**ORA DATA REQUEST**
**ORA-SDGE-181-TCR**
**SDG&E 2019 GRC – A.17-10-007**
**SDG&E RESPONSE**
**DATE RECEIVED: JULY 2, 2018**
**DATE RESPONDED: JULY 11, 2018**

**Exhibit Reference:** SDG&E-13, SDG&E-14, and SDG&E-24
**SDG&E Witness:** Alan M. Dulgeroff, Alan F. Colton, and Christopher R. Olmsted
**Subject:** "Grid-sensing technologies"

1. SDG&E provided a handout at the Public Participation Hearing (PPH) held June 28, 2018 in Chula Vista. Please provide a clean copy in PDF format of the handout.

**SDG&E Response 01:**

See attachment ORA-SDGE-181-TCR Q1_Attachment.pdf.

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2. In reference to the handout that SDG&E provided at the Public Participation Hearing (PPH) held June 28, 2018 in Chula Vista, the final bullet on the back page states that the benefits of SDG&E's request include "installing the latest software and grid-sensing technologies to help integrate more clean energy." Please provide a list of all budget codes and associated names for each program that installs these grid-sensing technologies on SDG&E's distribution system.

**SDG&E Response 02:**

1. BC 11246 – Smart Transformers
2. BC 11247 – Advanced Energy Storage
3. BC 14243 – Borrego Springs Microgrid Enhancements
4. BC 14259 – Vanadium Flow Battery Storage
5. BC 16243 – Microgrid for Energy Resilience
6. BC 17244 – Volt/VAr Optimization Transformer
7. BC 17245 – Integrated Test Facility Improvements
8. BC 17246 – Borrego 3.0
9. BC 14860A – Distributed Energy Resource Management System

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3. For each of the programs listed in response to question 2 above, if SDG&E's testimony and workpapers do not use the term "grid-sensing technologies," please provide a clear description of the equipment installed that demonstrates "grid-sensing technologies" are to be installed as part of the program.

**SDG&E Response 03:**

1. BC 11246 – Smart Transformers
Equipment: monitoring devices to be attached to selected transformers to enable real-time data collection of loads, which will be used to establish load profiles for transformers that serve customers with plug-in electric vehicles.[1]

2. BC 11247 – Advanced Energy Storage
Equipment: Energy storage with advanced inverter (i.e. 4 quadrant operation) to allow for 4-quadrant operational support. The advanced inverter has the capabilities to consume or provide reactive resource during exporting or importing of real power.[2]

3. BC 14243 - Borrego Springs Microgrid Enhancements
Equipment: Energy storage including advanced inverter functionality (i.e. 4 quadrant operation), DERMS software (microgrid controller)

4. BC 14259 – Vanadium Flow Battery Storage
Equipment: Energy storage including advanced inverter functionality (i.e. 4 quadrant operation), switchgear and metering equipment that will enable marketplace participation and grid support

5. BC 16243 – Microgrid for Energy Resilience
Equipment: Energy storage including advanced inverter functionality (i.e. 4 quadrant operation), microgrid controller

6. BC 17244 - Volt/VAr Optimization Transformer
Equipment: as stated in Mr. Colton's testimony: "secondary regulation devices to correct voltage issues (low or high) on the secondary network (240V)."[3]

7. BC 17245 – Integrated Test Facility Improvements
SDG&E tests equipment to be installed in the field as part of testing and evaluating technologies and operational schemes prior to deployment. Some examples of grid sensing equipment that are tested at the ITF include: advanced inverters, DERMS software application

8. BC 17246 – Borrego 3.0
Equipment: advanced energy storage and solar PV with smart inverters.

[1] December 2017, Revised SDG&E Direct Testimony of Alan F. Colton (Electric Distribution Capital), Ex. SDG&E-14-R at AFC-128, lines 10-12
[2] Ex. SDG&E-14-R (Colton) at AFC-130, lines 2-6
[3] Ex. SDG&E-14-R (Colton) at AFC-134, lines 19-20

**SDG&E Response 03:-CONTINUED**

9. BC 14860A – Distributed Energy Resource Management System

Equipment: DERMS software. The DERMS product serves as the microgrid controller for the Borrego Microgrid and battery fleet manager for SDG&E's energy storage. Through DERMS, SDG&E can communicate with field devices, including DER, meters, relays and data concentrators, to optimize and automate specific operations of DER.