BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of San Diego Gas & Electric Company (U 902 E) for Approval of Real Time Pricing Pilot Rate	Application No. 21-12-___ (Filed December 13, 2021)

PREPARED DIRECT TESTIMONY OF

LESLIE WILLOUGHBY (CHAPTER 5)

ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY

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TABLE OF CONTENTS

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I. OVERVIEW AND PURPOSE

The purpose of this testimony is to describe the Measurement and Evaluation (M&E) activities for San Diego Gas & Electric Company's (SDG&E) Real Time Pricing (RTP) Pilot (RTP Pilot or Pilot). Decision (D.)21-07-010 (Decision) directs SDG&E to evaluate its RTP Pilot in two stages.[1] The M&E activities will include load impact estimates and bill impact estimates for both stages of the Pilot. SDG&E plans to use surveys to gain insights into participants understanding of the RTP rate and ease of ability for shifting or reducing loads. In addition to participant surveys, non-participants will also be surveyed. This will help SDG&E gain an understanding about why potential participants chose not to participate. Process surveys will be conducted during Stage 1 of the Pilot and used to inform Stage 2. Post Event surveys will be conducted when the top system load hour adders occur to find out if customers were engaged and aware of those higher cost hours. This testimony will also contain Budget estimates for theses M&E activities and support needed to conduct the overall evaluation.

A. Background

D.21-07-010 provides directions for SDG&E to create and implement an RTP Pilot to be conducted in two stages. Section 5.2 of the Decision states as follows:

> Pilot Stage 1 will have a small enrollment with a target implementation start date as soon as summer 2022 but no later than the end of 2022. The primary goal of Pilot Stage 1 is to provide real information and experience relevant to the larger Pilot Stage 2. Pilot Stage 1 enrollment and design should take into account this objective.
>
> Pilot Stage 2 will be similar to the PD Pilot, but will take into consideration newer information and more detailed modeling and analysis. The Pilot Stage 2

[1] D.21-07-010 at 57, Section 5.5 "The application should include a detailed evaluation plan for Stage 1, and a proposed evaluation plan for Stage 2."

> would begin after the Pilot Stage 1. The exact timing will be determined in the application proceeding for Pilot Stage 2, with the goal of implementing a thoughtful RTP pilot designed to obtain specific learnings and metrics.[2]

The Stage 1 RTP Pilot is to begin before the end of 2022 and have a smaller number of customers enrolled, with the intent that information on implementation, marketing and education, and customer feedback can be incorporated into the larger Stage 2 RTP Pilot. The Stage 2 Pilot should have more varied customer participation so that the data and experience collected from Stage 2 will inform the design of any future RTP rates. In addition to gathering data, information on barriers to participation and implementation challenges will be assessed. Additionally, input from key stakeholders should be considered, including Community Choice Aggregators (CCAs) serving customers in SDG&E's service territory. The Stage 2 Pilot design and evaluation will be further developed and finalized during Stage 1 of the RTP Pilot.

B. Objectives

The primary evaluation objective of the RTP Pilot M&E is to assess customer price responsiveness by calculating load impacts, bill savings, and utility cost savings. Participant interval data will be collected on a pre-Pilot basis as well as post Pilot. Surveys will be administered that will provide insights into customer understanding of the RTP Pilot and their satisfaction with the RTP Pilot. Demographic and customer characteristics will be collected from Pilot participants and non-participants to assess what type of customers are willing and able to use a day ahead hourly rate option. Survey information will be collected on participant acceptance, ease of understanding the rate, and perception about their ability to save money. Information gathered from Stage 1 will be utilized in the final design and implementation of

[2] D.21-07-010 at 52

SDG&E's Stage 2 RTP Pilot. Stage 1's RTP Pilot will be limited to eligible non-residential customers. The following eligibility criteria will be applied for Stage 1:

1. Must be taking service on Utility Distribution Company (UDC) tariff schedules ALTOU, ALTOU2, or A6TOU;
2. Must be an SDG&E bundled customer (i.e., cannot take Commodity service from a Community Choice Aggregation or Direct Access Energy Service Provider);
3. Net Energy Metered (NEM) customers are excluded;
4. Demand Response Customers are excluded; and
5. Conjunctively Billed Customers are excluded.

As laid out in the Decision in Section 5.6, the evaluation structure for the Pilot will strive to address the following topics.

- How to calculate load impacts, bill savings, utility cost savings, and cost shift. Guidelines should be specific enough to avoid disputes over methodology once the evaluation report is submitted. However, if some calculations are impossible to perform without significant expense (e.g., conducting a randomized control trial to determine load impacts), then the working group should highlight those considerations in its guidelines.
- Alignment with the nine goals in the Commission's Economic (sic) and Social Justice Action Plan.
- How to assess customer understanding and satisfaction at a reasonable cost.
- Participant use of technology and the impact of technology on load shift.
- How to assess whether low- and medium-income customers are participating in the pilot at the same rate as higher income customers. The working group should describe the steps that should be taken to address any disparities that be potentially discovered during an evaluation.
- The design and evaluation criteria should include the anticipated benefits of a dynamic rate, such as: reduced grid costs, reduction of GHG levels, increased use of renewable energy, and improvements to grid reliability.

> In particular, the pilot should evaluate whether the dynamic rate design(s) being piloted could reduce the likelihood of rolling blackouts.[3]

To the extent feasible, SDG&E will work to incorporate the elements and metrics identified in section 5.6 of the Decision into its evaluation plan.

SDG&E estimates that after applying the proposed eligibility criteria, approximately 1,100 medium and large commercial and industrial (M/L C&I) customer accounts will be eligible for participation in Stage 1. Of those eligible, SDG&E plans to enroll up to 100 customer accounts. Because the eligible customer population for Stage 1 will be a small percentage of the M/L C&I class, the resulting evaluation will not be representative of the entire customer class. Further, even assuming the Pilot cap is reached any conclusions about the resulting load impacts, bill savings, utility costs and cost shifts will not be representative of the customer class due to the small number of participants.

SDG&E plans to administer additional surveys, including participant and non-participant surveys, to gather additional information regarding potential barriers to participation, barriers to understanding the RTP rate, customer experiences with potential difficulties in shifting load and whether there may be certain types of customers/businesses that are structural benefiters, meaning customers that meet the eligibility requirements and are expected to save money on the tariff without changing their behavior.

The layout of the evaluation plan for Stage 1 is as follows: The primary objectives are identified and the accompanying metric and analysis questions along with the approach that will

[3] D.21-07-010 at 58-59; *see also* CPUC, Environmental and Social Justice Action Plan (February 21, 2019), available at https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/news-and-outreach/documents/news-office/key-issues/esj/environmental-and-social-justice.pdf..

be used to answer those questions. The overall description of how the objective will be met is described in the paragraphs after the last metric / analysis in the objective is described.

II. STAGE 1 EVALUATION PLAN

SDG&E proposes to address the following objectives in Stage 1 of the RTP Pilot:

A. **Objective 1:** Calculate load impacts, load shifts, and bill impacts savings or cost increases.

1. Recommended Metrics and Analyses for Objective 1

a. What is the load response (reduction, shift or increase) to the RTP rate?

i. Approach: Regression based analysis.

b. Does the customer currently respond to TOU? Are there incremental load drops moving to RTP? Is there an incremental load drop when the Commodity Critical Peak Pricing (C-CPP) event is called?

i. Approach: Regression based analysis.

c. What are the bill impacts for all eligible participants?

i. Approach: Calculate the customer's bill on the otherwise applicable tariff (OAT) during the same timeframe the customer is on the RTP rate and calculate the difference.

d. Are there technology-based reductions? Identify relative frequency of participant battery settings pre-intervention (e.g., operation mode, amount of energy reserved for backup by battery provider), presence of EV, climate zone, average peak demand by premise.

i. Approach: Utilize SDG&E's customer characteristics information to establish what climate zone the customer resides and whether storage is present.

e. Does the customer have technology load profiles?

i. Approach: Utilize customer interval data to develop technology profiles to the extent possible.

f. How often does the RTP participant change its energy source or usage based on RTP rates or following a C-CPP event? (A C-CPP event is when the CAISO forecasts its hourly load to be one of its top 150 hours (based on the prior year)

i. Approach: Identify all C-CPP event notifications for each customer and evaluate load data prior to and after each event.

g. What is the load impact by event type, event duration, month, weather conditions, and weekday and weekend events?

i. Approach: Using regression output, provide an excel table that can show each event day along with a reference load shape, including hourly weather conditions.

h. What is the average observed load profile for RTP participants including RA window, by month, weekday and weekend and technology if possible?

i. Approach: Identify resource adequacy assessment hours in excel table and show average reduction over those hours.

i. Do customers that show benefits from the bill impacts enroll in RTP?

i. Approach: Provide statistics on how many customers are structural benefiters versus how many customers enroll onto RTP.

j. Do eligible customers that have projected bill savings sign up for RTP?

i. Approach: Report on how many customers are projected to save money on the RTP Pilot and how many of those customers actually saved.

2. Evaluation Methodology for Objective 1

In order to evaluate the Pilot in terms of Objective #1, SDG&E will conduct a load impact evaluation to estimate load impacts and load shifts due to the RTP Pilot rate. If customers have storage technology available, analysis will include the customer's ability to reduce loads based on different factors, such as CAISO's day-ahead hourly pricing, and for C-

CPP events. SDG&E will utilize hourly interval data, weather data, customer characteristics and other survey information that may aid in this evaluation.

Typically, demand response load impact studies are performed in accordance with the load impact protocols.[4] However, pilots are not required to have the rigor of load impact protocols applied to their load impact evaluations.[5] Here, despite the fact that it is not a requirement, if enough customers participate in SDG&E's Stage 1 RTP Pilot, the evaluation may be able to assign the participants to randomized treatment and control groups (A/B groups) which would qualify for being compliant with the load impact protocols. If participation is less than the maximum target of 100, an alternating treatment design could 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 analyze load impacts under (1) different weather conditions, (2) different event durations, and (3) different amounts of advance notice. SDG&E plans to use statistical methods such as regression analysis or regression-based difference-in-differences methods to calculate load impacts and load shifts in response to the day-ahead hourly pricing. In addition to weather data and customer interval data, the load impact analysis will likely include additional variables such as time of day, day of the week, month or season, as appropriate.

SDG&E plans to submit a request for proposal (RFP) for the load impact evaluation study. Once the RTP Pilot has begun, and there are participants on the RTP Pilot rate, SDG&E will provide its formal evaluation plan which will include the appropriate load impact

[4] *See* D.08-04-050, Decision Adopting Protocols for Estimating Demand Response Load Impacts at Attachment A.

[5] *See generally, id.*, Attachment A at 93.

methodology. If it is not cost prohibitive, SDG&E will utilize the load impact protocols for its load impact reductions and shifts.

SDG&E proposes to use preliminary bill impacts to model the short-term and long-term effects of the RTP Pilot rate on customer bills based on rate with and without consumption changes in order to capture the full effect of energy savings between the customer's otherwise applicable tariff and the RTP Pilot rate. SDG&E proposes to conduct bill impact analyses on all eligible customers and to track the differences going forward.

B. **<u>Objective 2</u>**: Analyze participant enrollment process and characteristics. This will include types of businesses and hours of operation and how they relate to RTP. This will ensure that RTP Stage 2 design and implementation benefits from Stage 1 participant research regarding, for instance, ease of signing up for the rate, readily available access to day-ahead pricing data, how well participants understand the RTP Pilot rate and whether they are able to take action when prices are high.

1. Recommended Metrics for Objective 2

a. How many participants enrolled by year and month and classification of business type, such as North American Industrial Code (NAICs)?

i. Approach: Utilize customer characteristic data to and report out on participants.

b. What types of customers enrolled in the RTP Pilot from a qualitative perspective? Is there something unique about their load shape that incentivizes them to participate on the RTP Pilot rate.

i. Approach: Ask questions via participant and non-participant surveys, and/or utilize focus group information.

c. How easily can participants react to hourly day ahead pricing? How does it differ when the event component is included?

i. Approach: Questions via participant post event surveys following event days.

d. What is customer awareness of the event component of the RTP Pilot rate?

i. Approach: Responses from participant surveys and possibly post event surveys.

e. How easily can participants react to hourly day ahead pricing? Does it make a difference whether there contains the event component?

i. Approach: Questions via post event survey accompanied with statistics extracted from customer specific energy reductions during events.

f. Does customer uptake of energy efficiency (storage, electric vehicles, or energy management systems (EMS)) technology effect whether they utilize the RTP Pilot rate?

i. Approach: Compare known customer characteristics alongside the utilization of the RTP rate to view increases from technology.

2. Evaluation Methodology for Objective 2

To evaluate customer characteristics, SDG&E will gather relevant information from its customer information systems. Additional information may be obtained from customer account executives that can also provide insights into customer preferences and operating behaviors. Additional information regarding preferences, attitudes, understanding of the rate, ability to reduce loads and notification lead times related to event adders will be collected through surveys. SDG&E plans to survey both participants, and non-participants. SDG&E will work with third parties to conduct focus groups. These surveys will provide qualitative information that can help shape future RTP designs. SDG&E will compare differences and similarities so that it can determine and characterize what types of customers may be able to participate in the future. If there are barriers to entry those should be identified through survey data. Post event surveys may be administered to participants withing a few days of a system event adder to assess awareness and customer engagement.

C. **Objective 3:** What is the optimal hourly structure and price? Are there utility cost savings, and/or cost shifts?

1. Recommended Metrics for Objective 3

a. What are the bill impacts for all eligible participants?[6]

i. Approach: Calculate the customer's bill on the otherwise applicable tariff (OAT) during the same timeframe the customer is on the RTP rate, and calculate the difference.

b. Is there cost shifting potential between customer classes?

i. Approach: Track cost differences from the bill impacts to be assessed later in the Pilot. Track magnitude and direction of cost shifts.

c. What are the Marginal benefits and costs of each customer that enrolled in RTP program**?**

i. Approach: Calculating marginal benefits and costs analysis may be premature in Stage 1, SDG&E plans to track participant costs.

2. Evaluation Methodology for Objective 3

The marginal benefit design for this study will be done by comparing billing data with a control group (or by comparing the participants previous billing data). Cost shifting within the study will be focused on comparing billing data for customers that elected to join the RTP Pilot and those that did not join the RTP Pilot but were marketed to join RTP. If there is a difference, the difference in the cost shift due to the RTP Pilot will need to be held within the customer type and class and varying customer billing data will need to be analyzed. This is similar to the way that SDG&E handles its Critical Peak Pricing (CPP) rates, where SDG&E allocates revenue differences to only those customer classes that are eligible to take service on CPP rates. This

[6] SDG&E's proposal is to determine bill impacts for all eligible customers, but only to the extent possible. For instance, it may not be possible for new customers as they will not have a full year of interval data available.

ensures that no cross subsidization occurs from CPP. This objective may be difficult to achieve with respect to marginal costs and benefits as much of the information comes from the customer. SDG&E plans to provide incentives for customer surveys, and to work with 3rd party providers, but it is unknown how many will participate and how well those that do participate will reflect the other customers in the class that will not or cannot participate.

D. **Objective 4:** Can SDG&E use battery storage to respond to RTP Day-Ahead market prices? Once NEM is able to participate will there overlap between solar customers?

1. Recommended Metrics for Objective 4

a. Do customers with storage ability receive and adjust consumption in response to price signals?

i. Approach: If possible, meter battery storage to identify if changes in load correspond with the charging and discharging of the battery.

b. What load increases and load reductions can be achieved per kW of installed capacity?

i. Approach: Based on data from metric "a" SDG&E can model estimate what the ideal battery size may be for the customer.

c. Is storage capability alone enough to respond to price signals that enable bill savings?

i. Approach: Using the data from the above metrics, analyze the customer's total load with optimizing battery discharge and charging behavior. Calculate savings attributed to battery.

d. Would the addition of NEM benefits contribute to better performance on the RTP Pilot?

i. Approach: Using customer load data simulate what NEM size would be optimal for the customer, Calculate additional cost savings due to NEM addition.

2. Evaluation Methodology of Objective 4

The ability of batteries to dynamically respond to pricing signals can provide substantial benefits in the form of reliability. 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. SDG&E will attempt to simulate the effects of adding storage or NEM to customer loads in Stage 1 to determine if those technologies will benefit the customer.

E. **Objective 5:** What are greenhouse gas (GHG) savings as a result of implementing RTP?

1. Recommended Metrics for Objective 5

a. What are estimated GHG savings over the Pilot period?

i. Approach: Develop 8760 hourly impacts for Stage 1 Pilot participants from Objective 1, and apply those to GHG emissions data to derive savings

b. Are there any conclusions that can be drawn regarding potential for RTP savings from Stage 2 participation?

i. Approach: Using the information gathered in metric "a" extrapolate to expected participation in Stage 2.

2. Evaluation Methodology for Objective 5

The GHG benefits can be estimated by applying the hourly load impact estimates from the 1st and 2nd year of the RTP Pilot to the GHG emission data to derive GHG savings. The GHG can be calculated multiplying the activity data by the emission factor (GHG emissions = Activity Data x Emission Factor). In this case the activity data is the load impact or reduction in load attributed to the RTP Pilot rate. By applying the hourly load impact estimates from the 1st and 2nd year of the RTP Pilot to the GHG emission data GHG savings estimates can be derived. The results will need to be qualified as to whether it is appropriate to extend the savings to the

entire customer class. It may be that most customers in the class are unable to participate on SDG&E's RTP Pilot rate.

III. STAGE 2 EVALUATION PLANS

Stage 2 evaluation plans are expected to be similar to that of Stage 1. There could be significant differences in the types of customers that can participate that may warrant making changes to the Stage 2 evaluation plan. SDG&E believes that early Stage 1 analysis will help shape what will be needed to study in Stage 2. However, SDG&E anticipates using similar methodologies for the load impact studies to measure the load reductions and/or shifts. SDG&E plans to meet with stakeholders and determine what the study scope should include and if there are other areas that should be studied. SDG&E recommends conducting focus groups, participant and non-participant surveys, as well as post-event surveys after hourly event adders occur, and an end of Stage 2 Pilot survey. It is not assumed that another process survey needs to be conducted assuming that SDG&E is able to address the results from the Stage 1 process evaluation.

IV. BUDGET

This section explains the proposed budget for evaluation of the Pilot program detailed by year and as a total over the life span of the Pilot program. Below in Table LW-1 the budget estimates should not be considered final as costs will depend on participation (to be determined later).

Table LW-1		
SDG&E RTP Measurement and Evaluation Budget		
SDG&E M&E Activities	**Stage 1**	**Stage 2**
Two years of Load Impact Evaluation (includes load and bill impacts, bill savings, and utility savings	$300,000	$300,000
Customer Research (includes surveys on customer acceptance, customer understanding of the RTP, barriers to entry, difficulties in implementation, etc.	$250,000	$250,000
Miscellaneous research, analytical support, and Labor support	$226,000	$240,000
Total M&E related costs	**$776,000**	**$790,000**

V. SUMMARY AND CONCLUSION

SDG&E's RTP Pilot evaluation will utilize SDG&E's Advanced Metering Infrastructure/Smart Meter data, hourly interval, consumption, and customer characteristic data from enrolled customers to conduct the load impact evaluation. SDG&E plans to conduct surveys from participants and non-participants to assess understanding of the hourly rate, ease of participation, barriers to participating, and ease of access to pricing data. Process evaluations and post event surveys are also planned as well as an end of Pilot survey. The information obtained will help identify areas that can be improved for the implementation of Stage 2. The load impact studies in conjunction with the post event and end of Pilot survey information will help facilitate SDG&E's understanding of the drivers for participation and non-participation on RTP rates. Knowing whether customers are aware and can react to the event component in the

RTP rate will provide insights into load reduction potential when rolling out to a larger population. Responses to questions regarding how easily participants can reduce or shift loads in response to hourly day ahead market prices with event adders or whether only certain customer types be able to participate on SDG&E's RTP. The two-year Pilot will help identify if load reductions and shifts will persist during the second year. Answers to these types of questions will help SDG&E to develop rate strategies that will lead to a more reliable grid. These are just some of the objectives / questions that SDG&E will strive to answer during its Stage 1 and Stage 2 RTP Pilots.

VI. STATEMENT OF QUALIFICATIONS

My name is Leslie Willoughby. I am employed by SDG&E as Electric Load Analysis Manager in the Customer Pricing Department. My business address is 8326 Century Park Court, San Diego, California 92123. 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 Sec-tion of the Marketing Department as an Associate Economic Analyst. Over the past 30 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.

ATTACHMENT A

Proposed Measurement and Evaluation Timeline

Stage 1 Timing

- Q3 2022: Develop RFP and make Load Impact / Process and other survey Consultant Selection
- Q3 – Q: Calculate Bill Impacts for eligible customers
- Q4 2022: Enrollment starts, Stage 1 M&E planning during 4th quarter 2022
- Q1 2023: Begin Stage 1 Process Evaluation
- Q2 2023: Conduct Participant and Non-Participant Surveys
- Q3Q4 2023: Begin Measurement and Evaluation activities – Load Impacts / Shifts
- Q2 2024: Year 1 M&E Report, will also include results of Process, Participant/non-participant, post event surveys to date
- Q3 2024: Stage 1 Year 2 Post Event Surveys / End of Pilot Survey
- Q3-Q4 2024: Measurement & Evaluation for Stage 1 Year 2 begins.
- Q2 2025: Stage 1 Measurement & Evaluation Final Report – includes Post Event Surveys and End of Pilot Survey Results

Stage 2 Timing

- Q2 – Q3 2024: Calculate Bill Impacts for eligible customers
- Q2 – Q3 2024: Stage 2 Measurement and Evaluation Planning
- Q3 – Q4 2024: Stage 2 Enrollment starts
- Q1 2025: Begin Stage 2 Process Evaluation
- Q2 – Q3 2025: Conduct Participant and Non-Participant Surveys / Focus Groups
- Q3 2025: Stage 2 Measurement and Evaluation activities – Load Impacts / Shifts

- Q2 2026: Stage 2 Year 1 Measurement and Evaluation Report, includes results of Participant/non-Participant and post event surveys to date.
- Q3 2026: Stage 2 Year 2 Post Event Surveys / End of Pilot Survey
- Q3-Q4 2026: Measurement and Evaluation for Stage 2 Year 2 begins
- Q2 2027: Stage 2 Measurement and Evaluation Final Report – includes results of Post Event Surveys and End of Pilot Survey Results

Proposed Measurement and Evaluation Timeline