

Rulemaking 12-06-013 Phase 1

PREPARED DIRECT TESTIMONY OF
LESLIE WILLOUGHBY
CHAPTER 3
ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

FEBRUARY 28, 2014



TABLE OF CONTENTS

I. INTRODUCTION..... 1

II. BACKGROUND OF SDG&E’S RESIDENTIAL TOU..... 1

III. TOU STUDIES..... 5

A. Phoenix, Arizona 5

B. Sacramento Municipal Utility District (“SMUD”) 6

C. Ontario Power Authority (“OPA”)..... 6

D. Statewide Pricing Pilot (“SPP”)..... 7

IV. SDG&E’S EXPERIMENTAL TOU PILOT PROPOSAL 8

V. QUALIFICATIONS 12

1 **PREPARED DIRECT TESTIMONY OF**
2 **LESLIE WILLOUGHBY**
3 **CHAPTER 3**

4
5 **I. INTRODUCTION**

6 The purpose of my testimony is to set forth San Diego Gas & Electric Company’s
7 (“SDG&E”) proposal to conduct an experimental time-of-use (“TOU”) pilot for its
8 residential customers. The proposal is in support of and consistent with the California
9 Public Utilities Commission’s (“Commission” or “CPUC”) ten guiding rate design
10 principles for optimal rate design¹ and the Energy Division Staff Proposal for Residential
11 Rate Reform (“ED Staff Proposal”).² SDG&E’s proposal will evaluate the on-peak load
12 shifting effects of three different TOU rates with differing TOU period lengths and pricing
13 structures. The information and insights gained from this study will be used in creating the
14 default TOU rate structure that SDG&E is proposing to begin in 2018 as well as optional
15 TOU rates, consistent with CPUC policy priorities and in compliance with Assembly Bill
16 (“AB”) 327. This testimony will provide a brief overview of SDG&E’s current residential
17 TOU rates, relevant residential TOU rate studies and why SDG&E should conduct a TOU
18 pilot, followed by a general description of SDG&E’s TOU study pilot design.

19 **II. BACKGROUND OF SDG&E’S RESIDENTIAL TOU**

20 SDG&E currently has less than 1% of its residential class on a TOU rate, which is in
21 itself an important reason to conduct an experimental TOU pilot in preparation for default
22 TOU rates in 2018. SDG&E has offered its current residential TOU rate, Schedule DR-

¹ Administrative Law Judge’s Ruling Requesting Residential Rate Design Proposals, issued on March 19, 2013 in Rulemaking (“R.”) 12-06-013, Attachment A Principles of Rate Design.

² Staff Proposal for Residential Rate Reform in Compliance with R.12-06-013 and Assembly Bill 327, Energy Division, January 3, 2014.

1 TOU, since 1983.³ While the rate has undergone various iterations throughout the years,
2 DR-TOU is currently tiered and the rates differ by season. The on-peak period is weekdays
3 from noon to 6pm and off-peak is all other hours plus weekends and holidays. Other
4 optional residential TOU rates include Schedule DR-SES for SDG&E's solar customers,
5 which is a three part TOU rate that has a summer on-peak period of 11am to 6pm Monday
6 through Friday excluding holidays. SDG&E has five electric vehicle ("EV") TOU rates, one
7 whole house TOU rate and four individually metered electric vehicle charging rates.
8 SDG&E's EV-TOU2 schedule is a whole house three part TOU with the on-peak period
9 between noon to 6pm weekdays excluding holidays. There is no distinction for the on-peak
10 period between summer and winter. Schedule EV-TOU is a rate for separately metered EV
11 charging. The on-peak period is from noon to 8pm weekdays excluding holidays and has no
12 distinction for the on-peak period between summer and winter. There are three
13 experimental EV rates for separately billed EV charging that were created with the explicit
14 intent to conduct a pricing study for electric vehicles. These EV rates (Schedule EPEV-X,
15 Schedule EPEV-Y, and Schedule EPEV-Z) have an on-peak period from noon to 8pm all
16 days of the year, a "super" off peak period that encourages EV charging from midnight to
17 5am, and an off peak period from 8pm to midnight and from 5am to noon. A summary of
18 SDG&E's current TOU rate offerings is provided in the tables below:

³ SDG&E previously had TOU rates in 1979, but those rates are no longer offered. Schedule DR-TOU was made available in 1983; however, the first customer to actually go onto the rate was in 1989.

1

**Schedule
DR-TOU**

Season	Tier	On-Peak Noon - 6pm Weekdays (cents/kWh)	Off-peak All Other (cents/kWh)
Winter	Baseline	0.15	0.15
	101%-130% Baseline	0.16	0.16
	131%-200% Baseline	0.31	0.31
	200%+ Baseline	0.37	0.36
Summer	Baseline	0.17	0.15
	101%-130% Baseline	0.18	0.16
	131%-200% Baseline	0.36	0.33
	200%+ Baseline	0.47	0.36

2

3

**Schedule
DR-SES**

Season	TOU Name	TOU Hours	Rate (cents/kWh)
Winter	Semi-Peak	6am-6pm	0.21
	Off-Peak	6pm-6am	0.20
Summer	On-Peak	11am - 6pm	0.30
	Semi-Peak	All other	0.22
	Off-Peak	10pm-6am	0.20

4

1

Electric Vehicle Tariffs

Tariff	TOU Name	TOU Hours	Winter Weekday (cents/kWh)	Winter Weekend (cents/kWh)	Summer Weekday (cents/kWh)	Summer Weekend (cents/kWh)
EV-TOU2	On-Peak	Noon to 6pm	0.20	0.20	0.29	0.29
	Off-Peak	All Other	0.19	0.19	0.19	0.19
	Super Off-Peak	Midnight to 5am	0.17	0.17	0.17	0.17
EV-TOU	On-Peak	Noon to 8pm	0.20	0.20	0.29	0.29
	Off-Peak	All Other	0.19	0.19	0.19	0.19
	Super Off-Peak	Midnight to 5am	0.17	0.17	0.17	0.17
EPEV-X	On-Peak	Noon to 8pm	0.20	0.20	0.31	0.31
	Off-Peak	All Other	0.19	0.19	0.19	0.19
	Super Off-Peak	Midnight to 5am	0.16	0.16	0.15	0.15
EPEV-Y	On-Peak	Noon to 8pm	0.28	0.28	0.33	0.33
	Off-Peak	All Other	0.19	0.19	0.21	0.21
	Super Off-Peak	Midnight to 5am	0.09	0.09	0.09	0.09
EPEV-Z	On-Peak	Noon to 8pm	0.39	0.39	0.44	0.44
	Off-Peak	All Other	0.15	0.15	0.17	0.17
	Super Off-Peak	Midnight to 5am	0.08	0.08	0.08	0.08

2

3

4

5

6

7

8

SDG&E proposes to combine the best attributes of its TOU rate offerings so that it can prepare for and provide optimal default TOU rates in 2018 as well as optional TOU rates. One of the main purposes of this pilot is to gain insights into customer response to different TOU pricing structures while also providing customers with rate choices that benefit both the customer and SDG&E. SDG&E will apply various aspects of the TOU studies described in Section III below and utilize best practices from other TOU programs.

1 **III. TOU STUDIES**

2 **A. Phoenix, Arizona**

3 Although TOU rates for residential customers have been offered since the 1980’s in
4 the Phoenix area, recent TOU studies have been conducted at Salt River Project (“SRP”) and
5 Arizona Public Service (“APS”) which are relevant to SDG&E’s experimental TOU
6 proposal. Both utilities serve the Phoenix area, and have had TOU rates in place for many
7 years. High residential air conditioning loads contribute to peak demands, and TOU rates
8 have helped both utilities manage their peaks. Similarly, SDG&E’s peaks are also driven by
9 extremely warm temperatures and higher than normal residential air-conditioning use.

10 Both Arizona utilities have a significant proportion of their residential customers on
11 TOU for several years and both utilities consider their TOU rates to be successful. APS has
12 over 50% of its residential customers on TOU and SRP has over 20%. The original TOU
13 rate structures that were implemented in the 1980’s had long 12 hour on-peak periods.⁴ APS
14 still offers a 12 hour on-peak rate while SRP has moved to a seven hour on-peak period
15 (1pm to 8pm) for its longest TOU on peak option. Both utilities now have a variety of TOU
16 options ranging from 12 hours to 3 hours to help manage their peak loads. SRP’s on-peak to
17 off-peak rate differentials range from 3 to 1 for its seven hour TOU, up to 4.5 to 1, and their
18 EZ3 – 3 hour TOU rate– which offers three three-hour TOU on-peak periods that is targeted
19 to their larger users those that had at least 1,800 kWh a month. Coincident demand load
20 impacts from SRPs experimental TOU rate study were 11% for customers that moved from
21 its residential standard non TOU tiered rate (E23) to the seven hour TOU rate (E26), and

⁴ Oral conversation with APS on January 16, 2014.

1 large use customers that moved from either E23 or E26 to the three hour EZ3 rates had 25%
2 impacts.⁵

3 **B. Sacramento Municipal Utility District (“SMUD”)**

4 SMUD recently presented first year results of their “Smart Pricing Options Pilot.”
5 SMUD utilized two recruiting strategies, an “opt in” and a “default” strategy. Specifically,
6 they used a randomized control trial design (recruit and delay) as well as a randomized
7 default encouragement design. Because SMUD adhered to strict experimental design, the
8 insights gained from its pilot can be applied to all residential customers within SMUD’s
9 service territory. One of the important features of SMUD’s pilot was that a representative
10 sample of residential customers was randomly selected and defaulted onto one of three rates
11 – which included both TOU and Critical Peak Pricing (“CPP”) rate options. The design
12 allowed SMUD to accurately estimate what the “opt out” rates would look like if all of its
13 customers were defaulted onto any of the three rate options. Additionally, SMUD’s default
14 treatment groups display extremely high enrollment rates, ranging from a low of almost 93%
15 for the TOU-CPP rate to a high of almost 98% for the TOU rate⁶.

16 **C. Ontario Power Authority (“OPA”)**

17 OPA is one of the only regions where full scale Smart Meter deployment was
18 immediately followed by TOU rates for all its residential customers.⁷ First year results
19 indicate that residential customers showed a consistent pattern of load shifting behavior
20 across the Local Distribution Companies (“LDCs”) analyzed. Generally, residential

⁵ Effects of Three-Hour On-Peak Time-of-Use Plan on Residential Demand during Hot Phoenix Summers, Loren Kirkeide, The Electricity Journal, May 2012, at p. 11.

⁶ SMUD Smart Pricing Option Pilot Interim Load Impact Evaluation, Freeman, Sullivan & Co., September 19, 2013, at pp. 1-10.

⁷ Impact Evaluation of Ontario’s Time-of-Use Rates: First Year Analysis, Brattle Group, November 26, 2013, Executive Summary, at p. iv.

1 customers shifted energy usage from peak periods to off-peak periods. Overall, on-peak
2 demand impacts ranged from 1.3% to 5.6%, and summer on-peak impacts ranged from 2.6%
3 to 5.7% depending on LDC.⁸ OPA’s on-peak reductions in usage are consistent with other
4 TOU pilots that have been conducted in the U.S. in recent years. OPA has commissioned a
5 three-year study and results for both year 2 and year 3 will build on the foundation of the
6 first year study.

7 **D. Statewide Pricing Pilot (“SPP”)**

8 SPP was conducted largely to the response of the 2000-2001 energy crisis.
9 California had little ability to react to California’s Power Exchange price spikes as there
10 were virtually no dynamic rates implemented at the time. SDG&E participated in the pilot
11 along with PG&E and SCE. SPP conducted residential pricing experiments for critical peak
12 pricing rates and TOU rates throughout California. One of the tracks studied was a TOU
13 only rate where the on-peak to off-peak price differential was about 2 to 1. The TOU track
14 looked at one summer on-peak period that was from 2pm -7pm. First year results showed
15 that modest reductions of 5.9% were seen during on-peak period during the “inner” summer
16 months (July, August and September). Those results also closely matched the TOU effect of
17 the dynamic rate of CPP-F track. However, during the second year of the study those peak
18 period impacts were close to zero and the authors warn of small sample sizes and being able
19 to draw conclusions from the TOU track itself.⁹ In 2003, SPP was the best pricing
20 experiment conducted; however, it is now over 10 years old and more information as well as

⁸ *Id.*, at p. vi.

⁹ Impact Evaluation of the California Statewide Pricing Pilot, Charles River Associates, March 16, 2005, at pp. 8-10.

1 updated information is needed in order for SDG&E to make a successful transition into
2 default TOU for its residential customers.

3 **IV. SDG&E’S EXPERIMENTAL TOU PILOT PROPOSAL**

4 As further explained in the direct testimony of SDG&E witness Chris Yunker,
5 SDG&E’s goal is consistent with ED’s in that “TOU time periods and rate design need to
6 carefully developed in the context of GRC’s, or comparable rate setting proceedings.”¹⁰ To
7 accomplish this, SDG&E needs to answer several important research questions that can be
8 addressed in an experimental TOU pilot. Some of these questions are similar to those asked
9 in the ED’s Staff Proposal. Such questions include the following:

- 10 1. Are there statistically significant reductions in energy use at time of
11 SDG&E’s monthly system peaks?
- 12 2. Are there statistically significant load reductions in monthly on-peak energy
13 use?
- 14 3. Are there statically significant load increases in monthly semi-peak and off-
15 peak energy use?
- 16 4. How do the changes in energy use differ between the three TOU rates?
- 17 5. For the customers enrolled in the four hour on-peak time of use rates are
18 there statistically significant increases in energy use during the other three
19 hours that are part of the on-peak period of the seven-hour TOU rate?
- 20 6. Do the combined shorter TOU rate options provide more on-peak load
21 reduction than the seven hour rate option?

¹⁰ ED Staff Proposal, at p. 16.

1 7. Is there an increase in energy usage immediately after the end of the on-peak
2 period and is the increase in energy snapback higher in the seven-hour TOU
3 or the two four-hour TOU rates?

4 8. What are the opt-out rates and how do the opt-out rates differ between the
5 three TOU rates?

6 It is important that SDG&E understands how a default TOU program will impact
7 peak hours during normal system conditions as well as peak load conditions. Successful
8 implementation of on-peak TOU rates will promote lasting load shifts and improve
9 SDG&E's overall system load factor. The success of long-term TOU rates implemented in
10 2018 will depend on SDG&E's ability to understand customer opt-out rates and associated
11 load shifts prior to 2018 implementation of default TOU. SDG&E plans to examine its
12 proposed optional seven hour summer on-peak period along with two four-hour on-peak
13 windows within the seven hour summer on-peak period.

14 SDG&E proposes to conduct a pilot where it will recruit a representative sample of
15 residential customers to participate in the TOU pilot. Before enrolling, customers will be
16 informed that as part of the pilot they will be randomly assigned to one of three TOU rates.
17 Once enrolled, each participant will be randomly assigned to one of the three TOU rates.
18 This method will ensure that the customer response to the different time of use rates can be
19 compared without complications of selection bias. While SDG&E's proposed opt-in pilot
20 design is not SDG&E's first preference, a default TOU pilot is not allowable under
21

1 AB 327.¹¹ Nonetheless, SDG&E believes that there are significant benefits in conducting an
2 experimental TOU pilot. The pilot will provide important quantitative information about the
3 difference in customer response to on-peak time of use periods of different lengths that will
4 inform future rate design. SDG&E plans to leverage its opt-in study findings with other
5 utilities' opt-in studies such as SMUD's, SRP's, Ontario Power Authority's to assess how a
6 default TOU might reduce overall consumption during SDG&E's peak periods.

7 SDG&E plans to utilize residential smart meter interval data in the evaluation of this
8 pilot. Nearly 99% of SDG&E's residential customers are on Schedule DR and Schedule DR-
9 CARE and not on a TOU rate. SDG&E anticipates that the hourly and subsequent 15
10 minute data will be extremely useful in gaining insights in changes or reductions to
11 customer usage patterns on the experimental TOU rates. The fact that non-TOU pre-
12 treatment interval data for nearly all of SDG&E's residential population is available is
13 unique. SDG&E expects that this experimental TOU study will be able to use pre-treatment
14 smart meter data for nearly all of its residential customers. This is truly a special opportunity
15 in that SDG&E will have excellent baseline information for those customers defaulted into
16 the randomized experimental TOU pilot. SDG&E also may compare the energy use of pilot
17 participants to a control group of customers who were not defaulted onto the rate in order to
18 estimate the load impacts for the TOU rates.

19 SDG&E requires an aggressive schedule to implement its experimental TOU rates so
20 that the evaluation of its experimental pilot can be completed in time to inform its TOU
21 proposals. Costs associated with implementing SDG&E's proposed TOU pilot program will

¹¹ AB327 "The commission shall not establish a mandatory or default time-variant pricing tariff for any residential customer except as authorized in subdivision (c). (c) Beginning January 1, 2018, the commission may require or authorize an electrical corporation to employ default time-of-use pricing for residential customers"...

1 be provided in SDG&E's March 21, 2014 filing in this docket, where SDG&E will put forth
2 specific proposals for its experimental TOU pilot along with timelines.

3

4 This concludes my testimony.

5

1 **V. QUALIFICATIONS**

2 My name is Leslie Willoughby. My business address is 8306 Century Park Court,
3 San Diego, California 92123. I am employed by San Diego Gas & Electric Company
4 (“SDG&E”) as Electric Load Analysis Manager in the Strategic Analysis and Pricing
5 Department. In my current position, I am responsible for managing and conducting load and
6 energy research analysis.

7 I attended San Diego State University in San Diego, CA, where I graduated with a
8 Bachelor of Science in Business Administration in 1983. I continued to attend San Diego
9 State University where I graduated with an MA in Economics in 1989. In 1990, I was
10 employed by SDG&E to work in the Load Research Section of the Marketing Department as
11 an Associate Economic Analyst. Over the past 20 years I have held positions of increasing
12 responsibility within the company that have included Load and Energy Research.

13 I have previously testified before the Commission.