ORA DATA REQUEST
ORA Data Request, ORA-SDGE- 003
A.17-12-013
(SDG&E 2018 Residential Rate Design Window)
Date Received: March 5, 2018
Date Submitted: March 19, 2018

SUBJECT: OPT-IN PILOT RESULTS AND TOU LOAD IMPACT ASSUMPTIONS

Question 1:

San Diego Gas and Electric (SDG&E) states on p. LW-14 lines 18-19 of its testimony, "SDG&E recently completed an ex ante load impact analysis that provides hourly estimates for the average residential customer on the "TOU-DR1" rate for SDG&E's Mass TOU Default. These forecasted load impact results for 2020 are utilized in the GHG cost saving's calculation provided in the Direct Testimony of Ben Montoya."

a. Please provide all data, workpapers, formulas, documentation and the results of SDG&E's ex ante load impacts analysis.

Please refer to attachments (all saved inside zipped file)

- Q1a Response Support
- Q2g Response Support
- Q2e Actual vs Simulated.xlsx
- ExAnteDocumentation_20171128.docx
- SDG&E TOU Ex-Ante Load Impact Protocol Tables.xlsx

b. What average per customer percent load changes by time of use (TOU) period and by day type did SDG&E assume for its TOU-DR1 rate?

SDG&E did not directly assume the TOU load impacts. Rather, the load impacts were simulated using a Constant Elasticity of Substitution (CES) model. This model requires as inputs TOU rates, assumed elasticity values (which define how responsive customers are to TOU prices), and reference load profiles (the customer loads in the absence of the TOU rate). The assumed TOU rates and elasticities are contained in "ExAnteDocumentation_20171128.docx".

The simulations result in percentage load impacts differentiated by the following customer types:

- CARE vs. non-CARE
- Inland vs. Coastal

In addition, separate percentage load impacts are simulated by the following day/hour types:

- TOU pricing period
- Average weekday, system peak day, average weekend day;

- Month of year;
- 1-in-2 or 1-in-10 weather conditions; and
- CAISO or SDG&E-specific peak conditions

Question 2:

SDG&E states on p. LW-15 at lines 3-4 of its testimony, "Regression models analyzed historical data in explaining the relationship between customer usage, weather, and other regular usage patterns to simulate reference loads. Percentage load impacts were simulated by TOU pricing period and day type using the simulated reference loads, expected TOU prices, and assumed elasticity values (derived from the statewide SPP study)."

a. What type of regression did SDG&E use to forecast the reference loads? Did the regression produce 8760 hourly average customer loads, or loads according to some other time interval?

The reference loads were forecast using coefficients estimated from ordinary least squares (OLS) regression models with data from October 2016 through September 2017. Separate models were estimated for each of four customer types (by climate zone and CARE status), seasons (summer and winter), and weekdays vs. weekends. The resulting estimated coefficients were combined with forecast weather conditions (by month, day type, and weather type) to simulate the reference loads. The simulated load profiles were created for all day types and customer types listed in our response to question 1b.

b. Please provide SDG&E's regression model including all outputs and the SAS or other code used to produce the model.

The regression model of the following form is estimated for each customer type (climate zone, CARE status, and weekday/weekend), and season:

$$kW_t = \alpha + \sum_{i=2}^{24}(\beta_i^h \times h_{i,t}) + \sum_{i=1}^{24}(\beta_i^{Weather} \times h_{i,t} \times Weather_t) + \sum_{i=2}^{24}(\beta_i^{MON} \times h_{i,t} \times MON_t) + \sum_{i=2}^{24}(\beta_i^{FRI} \times h_{i,t} \times FRI_t) + \sum_{i=2}^{5}(\beta_{i,t}^{DTYPE} \times DTYPE_{i,t}) + \sum_{i=1}^{12}(\beta_i^{Month} \times Month_{i,t}) + e_t$$

Table 1: Descriptions of Terms included Regression Equation

Variable Name / Term	Variable / Term Description
kW_t	the demand in hour *t*
The various β's	the estimated parameters
$h_{i,t}$	a dummy variable for hour *i*
$Weather_t$	the weather variables selected using our model screening process
MON_t	a dummy variable for Monday
FRI_t	a dummy variable for Friday
$DTYPE_{i,t}$	a series of dummy variables for each day of the week
$MONTH_{i,t}$	a series of dummy variables for each month
e_t	the error term

The specific weather variables used in the model varied by season, In the summer models, we used the temperature humidity index (THI) and cooling degree hours (CDH) with a 65 °F temperature threshold. In the winter models, we included cooling degree days (CDD), heating degree days (HDD), CDH, and heating degree hours (HDH), all with a 60 °F temperature threshold. The calculation of each of these weather variables is included in "ExAnteDocumentation_20171128.docx".

c. Which years of data did SDG&E use as inputs into the regression model? Did SDG&E use the same 14,000 customer sample for all of the historical years?

The time frame between October 2016 to September 2017 was used as the inputs. All 14,000 customers were used in the regression model.

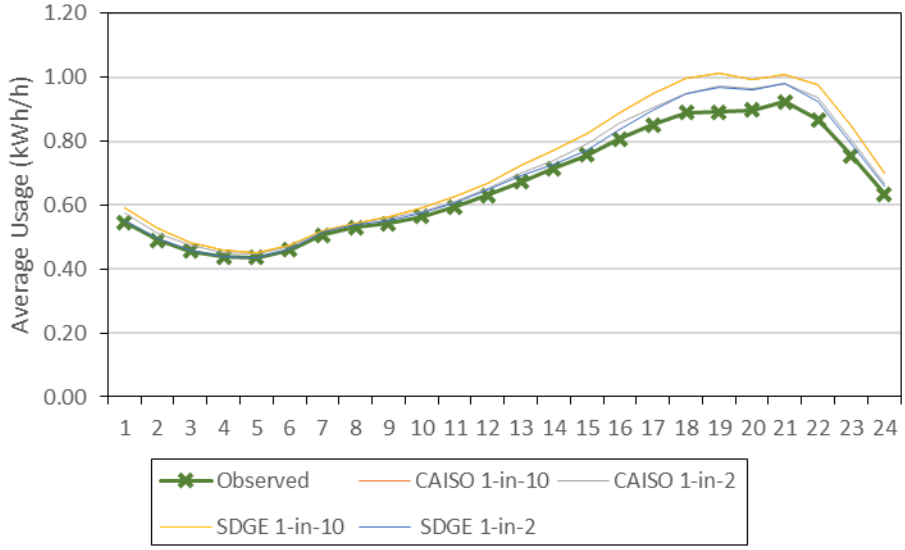
d. Does the 14,000 customer sample exclude CARE customers in hot climate zones or any other groups excluded under P.U. Code section 745(c)?

The 14,000 sample does not include any CARE/FERA eligible customers in the hot climate zones.

e. Please provide a comparison of the regression model's hourly reference load outputs to the historical hourly loads – e.g. compare the 8760 hourly simulated per customer reference load profile to the 8760 hourly average per customer load profiles of the historical years.

The regression model does not directly produce the hourly reference loads. However, we provide comparisons of the observed historical loads used in the regression model to reference loads simulated using the estimated coefficients and weather forecasts.

The figure below compares the average hourly weekday load profile in August 2017 for the 14,000-customer sample to the simulated load profiles for the four weather scenarios, which correspond to 1-in-2 and 1-in-10 weather conditions for CAISO and SDG&E average August weekdays. Figures for each month of the year can be seen in "Q2e Actual vs Simulated.xlsx", which we provided as part of our response.



f. Please provide all calculations showing how the percentage load impacts were calculated "using the simulated reference loads, expected TOU prices, and assumed elasticity values."

This is included in our response to question 1a.

g. Please provide all calculations and data behind SDG&E's assumed price elasticity values.

The assumed elasticity values were developed as part of an earlier study by Christensen Associates Energy Consulting, please see "Q2g Response Support". The primary source for the values is the California Statewide Pricing Pilot (SPP), which is also include in our response.

h. Does SDG&E assume any overall conservation effect from the rollout of residential default TOU? If so, please provide the calculations and the annual percentage value.

The assumed elasticity values include "daily" elasticities, which describe how customers adjust their overall usage level in response to the change in the average price level. However, the TOU load impacts are simulated against a counter-factual rate equal to the load-weighted average of the TOU rate. Therefore, there is little to no change in the overall price level (by design) and by extension, very little simulated change in total energy consumption. For the on-peak period, the simulations resulted in

approximately 180 MWHs of load reduction for a 1-in-2 weather scenario on a typical August weekday for the Mass TOU Default, as outlined in our testimony. Below is the calculation.

0.03 kWh is the average per enrolled customer load impact for the on-peak hours (4-9pm) on a typical Aug. weekday.

HourEnding	EstLoadImpact_kWh
17	0.03
18	0.03
19	0.03
20	0.03
21	0.03
Total	0.15

Assumptions:	
Res Customers	1,200,000
Total Est. Impact	180,000