter cost is only good for one unit and does not include costs of external cellular modem, computer, and other external device necessary to communicate remotely as described on the testimony.

[5] Installation cost is only good for simple meter installation. Difficult installations can take much longer and can be costly depending on situation as described on the testimony.

[6] Meter cost is only good for one unit and does not include costs of external cellular modem, computer, and other external device necessary to communicate remotely as described on the testimony.

Range of Revenue-Grade and Settlement-Quality Meter Installation Cost[7] (per Resource Unit)	$1,300	$1,300	$1,300
Range of Logger Cost[6] (per Resource Unit)	Continental Control System WattNode Pulse: $1700 Campbell Scientific CR310: $300	Continental Control System WattNode Pulse: $1700 Campbell Scientific CR310: $300	Continental Control System WattNode Pulse: $1700 Campbell Scientific CR310: $300
Range of Logger Installation Cost[7] (per Resource Unit)	$1200	$1200	$1200

[7] Installation cost is only good for simple meter installation. Difficult installations can take much longer and can be costly depending on situation as described on the testimony.

ATTACHMENT B

CUSTOMER INCENTIVES AND LOAD PROFILES FOR THE CAPACITY BIDDING PROGRAM

ATTACHMENT B

CUSTOMER INCENTIVES AND LOAD PROFILES FOR THE CAPACITY BIDDING PROGRAM (CBP)

Below are SDG&E's responses to the information requested in Resolution E-4906 OP 37(d) and OP 37(e). In Table 1, SDG&E provides what data it is able to in accordance with the given format in E-4906 OP 37. However, SDG&E is not able to break out some of the data in this manner; therefore, Tables 2 and 3 provide what data SDG&E does have available in regards to CBP.

Table 1: Response to OP 37 (d) and OP 37 (e)

	x ≤ 100 kW	100 kW < x ≤ 1 MW	1 MW < x ≤ 2 MW
Incentive Range[1]	$2.86 - $27.63 per kW per month (May-October)	$2.86 - $27.63 per kW per month (May-October)	$2.86 - $27.63 per kW per month (May-October)
Incentive Mean[2]	N/A; see footnote 2, below	N/A; see footnote 2, below	N/A; see footnote 2, below
Incentive Median[3]	N/A; see footnote 3, below	N/A; see footnote 3, below	N/A; see footnote 3, below
% of Customers Providing Reduction[4]	N/A; see footnote 4, below	N/A; see footnote 4, below	N/A; see footnote 4, below
Range of Non-Revenue Grade and Settlement Quality Meter Cost[5] (per Resource Unit)	Elite XC Data Logger: $1,500 Veris Industries X51C3: $2100	Elite XC Data Logger: $1,500 Veris Industries X51C3: $2100	Elite XC Data Logger: $1,500 Veris Industries X51C3: $2100
Range of Non-Revenue Grade and Settlement Quality Meter Installation Cost[6] (per Resource Unit)	$1,200	$1,200	$1,200

[1] The incentive range is a capacity payment that remains the same regardless of the customer load reduction. The capacity incentive is based on the committed load available by a customer.
[2] The incentive mean is not meaningful because SDG&E nominates different customers at different times of year.
[3] The incentive median is not meaningful because SDG&E nominates different customers at different times of year.
[4] SDG&E does not have load analysis by percentage of customers providing reduction by these categories. Reference Table 1 and Table 2, below, for Ex-Post Load Impacts and the nominated accounts.
[5] Meter cost is only good for one unit and does not include costs of external cellular modem, computer, and other external device necessary to communicate remotely as described on the testimony.
[6] Installation cost is only good for simple meter installation. Difficult installations can take much longer and can be costly depending on situation as described on the testimony.

Range of Revenue-Grade and Settlement-Quality Meter Cost[7] (per Resource Unit)	Itron Sentinel Meter: $1,500 Maxsys Elite: $3,500	Itron Sentinel Meter: $1,500 Maxsys Elite: $3,500	Itron Sentinel Meter: $1,500 Maxsys Elite: $3,500
Range of Revenue-Grade and Settlement-Quality Meter Installation Cost[8] (per Resource Unit)	$1,300	$1,300	$1,300
Range of Logger Cost[7] (per Resource Unit)	Continental Control System WattNode Pulse: $1,700 Campbell Scientific CR310: $300	Continental Control System WattNode Pulse: $1,700 Campbell Scientific CR310: $300	Continental Control System WattNode Pulse: $1,700 Campbell Scientific CR310: $300
Range of Logger Installation Cost[8] (per Resource Unit)	$1,200	$1,200	$1,200

As stated in footnote 4, San Diego Gas & Electric (SDG&E) does not have some of the data broken out as requested. As such, we present the data that we do have on CBP, which comes from a report that SDG&E filed for its Demand Response (DR) activities for program year (PY) 2017 in accordance with (D.) 08-04-050. This report documents ex-post and ex-ante load impact evaluations of non-residential customers.

Table 2 below, presents the PY2017 ex-post load impact estimates filed in April 2018 with the following columns:

- Average of typical event date (MW): Represents average load impact at the aggregate level across all SDG&E events for CBP. SDG&E called 9 events for the Capacity Bidding Program (CBP Day Of (DO) and 19 events for CBP Day Ahead (DA)).

[7] Meter cost is only good for one unit and does not include costs of external cellular modem, computer, and other external device necessary to communicate remotely as described on the testimony.
[8] Installation cost is only good for simple meter installation. Difficult installations can take much longer and can be costly depending on situation as described on the testimony.

- Peak event date (MW): Represents the average load impact at the aggregate level across all SDG&E events for CBP on SDG&E's Peak Day (September 1st, 2017).
- Average per premise on the typical event date (kW): Represents the average per premise load impact across all SDG&E events for CBP.

Total accounts: The last 2 columns show the number of accounts on the typical event date (on average across all event dates) and on the SDG&E Peak Date.

Table 3, below, shows the current number of customers as of September 2018 for CBP.

Table 2: PY17 DR Ex-post LI estimates

Program	Average of typical event date (MW)	Peak event date (MW) - Sep 1st 2017	Average per premise on the typical event date (kW)	Total nominated accounts on the typical event date	Total enrolled accounts on the peak date
CBP-DA All	0.7	1.1	9.9	68	69
CBP-DO All	3.2	3.0	18.4	174	178
CBP_DO4	3.1	3.0	18.5	170	174
CBP_DO6	0.1	0.1	13.4	4	4

Table 3: Total nominated accounts

Program	Total nominated accounts as Sep 2018
CBP DA 11-7 Hour	2
CBP DA 1-9 Hour	1
CBP DO 11-7 Hour	96
CBP DO 1-9 Hour	97