**Appendix Volume II - 2016 Survey Documents**

**Final Research Plan**

Final Research Plan

# Opt-in TOU Pilot
# Survey Research Plan

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Funded By:

Pacific Gas & Electric
Southern California Edison
San Diego Gas & Electric

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# Introduction

This document provides the research plan for the survey design, implementation, analysis and reporting for the opt-in Time of Use (TOU) pilots for Southern California Edison (SCE), San Diego Gas and Electric (SDG&E) and Pacific Gas and Electric (PG&E) – known collectively as the opt-in TOU pilot – henceforth "opt-in pilot". The survey results, coupled with the impact evaluation of the pilot, will inform the 2018 Default Pilot and eventual roll-out of default TOU rates across California.

The 2016 and 2017 opt-in pilot was required by the CPUC July 2015 decision D15-07-001 in the Residential Rate Reform OIR (R12-06-013). A TOU Pilot working group was formed to design the opt-in pilot with assistance from Nexant who documented the plan in the December 2015 report "Time-of-Use Pricing Opt-in Pilot Plan". The three IOUs then filed advice filings with the IOU specific detailed plans which were adopted, as modified, in Resolutions E-4762(PG&E), E-4761(SCE), and E-4769(SDG&E). The resolutions describe expected deliverables of the opt-in pilot, and are the basis of this research plan.

During May and June of 2016, the research team worked with the California Public Utilities Commission (CPUC), the individual Investor Owned Utilities (IOUs), and the TOU Working Group to develop a list of research questions for the pilot survey. The multifaceted needs of this pilot present challenges to developing a honed list of research questions. The goals of the opt-in pilot are to:

- Allow the IOUs and CPUC to identify the effects of different pilot TOU rates relative to the current tiered rate structure,
- Estimate load impacts for tested opt-in pilot rates,
- Assess the degree of hardship for some customers that may result from the opt-in pilot TOU rates – particularly on vulnerable populations in hot climate zones,
- Assess the effectiveness of the messaging and outreach, customer understanding, acceptance, and satisfaction of TOU rates, and
- Assess whether enabling technologies mitigate load impacts and increase satisfaction with TOU rates.

This research plan begins with a description of the survey research approach we will take to ensure high response rates, and our strategy for implementing a modular approach in survey implementation. The research plan also includes task-level details outlining the steps we will take to manage the project, design and implement the survey, and analyze and report the results. In the task-level sections, this plan outlines the data collection opportunities in this pilot and our high-level analytical approach, clearly identifying how we will collect the necessary data and then translate them into information that addresses research topics and questions.

This document describes the research plan for both the 2016 and 2017 surveys, but, out of immediate necessity, provides more specific details on the 2016 survey. In March 2017, we will revisit and update the research plan, as appropriate, to reflect any lessons learned during 2016. For the 2017 update, we will meet with the Project Coordination Group (PCG)[1] to review our suggested updates and collect feedback. We will make any necessary revisions and present the draft to the PCG. Once it is approved, we will present the updated Research Plan to the TOU Working Group and, after receiving their comments, make additional revisions as appropriate, and submit a final updated Research Plan.

1 The PCG is comprised of IOU and CPUC staff as described in the CPUC resolution: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M158/K887/158887328.docx

# Research Approach

We will use an email, mail, and phone (EMP) mixed-mode survey approach across all segments in the pilot. We use the EMP mixed-mode Tailored Design Method outlined by Dillman to achieve a high response rate from pilot participants.[2] In our experience, opt-in participants are more engaged with data collection efforts, and we anticipate a high response rate as estimated by mode and wave in **Figure 1**.

We will attempt a census for all pilot participants by including three modes: a mail/paper survey component, an email component, and a phone component. Figure 1 illustrates the strategy, as well as our assumptions regarding completion rates for each portion of the implementation. Those customers without email will receive an invitation letter, a postcard reminder, a mailed questionnaire, a follow-up postcard reminder, and phone calls; those customers with email address, either from the enrollment survey or from the IOU database, will receive an invitation letter, two email invitations, a mailed paper questionnaire, a follow-up postcard reminder, and phone calls (see Task 4 section below for more details). This approach is based on the Dillman Total Design Method and targets a census of pilot participants.

**Figure 1. Survey Implementation Strategy**

| | | Letter | | | | Reminder | | | | | | | Booklet | | | | Reminder | | | | Call | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Outreach Method** | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **…** | **40** |
| **Mail to Phone** | **Letter with link** | | | | 18% | | | | | | | | | | | | | | | | | | |
| | **Postcard reminder** | | | | | | | | | | | 27% | | | | | | | | | | | |
| | **Letter booklet** | | | | | | | | | | | | | | | 45% | | | | | | | |
| | **Postcard reminder** | | | | | | | | | | | | | | | | | | | 54% | | | |
| | **Call** | | | | | | | | | | | | | | | | | | | | | | 85% |

| | | Letter | | | | Email | | | Email | | | | Booklet | | | | Reminder | | | | Call | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Email to Mail to Phone** | **Letter with link** | | | | 18% | | | | | | | | | | | | | | | | | | |
| | **Email with link** | | | | | | | 35% | | | | | | | | | | | | | | | |
| | **Email with link** | | | | | | | | | | | 55% | | | | | | | | | | | |
| | **Letter booklet** | | | | | | | | | | | | | | | 73% | | | | | | | |
| | **Postcard reminder** | | | | | | | | | | | | | | | | | | | 82% | | | |
| | **Call** | | | | | | | | | | | | | | | | | | | | | | 85% |

1. The estimates of cumulative completes after each wave shown in **Figure 1** are derived from Messer and Dillman 2011,[3] which used internet and address based sampling with mail delivery with a general population. While we hope the assumed rates of completion can be improved through our planned approach to inviting potential respondents, these rates provide a conservative estimate so that the CPUC and IOUs can be confident of a predicted maximum cost for the survey. Since the IOUs need a census for all climates, we have designed our approach to

2 Dillman, Don A., Smyth, Jolene D., Christian, Leah Melani. 2014. Internet, Phone, Mail and Mixed-Mode Surveys: The Tailored Design Method, 4th edition. John Wiley: Hoboken, NJ

3 "Surveying the General Public Over the Internet Using Addressed-Based Sampling and Mail Contact Procedures." Messer, B. L., and D. A. Dillman. 2011. Public Opinion Quarterly, 75 (3): 429-57.

maximize response rates, and are assuming a near-85% response rate (after 5 phone calls) for the census approach. We have staggered the planned launch dates to enable each respondent to receive the survey on approximately the same date for each mode (letter or email) and during each wave (letter, reminder, booklet, reminder, call). This is important to maintain consistency of survey engagement across modes for external validity.

The use of three modes – mail, web, and phone - will increase the likelihood of reaching all households, but also will lengthen the overall time to implement the survey. We now anticipate slightly less than two months, at about 40 days, for full implementation, with up to 5 phone follow-ups. We estimate we will need between two and three weeks for phone follow-ups, which allows time to randomize the call backs to cover weekend/weekday and daytime/evening times. By rolling the survey out October 1, 2016, data collection may extend into the 2016 holiday season. We will attempt to complete the bulk of our data collection prior to November 2016. However, with the upcoming presidential elections in November 2016, we anticipate lower response rates in November, and, in response, have increased the phone follow-up time period to 20 days to ensure high response rates.

## Use of Survey Modules to Maximize Data Collection

While we will attempt a census of all pilot participants, we do not necessarily have to send one version of the survey to all participants. The complexity of the pilot design and the required insights from the pilot has led the TOU Working Group to identify a larger set of research questions than can be answered within one 20-minute survey.[4] Yet, fundamentally the survey must assess the:

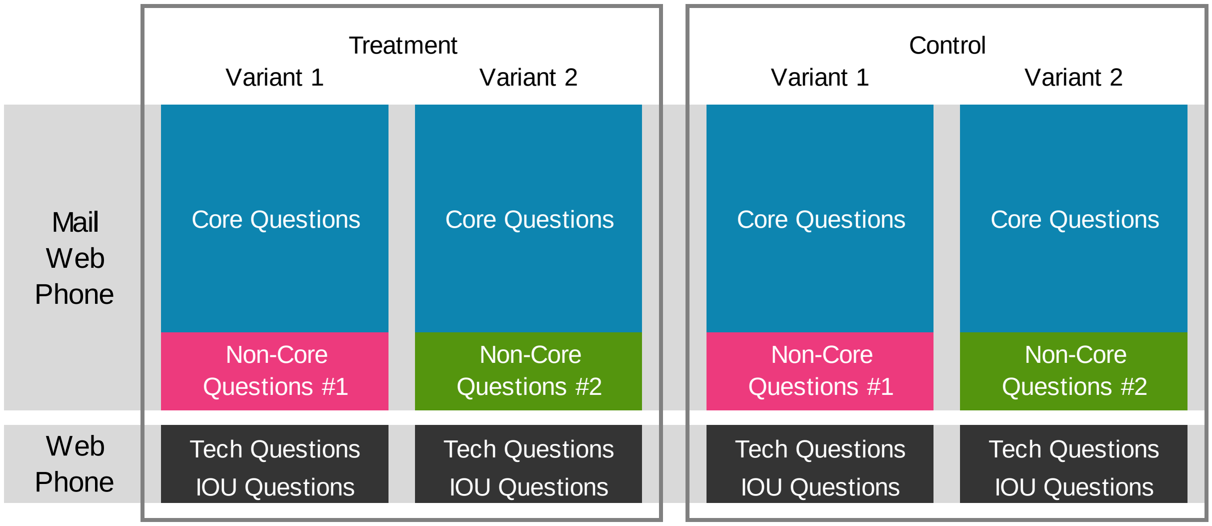
- Degree of hardship caused by TOU rates relative to tiered rates and identify key population segments most affected by the rate changes
- Level of customer understanding of TOU rates and reasons for them
- Effectiveness of the messaging and outreach used during the pilot, and
- Level of satisfaction customers have with the TOU rates

The survey, therefore, must contain a set of core questions to directly address the list above, yet there are many additional topics Working Group members identified as high-priority research topics. To balance these needs, we will use a modular survey approach where all participants will receive the same set of core questions, but half will receive one set of non-core questions, while the other half will receive a different set of non-core questions (as shown in **Figure 2**). We also anticipate creating versions of the survey for control versus treatment participants that will exclude TOU-specific questions from the control group survey. This will result in a total of four survey variants for the 2016 survey. Half of the opt-in pilot participants will be randomly assigned to receive non-core module 1 while the other half will be assigned to receive non-core

4 See Task 3 for more detail on our reasoning for a 20-minute survey.

module 2 (**Figure 2**). In the web and phone surveys, we will ask one or two IOU-dependent survey questions specific to messaging and outreach, technology, alert, and application use.

**Figure 2. Schematic to Illustrate Differences between Survey Variants using Modules**




2. The opt-in pilot is a randomized control trial (RCT) with a control group that does not experience a TOU rate change. All California IOUs, however, are implementing rate changes over the 2016 summer. This coincidental rate change will allow us to ask many of the same questions - about changes in rate structure, actions taken to save energy, and satisfaction with IOUs - to all pilot participants, including those in the control condition. Questions specific to TOU rates will be excluded from the control condition surveys.

# Research Plan Task Detail

This section details five tasks to design, implement and analyze the opt-in TOU pilot survey research.

## Task 1: Manage Project and Update Research Plan

### Subtask 1.1: Manage Project

*Project Management.* Drs. Peters and Dunn will be actively involved in the project from its inception. Dr. Peters will be available to the project team on an as-needed basis, and will be involved directly in the review of survey instruments and the development of conclusions and recommendations.

Dr. Dunn will work with project team members to ensure that they understand the project and are able to deliver the project in a timely and effective manner. Dr. Dunn will design and oversee the research; schedule milestone calls to discuss the project; hold regular internal meetings addressing the activities underway; and prepare monthly reports, to be delivered by the 10th day of each month, documenting project activities and any questions that need attention. We will coordinate with Nexant to provide interim reports in March and October 2017.

*Project Coordination Group Meetings.* Research Into Action staff will attend biweekly and ad-hoc PCG meetings. In these meetings we will present our approach to various aspects of the current survey research, including the research and sampling plans, high-level feedback on the survey guide, analysis plans, and survey findings. We will incorporate feedback from the PCG meetings into our design and analysis plans.

*TOU Workgroup Meetings*. Research Into Action staff will attend the following six TOU working group meetings in person to present our research design and results. We will listen to key issues raised during the working group meetings and incorporate these into our design and analysis plans.

1. Kick off meeting and research plan review
2. Draft survey instrument for year 1
3. Interim results from year 1
4. Updated survey instrument and sampling plan for year 2
5. Interim results from years 1 and 2
6. Final results presentation

### Subtask 1.2: Update Research Plan

In March 2017, we will revisit and update this research plan, as appropriate, to reflect any lessons learned during 2016. We will meet with the PCG to review our suggested updates and collect feedback. We will make the revisions and present the draft to the PCG. When it is approved, we will present the updated Research Plan to the TOU Working Group and, after receiving their comments, make additional revisions and submit a final updated Research Plan.

**Table 1** provides a list of key deliverables for Task 1 and the expected due date.

**Table 1. Task 1 Deliverables**

| Task | Deliverables | Due Date |
|---|---|---|
| 1 | Ongoing project management | Ongoing |
| 1 | Submit draft 2016 research plan to TOU Working Group | June 2016 |
| 1 | Integrate input into revised research plan, as appropriate | July 2016 |
| 1 | Update research plan for 2017 data collection and analysis, for review by the PCG | March 2017 |
| 1 | Conduct updated research plan review meeting with stakeholders | March 2017 |
| 1 | Integrate input into revised research plan, as appropriate | April 2017 |

## Task 2: Sampling Plan

Each survey (both 2016 and 2017 surveys) will attempt a census of all pilot participants irrespective of climate zone (about 57,500). Figure 1 earlier illustrates the implementation approach. We anticipate an 85% response rate using this approach. **Table 2** shows the estimated number of completes and response rates by mode (letter/email invitation, postcard reminder, mail booklet, and phone call).

**Table 2** displays our assumed response rates. These rates are based on prior survey response rates[5]. Unfortunately, implementation of the 2016 survey coincides with the 2016 national presidential election. Recent election cycles have tended to lower response rates below the rates shown in Table 2 due to survey fatigue. To manage survey implementation costs, if response rates are not met, we will sample non-responders such that a subset of non-responders receive the mailed booklet or are called. This approach maintains a census attempt – since all pilot participants will be contacted at least three times, but mitigates costs if the presidential election causes a reduction in response rates.

5 "Surveying the General Public Over the Internet Using Addressed-Based Sampling and Mail Contact Procedures." Messer, B. L., and D. A. Dillman. 2011. Public Opinion Quarterly, 75 (3): 429-57.

**Table 2. Estimated Survey Completes by Mode Assuming an 85% Response Rate and 60% Email Penetration (estimate as of 6/16/2016)**

| | |
|---|---|
| Total pilot population | **57,648** |

| | |
|---|---|
| Total starting with mail → | 23,059 |

| Mode | Estimates by Wave | | Cumulative Estimates | |
|---|---|---|---|---|
| | Response Rate | Number of Completes | Response Rate | Number of Completes |
| Letter invite | 18% | 4,151 | 18% | 4,151 |
| Postcard reminder | 9% | 2,076 | 27% | 6,227 |
| Mail booklet | 18% | 4,151 | 45% | 10,378 |
| Postcard reminder | 9% | 2,076 | 54% | 12,454 |
| Phone call | 31% | 7,149 | 85% | 19,603 |

| | |
|---|---|
| Total starting with email → | 34,589 |

| Mode | Estimates by Wave | | Cumulative Estimates | |
|---|---|---|---|---|
| | Response Rate | Number of Completes | Response Rate | Number of Completes |
| Letter + email invite | 35% | 12,106 | 35% | 12,106 |
| 2nd email invite | 20% | 6,918 | 55% | 19,024 |
| Mail booklet | 18% | 6,226 | 73% | 25,250 |
| Postcard reminder | 9% | 3,113 | 82% | 28,363 |
| Phone call | 3% | 1,038 | 85% | 29,401 |

**Survey Completes broken down by…**

| Invitation Mode | Count |
|---|---|
| Email | 19,024 |
| Mail invite | 21,793 |
| Phone | 8,187 |
| Total | 49,004 |

| Completion Mode | Count |
|---|---|
| Web | 30,440 |
| Booklet | 10,377 |
| Phone | 8,187 |
| Total | 49,004 |

Number of completes are rounded to the largest whole number.

3. Since we will attempt a census using a modular survey approach, the sampling plan will simply provide updated counts by cell for each IOU pilot. To implement two survey variants per condition (treatment and control), we will randomly assign half of all pilot participants into one of two groups (recipients of non-core module one and recipients of non-core module two).

4. Table 3. Current Enrollment for PG&E

| 5. Zone | Climate | Segment | Rate 1 | Rate 2 | Rate 3 | Control | Total |
|---|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Hot | CARE / FERA | 2,268 | 683 | 682 | 2,283 | 5,916 |
| | Non-CARE / FERA | 1,792 | 641 | 644 | 1,807 | 4,884 |
| | Total | 4,060 | 1,324 | 1,326 | 4,090 | 10,800 |
| Moderate | CARE / FERA | 660 | 663 | 660 | 662 | 2,645 |
| | Non-CARE / FERA | 593 | 593 | 592 | 592 | 2,370 |
| | Total | 1,253 | 1,256 | 1,252 | 1,254 | 5,015 |
| Cool | CARE / FERA | 631 | 632 | 632 | 633 | 2,528 |
| | Non-CARE / FERA | 644 | 639 | 640 | 643 | 2,566 |
| | Total | 1,275 | 1,271 | 1,272 | 1,276 | 5,094 |
| All | CARE / FERA | 3,559 | 1,978 | 1,974 | 3,578 | 11,089 |
| | Non-CARE / FERA | 3,029 | 1,873 | 1,876 | 3,042 | 9,820 |
| | Total | 6,588 | 3,851 | 3,850 | 6,620 | 20,909 |

6. Table 4 through **Table 5** show the current enrollment, as of June 16, 2016, by climate zone and CARE/FERA status for each IOU. The sampling plan will include updated numbers and show the total number who will receive non-core module one versus non-core module two.

**Table 3. Current Enrollment for PG&E**

| Climate Zone | Segment | Rate 1 | Rate 2 | Rate 3 | Control | Total |
|---|---|---|---|---|---|---|
| Hot | CARE / FERA | 2,268 | 683 | 682 | 2,283 | 5,916 |
| | Non-CARE / FERA | 1,792 | 641 | 644 | 1,807 | 4,884 |
| | Total | 4,060 | 1,324 | 1,326 | 4,090 | 10,800 |
| Moderate | CARE / FERA | 660 | 663 | 660 | 662 | 2,645 |
| | Non-CARE / FERA | 593 | 593 | 592 | 592 | 2,370 |
| | Total | 1,253 | 1,256 | 1,252 | 1,254 | 5,015 |
| Cool | CARE / FERA | 631 | 632 | 632 | 633 | 2,528 |
| | Non-CARE / FERA | 644 | 639 | 640 | 643 | 2,566 |
| | Total | 1,275 | 1,271 | 1,272 | 1,276 | 5,094 |
| All | CARE / FERA | 3,559 | 1,978 | 1,974 | 3,578 | 11,089 |
| | Non-CARE / FERA | 3,029 | 1,873 | 1,876 | 3,042 | 9,820 |
| | Total | 6,588 | 3,851 | 3,850 | 6,620 | 20,909 |

**Table 4. Current Enrollment for SCE Pilot**

| Climate Zone | Segment | Rate 1 | Rate 2 | Rate 3 | Control | Total |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Hot | CARE / FERA | 734 | 1,863 | 607 | 1,845 | 5,049 |
| | Non-CARE / FERA | 677 | 1,514 | 615 | 1,536 | 4,342 |
| | Total | 1,411 | 3,377 | 1,222 | 3,381 | 9,391 |
| Moderate | CARE / FERA | 730 | 730 | 616 | 739 | 2,815 |
| | Non-CARE / FERA | 662 | 660 | 620 | 658 | 2,600 |
| | Total | 1,392 | 1,390 | 1,236 | 1,397 | 5,415 |
| Cool | CARE / FERA | 735 | 737 | 609 | 745 | 2,826 |
| | Non-CARE / FERA | 740 | 743 | 615 | 741 | 2,839 |
| | Total | 1,475 | 1,480 | 1,224 | 1,486 | 5,665 |
| All | CARE / FERA | 2,199 | 3,330 | 1,832 | 3,329 | 10,690 |
| | Non-CARE / FERA | 2,079 | 2,917 | 1,850 | 2,935 | 9,781 |
| | Technology | 334 | | | 336 | 670 |
| | Total | 4,612 | 6,247 | 3,682 | 6,600 | 21,141 |

**Table 5. Current Enrollment for SDG&E Pilot**[6]

| Climate Zone | Segment | Rate 1 | Rate 2 | Rate 3 | Control | Total |
|---|---|---|---|---|---|---|
| Hot | CARE / FERA | | 89 | | | 89 |
| | Non-CARE / FERA | | 337 | | | 337 |
| | Total | | 426 | | | 426 |
| Moderate | CARE/FERA | 952 | 1,635 | | 963 | 3,550 |
| | Non-CARE/FERA | 1,052 | 1,795 | | 1,055 | 3,902 |
| | Total | 2,004 | 3,430 | | 2,018 | 7,452 |
| Cool | CARE/FERA | 1,011 | 1,730 | | 1,013 | 3,754 |
| | Non-CARE/FERA | 1,068 | 1,821 | | 1,077 | 3,966 |
| | Total | 2,079 | 3,551 | | 2,090 | 7,720 |
| All | CARE / FERA | 1,963 | 3,454 | | 1,976 | 7,393 |
| | Non-CARE / FERA | 2,120 | 3,953 | | 2,132 | 8,205 |
| | Total | 4,083 | 7,407 | | 4,108 | 15,598 |

6 Rate 3 enrollment is currently taking place. SDG&E anticipates 50 to 200 participants for Rate 3.

7. Once we obtain customer-level enrollment data from each IOU, we will submit the draft sampling plan to the PCG for review and comment. Since we are attempting a census, this sampling plan will provide updated population tables (Tables 3 through 5) as well as an updated sampling table (**Table 2**) with actual email penetration counts rather than the assumed 60%. We will address the comments and prepare a presentation of the sampling plan for the TOU Working Group. We will then proceed to develop the sampling database for implementation of the 2016 survey.

After we have updated the research plan in March 2017, we will review the sampling plan with the PCG and update the sampling plan to reflect changes in the research plan and in the population of participants. We will review the updated sampling plan with the TOU Working Group and integrate any additional suggestions. We will proceed to develop the sampling database for the 2017 survey.

**Table 6** provides a list of key deliverables for Task 2 and the expected due date.

**Table 6. Task 2 Deliverables**

| TASK | DELIVERABLES | DUE DATE |
|---|---|---|
| 2 | Data request to IOUs for relevant sampling data | Submitted June 2016 |
| 2 | Draft sampling plan for 2016 survey | August 2016 |
| 2 | Deliver a revised sampling plan to TOU Working Group | August 2016 |
| 2 | Develop sample database for October 2016 survey deployment | September 2016 |
| 2 | Conduct updated sampling plan review meeting with TOU Working Group, if necessary | April 2017 |
| 2 | Integrate input from TOU Working Group into revised sampling plan as appropriate | May 2017 |
| 2 | Develop sample database for 2017 survey deployment | June 2017 |

## Task 3: Develop Survey

The survey development process will be iterative with the PCG and TOU Working Group.

Step 1: Prepare a matrix of the topic areas and associated research questions, then submit the matrix to the PCG for review, comment, and approval.

Step 2: Draft the data collection instrument and review it internally for general quality control.

Step 3: Submit the draft instrument for review and comment.

Step 4: Finalize the instrument, sometimes with two or three iterations. Finalize instrument for each data collection mode (email, mail, and phone).

Step 5: Prepare the instrument for implementation in each mode; working with our subcontractor, we will set up the web, mail, and phone versions of the survey for implementation.

Step 6: Conduct pre-launch testing internally for each mode to ensure the instrument is ready to launch.

Step 7: Since we are attempting a census, we will be unable to pre-test the survey with pilot participants. As an alternative, we will conduct phone, mail, and web pre-tests with friends and family and integrate a soft launch into the survey. For the soft launch, we will call five to ten contacts via phone. If we identify any problems with responses or skip logic, we will modify the instrument across modes to address these problems.

Step 8: When the pretesting is complete, full fielding of the survey occurs.

Our internal survey design team follows our proprietary Survey Data Collection Process Guide, which covers all aspects of survey design and implementation, starting from the research questions, progressing through a discussion of the advantages and disadvantages of the different question types (such as closed-ended, multiple choice, and ranking) and tips for effective phrasing, through testing and deployment, data cleaning, and archiving. We follow the Dillman Tailored Design Method (discussed above). Our internal design team reviews all of our surveys and assesses them against a 38-item QC checklist.

## Identifying Topic Areas and Research Questions

Following meetings with the PCG and the Working Group, and discussions with the CPUC, CAISO and each IOU, we have compiled a set of 118 detailed research questions across the 11 topic areas. These 118 research questions are very detailed and many overlap with each other. As a result, we grouped overlapping research questions and collapsed them into a final set of 29 research questions. Table 7 displays the research topics and the condensed research questions. See Appendix A for the full list of detailed research questions associated with the condensed research questions.

**Table 7. Research Topics and Condensed Research Questions**

| Topic | Research Questions |
|---|---|
| General financial hardship | Which customers experience issues with paying their bills (any bill and/or electric bill)? |
| Hardship with TOU rates | Do TOU rates cause or enhance economic, or lifestyle hardship? |
| | How do customers' perceptions of their energy bills under TOU differ by pilot group and what is considered too much (and why)? |
| | What are customers' "breaking points" under the TOU rates, or the type of rate plan under which they are unable to do or keep track of? |
| Demographics | What are the demographic and lifestyle characteristics of customers, and do these characteristics predict self-reported hardship, level of curtailment, satisfaction and acceptance of rates, and ability to take action? |
| Household characteristics | What household/structural characteristics correlate with customers' ability to change behavior and/or saving energy? |
| | Do enabling technologies (e.g. smart thermostat) help customers to change behavior and/or save energy? |
| Satisfaction with rate | Are customers satisfied overall and with various aspects of their TOU rate plan, and why/why not? Does satisfaction differ by RCT group?? |
| | What are customers' perceptions of their utility? |
| | Why do customers opt-out or leave the pilot? |
| Assessment of messaging and outreach | Did customers receive, read, and understand materials? |
| | What is the relevance of the materials and their self-reported impact on customer's actions/behaviors? |
| | What is the frequency and mode of communication of the materials preferred by customers? |
| Understanding of how rates work | Are customers aware they are in the opt-in pilot and that they were not on TOU rates before? |
| | Do customers understand TOU rates, generally what peak periods are, and why they are designed this way? |
| | Do customers perceive a benefit from TOU rates and do customers understand how they can be successful in managing their bill? |
| | What are customers' suggestions for improvements? |
| Actions taken | How easy or difficult is it for customers to take action to save energy or shift load? |
| | What are the barriers to taking action? |
| | Do customers show persistence of taking actions? |
| | What are the changes in customer behavior during the pilot, and cause(s) of these changes? Are customers changing how they |

| Topic | Research Questions |
|---|---|
| | use appliances and technology because of the rate? |
| General attitudes and awareness towards EE and DR | What are customers’ attitudes and behaviors towards EE and DR? |
| Website / Tools/ App use | What kind of technology are customers interested in as a result of the pilot? |
| | What is customers' awareness and frequency of use of the apps and websites? |
| | Are customers satisfied with the app, alerts, and are they useful/valuable? |
| | What are the best features of and any improvements that should be made to the app(s)/alerts? |
| | What is the level of awareness, uptake, and interest in smart thermostats? |
| | Are there differences in actions taken, satisfaction, or understanding of rates by thermostat/app users vs. non-users? |
| Motivations for participating in Pilot | What are customers' motivation(s) for opting-in and participating in the pilot? |

## Identifying When Research Questions will be Addressed

As described in this research plan, we will field two surveys during the opt-in TOU pilot, one in October 2016 (2016 survey) and one in late July 2017 (2017 survey).[7] As a separate scope of work, each IOU will also gather qualitative data, and un-enrollment data from pilot drop-outs. Furthermore, we anticipate that data will be collected during the 2018 default pilot. Both the 2016 and 2017 surveys will address many of the research questions identified by the TOU Working Group but they cannot address them all.

In **Table 8**, we make specific assignments to non-core modules to ensure we group related questions together, and to enable more efficient analysis of survey results.[8] We also make recommendations for future research –qualitative or default pilot survey – to indicate where future research is needed to fully answer the research question. Our recommendations on qualitative and other future research, such as the default pilot survey, are recommendations only and are not meant to be directive. The CPUC and IOUs may have different objectives and research questions to answer in both future qualitative research and the default pilot survey.

7 Final timing for the 2017 survey may change depending on the needs of IOUs to support their default pilot filings.

8 These assignments may change as we develop the survey.

**Table 8. Research Topics and Questions with Recommended Data Collection Assignments**

| Topic | Research Questions | Data Source | | | | |
|---|---|---|---|---|---|---|
| | | 2016 Core | 2016 Non-Core 1 | 2016 Non-Core 2 | Qualitative | Other |
| General financial hardship | Which customers experience issues with paying their bills (any bill and/or electric bill)? | X | | | X | Assess change in 2017 Survey |
| Hardship with TOU rates | Do TOU rates cause or enhance economic, or lifestyle-hardship? | X | | | X | 2017 Survey |
| | How do customers' perceptions of their energy bills under TOU differ by pilot group (treatment and control) and what is considered too much (and why)? | | X | | X | 2017 Survey |
| | What are customers' "breaking points" under the TOU rates, or the type of rate plan under which they are unable to do or keep track of? | | | | X | |
| Demographics | What are the demographic and lifestyle characteristics of customers, and do these characteristics predict self-reported hardship, level of curtailment, satisfaction and acceptance of rates, and ability to take action? | X | | | | Different set in 2017 survey |
| Household characteristics | What household/structural characteristics correlate with customers' ability to change behavior and/or saving energy? | X | | | X | Different set in 2017 survey |
| | Do enabling technologies (e.g. smart thermostat) help customers to change behavior and/or save energy? | | | | | Answered analytically |
| Satisfaction with rate | Are customers satisfied overall and with various aspects of their TOU rate plan? Does satisfaction differ by RCT group? | X | | | X | 2017 Survey |
| | What are customers' perceptions of their utility? | | | X | | 2017 Survey |
| | Why do customers opt-out or leave the pilot? | | | | | Unenrollment Survey Answered analytically |
| Assessment of messaging and outreach | Did customers receive, read, and understand materials? | X | | | | |
| | What is the relevance of the materials and their self-reported impact on customer's actions/behaviors? | | X | | | 2017 Survey |
| | What is the frequency and mode of communication of the | | | | | 2017 Survey |

| Topic | Research Questions | Data Source | | | | |
|---|---|---|---|---|---|---|
| | | 2016 Core | 2016 Non-Core 1 | 2016 Non-Core 2 | Qualitative | Other |
| | materials preferred by customers? | | | | | Default Pilot |
| Understanding of how rates work | Are customers aware they are in the pilot and that they were not on TOU rates before? | X | | | | |
| | Do customers understand TOU rates, generally what peak periods are, and why they are designed this way? | X | | | | 2017 Survey |
| | Do customers perceive a benefit from TOU rates and do customers understand how they can be successful in managing their bill? | X | | | | 2017 Survey |
| | What are customers' suggestions for improvements? | | | | X | Default Pilot |
| Actions taken | How easy or difficult is it for customers to take action to save energy or shift load? | X | | | | 2017 Survey |
| | What are the barriers to taking action? | | | X | X | |
| | Do customers show persistence of taking actions? | X | | | | 2017 Survey |
| | What are the changes in customer behavior during the pilot, and cause(s) of these changes? Are customers changing how they use appliances and technology because of the rate? | | | X | X | 2017 Survey |
| General attitudes and awareness towards EE and DR | What are customers' attitudes and behaviors towards EE and DR? | X | | | | 2017 Survey |
| Website / Tools/ App use | What kind of technology are customers interested in as a result of the pilot? | | X | | X | Default |
| | What is customers' awareness and frequency of use of the apps and websites? | Web/phone | | | | Answered analytically Default |
| | Are customers satisfied with the app, alerts, and are they useful/valuable? | Web/Phone | | | X | |
| | What are the best features of and any improvements that should be made to the app(s)/alerts? | Web/Phone | | | X | |
| | What is the level of awareness, uptake, and interest in smart | | X | | | |

| Topic | Research Questions | Data Source | | | | |
|---|---|---|---|---|---|---|
| | | 2016 Core | 2016 Non-Core 1 | 2016 Non-Core 2 | Qualitative | Other |
| | thermostats? | | | | | |
| | Are there differences in actions taken, satisfaction, or understanding of rates by thermostat/app users vs. non-users? | | | | | Answered analytically |
| Motivations for participating in Pilot | What are customers' motivation(s) for opting-in and participating in the pilot? | X | | | X | |

## Drafting the Survey Instrument

We will develop a 20-minute close-ended survey. A 20-minute close-ended survey will typically result in about 40 questions. Core topics must be covered in both survey variants, and we anticipate that we will ask about 30 core questions, leaving about 10 questions available for non-core questions. We also assume that about half of the 2017 survey will include new questions.

Prior to drafting survey questions that address the research questions, we will review surveys from prior TOU RCT evaluations, other relevant programs, and the energy use behavior scales tested through psychometric research to identify possible questions that will allow for comparisons both within the pilot, and across other research endeavors in CA and nationwide. We will work with Evergreen Economics and SCE to review and consider for inclusion in the 2016 survey the relevant hardship questions recently used in the Low Income Needs Assessment (LINA).

We will then create a question matrix (in spreadsheet form) with proposed questions linked to citations with details about scale and question formats. If the question or scale was developed expressly for this study, we will clearly note it. We will provide the matrix to the PCG for review and comment to ensure that we have clearly articulated the questions needed to address each research question. The research question matrix and final survey will include a subset of questions specific to IOUs.

After we reach agreement on the question content using the matrix, we will draft the survey instrument (in a Word document) and invitation letters to invite participation in the survey. Prior to submitting these documents to the PCG, our internal survey review team will edit, pretest, and time the instruments. We will make any necessary revisions, and then we will submit the survey and invitation letter for review and comment. This review process is based on the strategies to maximize survey response rates as recommended in the Tailored Design Method by Dr. Don Dillman.[9]

We will submit the draft survey to the PCG and then to the TOU Working Group, along with the matrix documenting the question sources and the location in the questionnaire. We will solicit comments on question content, but not wording or sequencing of questions. We will address any comments, prepare a version for final approval, and begin programming the pre-survey for implementation. We will translate the final survey into Spanish, Chinese, Korean, and Vietnamese, and make the non-English language version available to participants across web and phone data collection modes.

**Table 9** provides a list of key deliverables for Task 3 and the expected due date.

9 https://www.une.edu/sites/default/files/Microsoft-Word-Guiding-Principles-for-Mail-and-Internet-Surveys_8-3.pdf

**Table 9. Task 3 Deliverables**

| Task | Deliverables | Due Date |
|---|---|---|
| 3 | Draft survey instrument for the Fall 2016 survey, for review by the PCG | July 2016 |
| 3 | Deliver a revised survey instrument that reflects comments from the PCG and is suitable for presentation to the TOU Working Group, as part of a survey instrument review meeting with stakeholders | July 2016 |
| 3 | Integrate input from TOU Working Group into revised survey instrument | First week of August 2016 |
| 3 | Integrate necessary changes to survey instrument as a result of pretest findings | Second week of August 2016 |
| 3 | Finalize survey instrument | August 2016 |
| 3 | Pretest 2016 survey | September 2016 |
| 3 | Draft survey instrument for July 2017 survey | March 2017 |
| 3 | Conduct updated survey instrument review meeting with PCG and TOU Working Group, if necessary | April 2017 |
| 3 | Integrate input into revised survey instrument as appropriate | May 2017 |
| 3 | Pretest 2017 survey | June 2017 |

## Task 4: Field Survey

The Social and Economic Sciences Research Center (SESRC) at Washington State University (WSU) will field the surveys. We will use the EMP mixed-mode approach across all segments in the pilot as discussed in the Research Approach section above. We use the mixed-mode Tailored Design Method outlined by Dillman to attain a high response rate from pilot participants.[10] To facilitate the fielding process, we will use IOU-collected enrollment data, including written and spoken language preferences, and the number of senior citizens residing in the house.

We will translate the web, and the phone surveys into Spanish, Chinese (Mandarin), Korean and Vietnamese, and invite pilot participants to complete the surveys using their preferred language via either the web or phone. For the phone surveys, which occur after first attempting email and/or mail surveys, we will call customers in their preferred language. We will use written language preferences to send out a reminder postcard and emails to encourage response via the web. Should the participant prefer to conduct the survey over the phone, we will provide a phone number for them to call and schedule a phone survey, on all written communications, including the invitation letters, the reminder postcards and the survey booklet. Participants will be reminded that they will receive a bill credit after they have submitted their survey. To field the survey, we will follow the steps listed in **Table 10**.

10 Dillman, Don A., Smyth, Jolene D., Christian, Leah Melani. 2014. Internet, Phone, Mail and Mixed-Mode Surveys: The Tailored Design Method, 4th edition. John Wiley: Hoboken, NJ

**Table 10. Survey fielding steps based on email availability**[11]

| Steps | Participants with emails | Participants without emails |
|---|---|---|
| Step 1 | Letter invitation mailed with link to web survey in email | Letter invitation mailed with link to web survey in letter |
| Step 2 | An email reminder with a link to web survey in email | A postcard reminder with link to web survey on postcard |
| Step 3 | A second email with link to web survey in email | |
| Step 4 | Mailed booklet | Mailed booklet |
| Step 5 | Postcard reminder with link to web survey on postcard | Postcard reminder with link to web survey on postcard |
| Step 6 | Phone call to main phone number provided in pilot | Phone call to main phone number provided in pilot |

8. We will track completions on a daily basis and provide the PCG with weekly updates on the status of completes. **Table 11** provides a list of key deliverables for Task 4 and the expected due date.

**Table 11. Task 4 Deliverables**

| Task | Deliverables | Due Date |
|---|---|---|
| 4 | 2016 survey fielding | October 2016 |
| 4 | 2016 survey disposition | November 2016 |
| 4 | 2017 survey fielding | July 2017 |
| 4 | 2017 survey disposition | August 2017 |

# Task 5: Analyze and Report Findings

## Subtask 5.1: Analysis Planning

Our data analysis is integrated throughout the development of data collection instruments. During Task 3 we will design questions that can be asked across groups to facilitate comparisons and the identification of differing views. Once we have gathered the survey data we will review the survey dispositions and question response frequencies to assess whether the response rates at both the survey and question levels show evidence of threats to validity and reliability. The

11 Implementation of the 2016 survey coincides with the upcoming presidential election and response rates may be lower than anticipated due to the election season. To manage survey implementation costs, if these response rates are not met, we will sample non-responders such that a subset of non-responders receive the mailed booklet or are called. The remainder of email-start non-respondents can be sent a postcard with web link. This approach maintains a census attempt – since all pilot participants will be contacted at least three times, but mitigates costs if the presidential election causes a high degree of survey fatigue.

survey data will be cleaned and recoded as necessary, then analyzed using SPSS and R. We will also calculate achieved confidence and precision for each survey. When our analysis is complete, we will provide the IOUs and CPUC with a database containing the raw and recoded survey data for their customers, along with the *SPSS* or R syntax developed for survey cleaning and analysis, and a data dictionary.

To analyze the survey data, we will use the spreadsheet matrix that links research questions to survey questions developed in Task 3 to identify the optimal statistical test for each question and to assess differences in responses longitudinally, by treatment group, pilot segment, and other subgroups of interest. We will split our analysis plan, and description of our plans for this subtask, by individual survey analyses, longitudinal analyses, and multivariate analyses.

In **Table 12**, we list an initial set of groups and metrics we anticipate using to help answer the research questions listed above. Our analysis plan document will provide more detail about the planned analytical comparisons at the survey question-level, rather than the list described in **Table 12**. **Table 12** also describes three anticipated metrics we will derive using survey or IOU database data. These metrics are meant to serve as examples of metrics we will create. We anticipate adding more in the analysis plan. The analysis plan will also describe the univariate and multivariate regression models we will conduct to understand deeper relationships between TOU pilot participant characteristics and the behaviors or attitudes changed as a result of the TOU pilot.

**Table 12: Example Groups and Metrics to Help Answer Research Questions**

| Preliminary Groups | |
|---|---|
| **Group** | **Definition or Example** |
| RCT Rate Groups | Treatment and control conditions |
| ME&O Groups | Personas or other segments IOUs are using to generate ME&O materials, SCE E&O treatment groups |
| Pilot Strata | These will be compared separately, but the strata used were: Seniors, CARE/FERA, climate zone |
| Demographic and household characteristics | Including but not limited to:<br>Income level, age group, number of occupants in home, language preference, availability of central air conditioning, square footage of home, age of home, house type |
| Enabling technology groups | Customers with and without enabling technologies – such as smart thermostats |
| Enrollment method | Whether customers enrolled via email, phone, mail |
| Utility | PG&E, SCE, or SDG&E |
| Preliminary Metrics | |
| Metrics | Description |
| Degree of | If possible, we will combine survey responses on hardship questions into a scaled metric to |

| | |
|---|---|
| hardship | allow us to compare the "degree of hardship" caused by TOU rates |
| Electricity energy burden | Sum of all electricity bills divided by gross household income (we may calculate this for both summer months and annually) |
| App engagement | We anticipate two metrics for app engagement:<br>1. A Boolean metric (downloaded app versus not)<br>2. A count metric – counting the number of times they logged into app |

## Subtask 5.2: Individual Survey Analysis

We will first analyze survey responses by reviewing general survey counts and frequencies, and statistically compare differences between sampling segments (using treatment group, climate zone, income level, and senior citizen status). We anticipate using simple parametric and non-parametric statistics for these comparisons, including Chi-Square, ANOVA, and generalized linear regression models. We will provide the initial summary statistics for each question to the PCG.

We will then compare survey responses between other subgroups such as language preference, housing type, pre-pilot load, income level, senior status, CARE status, level of load reduction (if available), and level of bill impact (to be delivered in Winter of 2017).

## Subtask 5.3: Longitudinal Survey Analysis

We will have ample sample to analyze survey response differences longitudinally by segment (2016 to 2017). We anticipate also having sufficient sample to assess changes in survey responses for other subgroups of interest with a high level of confidence/precision.

We will first compare survey responses by segment or subgroup using within-subjects parametric and non-parametric statistical tests such as within-subjects' ANOVA or Kruskal-Wallis tests.[12] Next, we will create multilevel models to identify attitudinal shifts between 2016 and 2017 for more than one survey question (a multivariate analysis).[13]

## Subtask 5.4: Advanced Statistical Modeling

Prior to conducting any Structural Equation Modeling (SEM)[14] or Classification and Regression Tree (CART) analysis,[15] we will create a set of detailed hypotheses based on findings from the

12 A longitudinal within-subjects analysis refers to a participant-level analysis that assesses a change in our variable of interest over time.

13 A multilevel regression model allows us to assess the effectiveness of individuals as well as higher-order groups such as rate group, or ME&O group within one model.

14 SEM is comprised of a set of statistical techniques, including exploratory factor analysis and path analysis, that will enable us to measure an abstract construct – such as hardship – using multiple measures associated with the concept.

individual and longitudinal survey analysis. These SEM and CART models will focus on identifying attitudinal, segment, or demographic predictors of hardship. Our experience developing and testing the Awareness Knowledge Attitudes and Behaviors (AKAB) framework and evaluating SDG&E's Peak Time Rebate program will guide us; we used SEM and CART respectively to a) identify underlying categories (such as awareness, and intention) and b) identify the factors that predict hardship.

## Subtask 5.5: Reporting

We will provide memos on initial findings for each survey and integrate these findings into the larger pilot evaluation report. We will provide the PCG our preliminary survey findings memo report in the fall of 2016, and our second survey findings memo report in July of 2017.

Once each survey has been fielded and the data have been cleaned, we will provide PCG with frequencies and summary statistics for each survey. The memo reports will include a short executive summary, our survey sampling methodology and disposition, and findings for each survey. Tables 13 provides a list of key deliverables for Task 5 and the expected due date.

**Table 13. Task 5 Deliverables (First Survey, October 2016)**

| Task | Deliverables | Due Date |
|---|---|---|
| 2016 Survey | | |
| 5 | Analysis plan | October 2016 |
| 5 | Analyze survey results | Dec 16/Jan 2017 |
| 5 | Provide summary statistics for each survey question | January 2017 |
| 5 | Provide dataset at individual customer level and a data dictionary to each IOU for their customers | March 2017 |
| 5 | Complete a section of the First Interim Report that documents high-priority survey responses, for review by the PCG | February 2017 |
| 5 | Produce revised survey section of the First Interim Report that reflects comments from the PCG and is suitable for presentation to the TOU Working Group, as part of the First Interim Results Presentation | March 2017 |
| 5 | Incorporate input as appropriate to finalize survey section of the First Interim Report | March 2017 |
| 2017 Survey | | |
| 5 | Analyze survey results | August 2017 |
| 5 | Provide summary statistics for each survey question | September 2017 |
| 5 | Provide dataset at individual customer level and a data dictionary | September 2017 |

[15] CART is a data driven statistical analysis that partitions data responses by a variable of interest. This technique, for example, will allow us to identify subpopulations that exhibit the largest bill impacts, or demographic characteristics of participants who are able to take most action under TOU rates.

| | | |
|---|---|---|
| 5 | Complete a section of the Second Interim Report that documents the survey responses, for review by the PCG | September 2017 |
| 5 | Produce revised survey section of the Second Interim Report that reflects comments from the PCG and is suitable for presentation to the TOU Working Group, as part of the First Interim Results Presentation | October 2017 |
| 5 | Incorporate input from the TOU Working Group as appropriate to finalize survey section of the First Interim Report | October 2017 |
| Final report | | |
| 5 | Conduct additional sub-segment analysis, taking into account results from the full pilot year bill and load impact analyses, as well as drop-out data | Jan/Feb 2018 |
| 5 | Integrate and compare survey findings from all survey efforts in the final report | Feb/Mar 2018 |

# Appendices

## Appendix A: Detailed Research Questions

This table shows the full list of 118 detailed research questions derived from PCG and TOU Working Group meetings, and discussions with IOU, CPUC, and CAISO staff. As described in Task 3 above, we collapsed overlapping research questions, resulting in a final set of 29 research questions.

| Topic | Detailed Research Questions | Research Questions |
|---|---|---|
| General financial hardship | Were customers struggling to pay their household bills? | Which customers experience issues with paying their bills (any bill and/or electric bill)? |
| | Did customers experience any prior bill payment issues (arrears/extensions/arrangements) | |
| | How closely do customers monitor their electricity bill each month? | |
| | Do customers experience general lifestyle hardship (e.g. cannot shift energy usage due to personal/household constraints)? | |
| | What is the hardship? (tradeoffs/financial/lifestyle/convenience/comfort/health/safety/perception of bills/anxiety) | |
| | What are customer's energy burden? (percentage of household income that goes toward energy bill) | |
| | What are the difference sources and types of economic hardship? | |
| | What types of customers experienced economic hardship(s)? | |
| Hardship with TOU rates | Did TOU rates make it harder to pay their electric bill or household bills in general? | Do TOU rates cause or enhance economic, or lifestyle hardship? |
| | Do higher TOU rates for on-peak summer use exacerbate the potential that some (low income? fixed income?) seniors might reduce A/C use due to fear of high bills enough to impact or endanger their health, due to the differential impact of high temperatures on the elderly? | |
| | Is there increased concern about paying bills BECAUSE of the rates? | |
| | How many seniors and economically vulnerable households in hot areas would be likely to suffer unreasonable hardship if they are defaulted onto TOU rates? | |
| | Do TOU rates cause customers to experience hardship (segmented by cool/moderate/hot, senior status, income, rent vs own, disability status)? | |
| | If we determine that TOU rates cause hardship, what specific aspects of the rate underlie their perception of that hardship? Do these underlying | |

| Topic | Detailed Research Questions | Research Questions |
|---|---|---|
| | perceptions vary by rate assignment? | |
| | Is there a hardship that would not exist without the TOU rate? What is incremental hardship of the TOU rate? | |
| | Do customers think their bills since going on the TOU Rate are lower, higher, or about the same as last year? | How do customers' perceptions of their energy bills under TOU differ by pilot group and what is considered too much (and why)? |
| | To what degree is higher bill a problem? | |
| | What level of increase in a monthly bill would cause concern? (may differ by season) | |
| | Do bill credits/incentive influence initial views on hardship? | |
| | What is the emotional breaking point (I'm tired) vs. functional breaking points (I'm already efficient)? Are customers already there? Does this differ by TOU rate, segment, or climate zone? | What are customers' "breaking points" under the TOU rates, or the type of rate plan under which they are unable to do or keep track of? |
| | Are we at a breaking point? Emotional health/stress - "I'm already doing so much (outside of electricity)" | |
| | Is the thinking/planning too much? | |
| | How far can we go before reaching breaking point of feeling like we are doing too much, and does this vary by treatment and demographic? | |
| | Do customers feel they have control? | |
| Demographics | Type of employment (full time/part time/seasonal - at home/at office) | What are the demographic and lifestyle characteristics of customers, and do these characteristics predict self-reported hardship, level of curtailment, satisfaction and acceptance of rates, and ability to take action? |
| | Ethnicity/Race/Language | |
| | Children | |
| | Do customers with respiratory conditions experience more hardship due to TOU rates? Does this differ by treatment group? | |
| | Do disabled customers experience more hardship due to TOU rates? | |
| | What are the differences in all survey results by ME&O segment (environmentally savvy vs. needs first)? | |
| Household characteristics | What household/structural characteristics restrict your ability to enact certain behaviors? (example: multifamily units/noise/communal areas/insulation/electric vs gas) | What household/structural characteristics correlate with customers' ability to change behavior and/or saving energy? |
| | Are people with outdoor living spaces able to curtail more? | |
| | Are customers with electric heating able to pre-warm their homes? | |
| | Do customers who purchase/install thermostat behave differently than those who did not? | Do enabling technologies (e.g. smart thermostat) help customers to change behavior and/or save energy? |
| | Would having a smart thermostat help people to curtail more? | |
| | Is automation (smart thermostat) going to help customers change | |

| Topic | Detailed Research Questions | Research Questions |
|---|---|---|
| | consumption behavior? | |
| Satisfaction with rate | Are customers satisfied with and accepting of the TOU rates (segmented by seniors, SmartAC status, customers with higher bills compared to prior year, customers with lower bills compared to prior year, structural winners vs structural losers)? | Are customers satisfied overall and with various aspects of their TOU rate plan, and why/why not? Does satisfaction differ by RCT group? |
| | Would customers stay on the same rate after the pilot ends? | |
| | What is the impact of a TOU-oriented usage alert on load reductions, customer acceptance and customer satisfaction with TOU pilot rates? | |
| | Would customers recommend this TOU rate to friends and family? | |
| | What do TOU customers view as the value proposition? Good for me/us/them? Do they think it's good for the community? What is larger value? | |
| | Do they feel more control and does that lead to greater satisfaction? Or do they feel overwhelmed? | |
| | Are customers okay with paying different prices during different times of day? | |
| | Does customer acceptance vary across TOU pilot rates and customer segments? | |
| | Are the peak periods too long? Do they come at a bad time? | |
| | To what extent did bill protection and incentive impact perception of rate? | |
| | Perceptions about utility - how agreeable are customers with their utility? Is favorability with utility predictive of satisfaction with the pilot? | What are customers' perceptions of their utility? |
| | What causes attrition in the pilot? | Why do customers opt-out or leave the pilot? |
| Assessment of messaging and outreach | When they signed up, were they clear on the study details? | Did customers receive, read, and understand materials? |
| | How did people enroll in the pilot (sign up on web, phone recruitment, etc.)? | |
| | Do customers recall receiving their welcome kit? Did customers see it, read it, discuss it? | |
| | Was the welcome kit clear and easy to understand? | |
| | Were the seasonal mailings clear and easy to understand? | |
| | Were the tips clear? | |
| | Is the TOU bill easy to understand? | |
| | Did customers read materials they received? | |
| | Do the materials spur customers to take action? | What is the relevance of the materials and their self-reported impact on customer's actions/behaviors? |
| | What materials are most effective in enhancing customer acceptance and retention, engagement, satisfaction, knowledge of rates, etc.? | |

| Topic | Detailed Research Questions | Research Questions |
|---|---|---|
| | What materials and efforts will be most effective for creating customer awareness and satisfaction leading up to the default pricing in 2019? | |
| | Did the materials resonate with the customer - did the customer WANT to follow the tips? | |
| | What materials do TOU rate participants find most useful and most preferred? | |
| | Did the frame - broad vs specific - of the message resonate with the customers it is targeting? | |
| | Were tips relevant to the customer? Does this vary by climate zone? | |
| | Which type of messaging was more effective - Phone, mail, email? | What is the frequency and mode of communication of the materials preferred by customers? |
| | How was the frequency and mode of communication? Are customers getting enough information, too much information? Are they receiving info in a channel that works for them? | |
| Understanding of how rates work | Do you remember that you are in this pilot? | Are customers aware they are in the opt-in pilot and that they were not on TOU rates before? |
| | Are customers aware that they were not on a TOU rate before? | |
| | Were customers aware of TOU rates before joining the pilot? | Do customers understand TOU rates, generally what peak periods are, and why they are designed this way? |
| | Do customers find their rate easy to understand? | |
| | Do customers understand that the cost of energy varies by time of day / peak period? | |
| | For almost 15 years the state and IOUs have been communicating peak as hot summer afternoons. Is the shift of peak to later in the day, late afternoon and early evening confusing? | |
| | Does the degree of awareness/knowledge of TOU-type things affect the level of understanding of the rate? Does it affect their ability to shift load. | |
| | Do customers understand why the peak period is when it is? | |
| | Does it make sense for TOU periods to be consistent between work and home for small business owners? | |
| | Do customers understand WHY TOU is happening? | |
| | Do customers understand that they could save money across the year? | Do customers perceive a benefit from TOU rates and do customers understand how they can be successful in managing their bill? |
| | What do customers view as the value proposition? | |
| | Do customers understand the value in looking at their bills over time/annually? | |
| | Do they understand the value of curtailing or shifting load across a day and how much that can save them (within a day)? | |
| | Do customers understand bill protection? | |
| | What suggestions do customers have for improving understanding/tools/materials? | What are customers' suggestions for improvements? |

| Topic | Detailed Research Questions | Research Questions |
|---|---|---|
| Actions taken | How easy was it to take action? | How easy or difficult is it for customers to take action to save energy or shift load? |
| | Have customers experienced other TOU-type things (costs varying based on demand) in other aspects of life? (e.g. matinees) Have customers taken action to respond to pricing like this? | |
| | Barriers to taking actions? What keeps customers from being able to shift/curtail? | What are the barriers to taking action? |
| | Would customers continue to shift/curtail even without the rate? | Do customers show persistence of taking actions? |
| | Do customers take alternative actions by going outside of the home and does this differ by rate type? | What are the changes in customer behavior during the pilot, and cause(s) of these changes? Are customers changing how they use appliances and technology because of the rate? |
| | What are customers going to do to shift off the evening peak hours? | |
| | How will they change their consumption behavior? | |
| | What electric loads can be turned off during the day? What loads can be turned down during the evening? | |
| | Can we incentivize customers to consume at different times? | |
| | Will prices be sufficient to get people to change their energy consumption behavior? | |
| General attitudes/awareness towards EE and DR | Are customers aware of EE and DR, and what do they think of these each? | What are customers' attitudes and behaviors towards EE and DR? |
| Website / Tools/ App use | Would customers be interested in reminders? What channel would they prefer? | What kind of technology are customers interested in as a result of the pilot? |
| | Is there some scope for using EV or storage? | |
| | Do people know they were offered the app? | What is customers' awareness and frequency of use of the apps and websites? |
| | Did customers download the app? | |
| | Did customers download the thermostat app? | |
| | Did customers download the SDG&E app? | |
| | Did customers use the app? Frequently or just once? | |
| | Was the SDG&E app easy to use? | Are customers satisfied with the app, alerts, and are they useful/valuable? |
| | Are customers satisfied with the SDG&E app? | |
| | Satisfaction with app? | |
| | Was the SDG&E app useful/valuable? How? | |
| | Is the app helpful? How is it helpful? If no, why not? | |
| | Did the app make customers more comfortable with their rate? | |

| Topic | Detailed Research Questions | Research Questions |
|---|---|---|
| | How long does it take for customers to turn off the push notification in the SDG&E app? And, why it was turned off? | What are the best features of and any improvements that should be made to the app(s)/alerts? |
| | What feature(s) stood out in the app? | |
| | What enhancements would customers like made to the app? | |
| | Do customers know what a smart thermostat is? | What is the level of awareness, uptake, and interest in smart thermostats? |
| | Uptake rate of the thermostat rebate (by climate zone, rate type, etc.)? | |
| | What is the best price point for the smart thermostats? | |
| | How quickly do customers install the thermostat? | |
| | Did customers own smart thermostat before Pilot? | |
| | Do survey results regarding the app/thermostat vary by SDG&E segments? | Are there differences in actions taken, satisfaction, or understanding of rates by thermostat/app users vs. non-users? |
| | What is the impact of a smart phone app on load reductions, customer acceptance, and customer satisfaction with TOU rates? | |
| | Do customers with smart thermostat use SDG&E app differently than those without smart thermostat? | |
| Motivations for participating in Pilot | Why did customers opt in? Bill protection/incentive/etc.? | What are customers' motivation(s) for opting-in and participating in the pilot? |
| | Why did customers actively participate? Does this differ by rate/segment? Attitudinal and structural barriers? | |
| | Would customers have participated without being paid? | |

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# Appendix B: Survey Analysis Plan

## Memorandum

To: TOU Working Group

From: Alexandra Dunn, Benn Messer and Jane Peters, Research Into Action

Date: December 16, 2016

Re: 2016 Survey Analysis Plan

This memo describes Research Into Action's analysis plan for the 2016 survey. This survey is the first of two surveys, coupled with the impact results are designed to inform the 2018 Default Pilot and eventual roll-out of default TOU rates across California.

The 2016 and 2017 opt-in pilot was required by the CPUC July 2015 decision D15-07-001 in the Residential Rate Reform OIR (R12-06-013). A TOU Pilot working group was formed to design the opt-in pilot with assistance from Nexant who documented the plan in the December 2015 report "Time-of-Use Pricing Opt-in Pilot Plan". The three IOUs then filed advice filings with the IOU specific detailed plans which were adopted, as modified, in Resolutions E-4762(PG&E), E-4761(SCE), and E-4769(SDG&E). The resolutions describe expected deliverables of the opt-in pilot, and are the basis of this research plan.

During May and June of 2016, the research team worked with the California Public Utilities Commission (CPUC), the individual Investor Owned Utilities (IOUs), and the TOU Working Group to develop a list of research questions for the pilot survey. The multifaceted needs of this pilot present challenges to developing a honed list of research questions. The goals of the opt-in pilot are to:

- Allow the IOUs and CPUC to identify the effects of different pilot TOU rates relative to the current tiered rate structure,
- Estimate load impacts for tested opt-in pilot rates,
- Assess the degree of hardship for some customers that may result from the opt-in pilot TOU rates – particularly on vulnerable populations in hot climate zones,
- Assess the effectiveness of the messaging and outreach, customer understanding, acceptance, and satisfaction of TOU rates, and
- Assess whether enabling technologies mitigate load impacts and increase satisfaction with TOU rates.

The ream worked with the TOU Working Group to design a survey to answer, in part, the goals of the opt-in pilot. This memo provides an outline of the analysis plan Research Into Action will follow for analyzing data from the 2016 TOU survey. We will analyze customers' responses to survey questions to answer specific research questions the team developed from the 2016 opt-in pilot survey research plan.

First, our analysis will help answer several broad questions about the impact of TOU rates that were specified by the CPUC in its resolutions[16]:

- Did customers experience hardship?
- What are barriers to load shifting or load reduction activities?
- Are certain behaviors or activities higher among customers on TOU rates compared to OAT?
- Are customers aware, do they understand, are they satisfied with rate?
- How useful were the outreach materials?
- Did customers prefer some outreach materials over others? (across TOU segments and personas)

Second, the analysis will provide insights within specific customer sub-segments. To both comply with the CPUC's requirements in its resolutions and for consistency with the way load and bill impacts will be reported by Nexant, we will perform treatment versus control comparisons among the following customer segments. **Table 12** provides an example of the customer segments we will compare for each IOU across RCT groups (Rates 1, 2, and 3 compared to Control).

**Table 14: Example of Time of Use Segment Comparisons**

| |
|---|
| Hot, CARE |
| Hot, Non-CARE |
| Hot, Non-Senior, CARE, Above 100% FPG |
| Hot, Non-Senior, CARE, Below 100% FPG |
| Hot, Senior, Above 100% FPG |
| Hot, Senior, Below 100% FPG |
| Moderate, CARE |
| Moderate, Non-CARE |
| Cool, CARE |
| Cool, Non-CARE |

16 Please refer to Appendix A for an illustration of how the CPUC's mandated deliverables directly match to the research questions developed by the Time-of-Use Working Group.

| Climate region | Additional attributes |
|---|---|
| Hot | Seniors |
| | <=100% FPG |
| | 100-200% FPG |
| | <=100% FPG and Senior |
| | CARE/FERA |
| | CARE/FERA-eligible |
| Moderate | All customers |
| Cool | All customers |

We will take the following five steps to analyze the 2016 survey data:

1. *Validate Data:* Prior to analyzing the data, we will review the survey dispositions and question response frequencies by segment to assess whether the response rates at both the survey and question levels show evidence of threats to validity and reliability. We will flag and strongly consider excluding questions where the response rates differ between the control and treatment groups. We anticipate response rates for specific questions, particularly income, will differ by segment type (e.g. in our experience respondents who earn a higher income are less likely to report their income). We will flag these differences and confine the use of these variables to analyses specific to segments where the response rates are similar. For example, we may include income as a covariate in a regression model specific to the CARE/FERA segment if the response rates across all CARE/FERA segments are similar.

2. *Review Initial Frequencies and Crosstabs:* We will calculate frequencies of customers' responses for each survey question and by each TOU segment. For example, we will conduct crosstabs for each survey question by RCT group, and depending on sample size, we will partition crosstabs by segment (e.g. comparisons between the control and treatment groups for CARE/FERA customers in the hot region). Where applicable, we will also make comparisons based on other key demographic, household, and technology characteristics reported by customers in the TOU survey (see Sections 1.1.3 and 1.1.4).

3. *Assess differences in responses between control and treatment groups:* We will conduct the appropriate bivariate analyses between variables and TOU segments to determine whether there are statistically significant differences between groups. The team will use t-tests for comparing means of interval variables, chi-square tests for comparing distributions between categorical variables, and ANOVA methods for comparing two variables across more than two groups.

4. *Create hardship metrics:* We will use exploratory factor analyses (EFA) methods to combine multiple survey questions or items into one variable for analyses. We will focus our factor

analyses on survey questions directly applicable to financial and health hardship. In this step, we anticipate using a maximum likelihood extraction method with a varimax rotation. If the data are not normally distributed, or we find the resulting factors are highly correlated, we will consider other extraction and rotation methods.

5. *Assess degree of incremental hardship due to TOU rates:* We will perform regression analyses to determine whether hardship varies by experimental treatment group. Anticipated methods include OLS regression and ANOVAs for interval dependent variables, and logistic regression for dichotomous dependent variables. Section 1.2 describes the hardship analysis in more detail. We will also assess whether TOU rates cause a change in respondents' understanding of rates, energy-saving actions taken by customers, and customer satisfaction.

Please note that the specific analyses described in this memo may change depending on the distribution of responses we observe in the survey data. For example, if most responses to a rating-type question are nines or tens on a zero to ten-point scale, we may have to exclude that question from our analyses. While we endeavored to avoid this issue by wording questions a specific way, we cannot entirely predict whether this will happen. Thus, while we will make our best effort to follow this analysis plan as written, we may have to deviate from it if the data flout statistical assumptions.

# Detailed Analyses by Research Topic

This section outlines our general analytical approach to answer each research question outlined in the opt-in TOU survey research plan. We organize each research question under the 11 broader research topics.

## General Financial Hardship

**Research Question:**

Which customers experience issues with paying their bills (any bill and/or electric bill)?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

Since June 2016, how many times, if at all, has your household had difficulty paying your bills? (Q12)

How did your household afford to pay electricity bills and/or other basic needs this summer? (Q13)

Since June 2016, how well do these statements describe you and your situation? 1) Because of my money situation, I feel like I will never have the things I want in life. 2) I am just getting by financially. 3) I am concerned that the money I have won't last. (Q14)

How often does these statements apply to you? 1) I have money left over at the end of the month. 2) My finances control my life. (Q15)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments such as CARE/FERA seniors in the hot climate zone for rate 1.
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments, and other key demographic and household characteristics
- Include questions 12 - 15 for use as variables in hardship analyses (see Section 1.2 for more details)

## Hardship with TOU Rates

**Research Question 1:**

Do TOU rates cause or enhance economic, or lifestyle hardship?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

- Since June 2016, how many times, if at all, has your household had difficulty paying your bills? (Q12)
- Since June 2016, how often, if ever, were you or any members of your household uncomfortably hot inside your home because you were trying to save money on your electricity bill? (Q16)
- Since June 2016, how often, if ever, did you or any members of your household need medical attention because it was too hot inside your home? (Q17)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT Groups, TOU segments, and other key demographic and household characteristics
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups and TOU segments by survey responses (Q5/Q7) – grouped by those who were aware of and read the marketing materials vs those who were not aware or did not read the marketing materials.
- Create a financial hardship metric for use as variables in hardship analyses

**Research Question 2:**

How do customers' perceptions of their energy bills under TOU differ by pilot group (treatment and control) and what is considered too much (and why)?

**Survey Question:**

The following survey question from the TOU instrument will be analyzed for answering the research question:

Since June 2016, has your household's electricity bills been high, lower, or about the same as you expected? (Q18)

**Analyses:**

The team will perform the following analyses with the survey question to answer the first part of the research question regarding how customers perceive their energy bills under TOU. The team will include questions in the 2017 TOU survey to answer the second part of the research question regarding what energy bill amount is considered too much, and why.

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics

Use as a dependent variable in regression analyses to determine predictors of customers’ energy bill perceptions

## Demographics

**Research Question:**

What are the demographic and lifestyle characteristics of customers, and do these characteristics predict self-reported hardship, level of curtailment, satisfaction and acceptance of rates, and ability to take action?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question. We will analyze and interpret findings from respondent-level and household-level demographic questions differently.

Household Level Questions:

- First, we will compare responses across TOU segments and between RCT groups for each household-level demographic question as a validity check that the randomization applies to self-reported demographic questions. Second, the household-level demographic questions may be included in our regression models as covariates if warranted.

- Which of the following best describes your household's annual income in 2015, before taxes? (Q26)
- Since June 2016, have you or other members of your household experienced any of the following? (Q27)
- Do any of following apply to you or others in your household? 1) Has a serious disability, respiratory condition, or other serious medical condition. 2) Receives disability payments. (Q28)
- Does anyone in your household have a disability or serious medical condition that requires any of the following item? 1) Your home to be cooled in the summer. 2) You to use more energy for medical equipment. 3) Them to be home most of the day. (Q29)
- How many people in each of the following age categories lived in your home this summer, not including yourself? 1) Under 6 years old. 2) Between 6 and 17 years old. 3) Between 18 and 64 years old. 4) Between 65 and 74 years old. 5) Between 75 and 84 years old. 6) 85 years or older. (Q30)

Respondent-Level Questions:

- We will use respondent-level demographic questions as control or explanatory variables when examining the respondent's attitudes toward TOU, demand response and energy efficiency, awareness of TOU, and satisfaction with TOU and their utility. We will avoid using these questions in hardship-level analyses because they pertain not to the household, but to the respondent, and therefore, may not encompass the full diversity of the household.
    - In what year were you born? (Q23)
    - Which of the following best describes the highest level of education you completed? (Q24)
    - What is your current employment status? (Q25)
    - Which categories describe you? 1) American or Alaska Native. 2) Asian. 3) Black or African American. 4) Hispanic, Latino, or Spanish origin. 5) Native Hawaiian or Other Pacific Islander. 6) Middle Eastern or North African. 7) White. 8) Some other race, ethnicity, or origin. (Q31)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

- If the data review show no systematic differences between RCT groups, we will create TOU demographic subgroups to use in statistical comparisons and regression analyses regarding satisfaction, actions taken, and other research topics

## Household Characteristics

**Research Question 1:**

What household/structural characteristics correlate with customers' ability to change behavior and/or saving energy?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed separately for answering the research question:

- In the summer, is there someone usually home during each of the following times on weekdays and weekends? 1) Morning. 2) Afternoon. 3) Evening. 4) Night. (Q32)
- Do you or others in your household own your home, rent your home without subsidized housing assistance, or rent your home with subsidized housing assistance? (Q33)
- What kind of house or building do you live in? (Q34)
- How many bedrooms are in your home? (Q35)
- Do you have the following items in your home? For the items you have in your home, please mark how often you've used them to cool your home this past summer. 1) Central air-conditioning system. 2) Room air conditioning unit that is portable or attached to your window. 3) Evaporative or swamp cooler. 4) Heat pump. 5) Ceiling or portable fan(s). (Q36)
- Does your home have a thermostat to control your cooling and/or heating equipment? (Q37)
- Which of the following best describes your home's thermostat? (Q38)
- In late afternoon and evening times during the summer, what temperature do you typically set your thermostat at for weekdays and weekends? (Q39)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments, and assess whether there is a relationship between TOU segments, RCT groups, and ability to change behaviors that may shift consumption.

- If the data review show no systematic differences between RCT groups, we will create TOU demographic subgroups to use in statistical comparisons and regression analyses regarding hardship, satisfaction, actions taken, and other research topics outlined in this memo

**Research Question 2:**

Do enabling technologies (e.g. smart thermostat) help customers to change behavior and/or save energy?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

- Does your home have a thermostat to control your cooling and/or heating equipment? (Q37)
- Which of the following best describes your home's thermostat? (Q38)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

- Use questions 37 and 38 to identify customers with a smart thermostat
- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments
- Conduct statistical comparisons and regression analyses to determine differences in actions taken (Section 1.8) by customers with and without a smart thermostat

## Satisfaction with Rate

**Research Questions:**

Are customers satisfied overall and with various aspects of their TOU rate plan? Does satisfaction differ by RCT group?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

- On a scale of 0 to 10, where 0 means not satisfied at all and 10 means extremely satisfied, how satisfied are you overall with the following? 1) Your current electricity plan. 2) [IOU NAME]. (Q3)
- On a scale of 0 to 10, where 0 means do not agree at all and 10 means completely agree, to what extent would you agree with the following statements about your current study rate plan? 1) The rate is easy to understand. 2) The rate is fair. 3) The rate provides me with opportunities to save money. 4) The new rate is better than my old rate. 5) The rate works with my household’s

schedule. 6) The rate is affordable. 7) My electricity bill is easy to understand. 8) My electricity bill helps me understand the time of day I'm spending the most money on electricity. 9) The peak and off-peak time periods are easy to remember. 10) I would recommend my electricity rate plan to friends or family. 11) I want to stay on my new rate plan after this study ends. (Q4)

## Analyses:

The team will perform the following analyses with the survey questions to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics
- Use as dependent variables in regression analyses to determine predictors of customers' level of satisfaction

## Assessment of Messaging and Outreach

**Research Questions 1:**

Did customers receive, read, and understand materials?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

- At the beginning of the summer, did you receive and look through the welcome packet that came from [IOU NAME]? This "welcome packet" included information about your rate plan and tips to save on your energy bill. (Q5/Q7)
- On a scale of 0 to 10, where 0 means do not agree at all and 10 means completely agree, please indicate the extent to which you agree with each of the following statements about the welcome packet you received. 1) The items in the packet were easy to understand. 2) The information clearly explained how the price of electricity is different depending on the time of day and the season of the year. 3) After looking at the packet, I completely understood how the new rate works. 4) I have used many of the tips provided in the packet. 5) The decals or stickers in the packet were helpful. (Q6/Q8)
- Since your rate changed this summer, [IOU] has sent you information to help you manage your electricity use, including a welcome packet, and seasonal packets. Which of the following sources of information do you remember receiving? 1) A welcome packet. 2) A summer newsletter with tips. 3) A fall newsletter with tips. 4) An invitation to download a smartphone app by Bidgely to manage your electricity use. 5) SDG&E's smartphone app that can alert you when your rate changes throughout the day. (Q40)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics
- Create messaging metric for use as a control variable in regression analyses regarding actions taken and other research topics

**Research Question 2:**

What is the relevance of the materials and their self-reported impact on customer's actions/behaviors?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

- On a scale of 0 to 10, where 0 means do not agree at all and 10 means completely agree, please indicate the extent to which you agree with each of the following statements about the welcome packet you received. 1) The items in the packet were easy to understand. 2) The information clearly explained how the price of electricity is different depending on the time of day and the season of the year. 3) After looking at the packet, I completely understood how the new rate works. 4) I have used many of the tips provided in the packet. 5) The decals or stickers in the packet were helpful. (Q6/Q8)
- For each of the sources of information you used, please rate how useful you found the information in managing your electricity use, where 0 is not useful at all and 10 is extremely useful. 1) Your rate plan study website. 2) The [IOU] My Account website. (Q42)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics
- Create messaging metric for use as a control variable in regression analyses regarding actions taken and other research topics

**Research Question 3:**

What is the frequency and mode of communication of the materials preferred by customers?

**Survey Question:**

The following survey question from the TOU instrument will be analyzed for answering the research question:

Our records indicate that your household received information in both English and [LANGPREF] On a scale from 0 to 10, where 0 is not important at all and 10 is extremely important, how important was it for you to receive this information in [LANGPREF]? (Q43)

**Analyses:**

The team will perform the following analyses with the survey question to answer the research question. The team will answer to what extent customers prefer materials in their preferred language and, in the 2017, the team will include questions about customers' preferred frequency and mode of the materials.

Relevance and ratings of materials differ by language preference

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics

Conduct statistical comparisons with customers' awareness of their rate change, their understanding of TOU rates, ratings on the relevance or usefulness of the materials and action taken

## Understanding How Rates Work

**Research Question 1:**

Are customers aware they are in the pilot and that they were not on TOU rates before?

**Survey Question:**

The following survey question from the TOU instrument will be analyzed for answering the research question:

According to our records, your household signed up with [IOU NAME] to participate in a rate study, called the [IOU STUDY NAME], that began this summer (2016) and ends in December next year (2017). Do you recall participating in this study? (Q1)

**Analyses:**

The team will perform the following analyses with the survey question to answer the research question:

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics

Use as a dependent variable in regression analyses to determine customer recall of participation in the TOU study

**Research Question 2:**

Do customers understand TOU rates, generally what peak periods are, and why they are designed this way?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

Please select all the statements below that describe the price of electricity for your rate as of June 2016, the beginning of summer. "Under my current study rate the price of electricity is different depending on… " 1) The time of day. 2) The day of the week. 3) The season. 4) The weather or temperature. 5) The total amount of electricity you use. 6) None of the above. (Q9)

To the best of your knowledge, during what times on weekdays in the summer months is electricity the most expensive to use based on your current study rate plan? Mark all the hours when electricity is most expensive to use. (Q10)

To the best of your knowledge, why do you think California electric utilities are changing to time of use rates? (Q11)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics

Use as a dependent variable in regression analyses to determine predictors of customer understanding of TOU rates

Use as a control variable in regression analyses regarding hardship, actions taken, satisfaction, and other relevant research topics

**Research Question 3:**

Do customers perceive a benefit from TOU rates and do customers understand how they can be successful in managing their bill?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

On a scale of 0 to 10, where 0 means do not agree at all and 10 means completely agree, to what extent would you agree with the following statements about your current study rate plan? 1) The rate is easy to understand. 2) The rate is fair. 3) The rate provides me with opportunities to save money. 4) The new rate is better than my old rate. 5) The rate works with my household's schedule. 6) The rate is affordable. 7) My electricity bill is easy to understand. 8) My electricity bill helps me understand the time of day I'm spending the most money on electricity. 9) The peak and off-peak time periods are easy to remember. 10) I would recommend my electricity rate plan to friends or family. 11) I want to stay on my new rate plan after this study ends. (Q4)

Please select all the statements below that describe the price of electricity for your rate as of June 2016, the beginning of summer. "Under my current study rate the price of electricity is different depending on… " 1) The time of day. 2) The day of the week. 3) The season. 4) The weather or temperature. 5) The total amount of electricity you use. 6) None of the above. (Q9)

To the best of your knowledge, during what times on weekdays in the summer months is electricity the most expensive to use based on your current study rate plan? Mark all the hours when electricity is most expensive to use. (Q10)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics

Use as a dependent variable in regression analyses to determine predictors of customer understanding of TOU rates

Use as a control variable in regression analyses regarding hardship, actions taken, satisfaction, and other relevant research topics

## Actions Taken

**Research Question 1:**

How easy or difficult is it for customers to take action to save energy or shift load?

**Survey Question:**

The following survey question from the TOU instrument will be analyzed for answering the research question:

Since the beginning of this summer, how easy was it for you or members of your household to take action to reduce your electricity usage in the afternoon and evenings? Please use a 0 to 10 scale where 0 means not easy at all and 10 means extremely easy. (Q20)

**Analyses:**

The team will perform the following analyses with the survey question to answer the research question:

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics

Use as a dependent variable in regression analyses to determine predictors of customers' ease/difficulty in taking energy saving actions

Use as a control variable in regression analyses regarding hardship, actions taken, satisfaction, and other relevant research topics

**Research Question 2:**

What are the barriers to taking action?

**Survey Question:**

The following survey question from the TOU instrument will be analyzed for answering the research question:

Which of the following, if any, has kept you from reducing or shifting your electricity usage in the afternoon and evenings? 1) Nothing keeps me from shifting my usage. 2) I can't think of anything else to do. 3) My household already uses very little electricity. 4) My home gets uncomfortable if I try to reduce electricity usage. 5) Child(ren) in household make it difficult to change our routines. 6) Disabled household member makes it difficult to change our routines. 7) Elderly household member makes it difficult to change our routines. 8) Working from home makes it difficult to use less electricity. 9) My schedule doesn't allow me to reduce my usage. 10) I am at home most of the day. 11) I have old appliances that use a lot of energy. 12) I can afford to use as much electricity as I want. 13) I don't know what actions to take to lower my electricity bill. (Q21)

**Analyses:**

The team will perform the following analyses with the survey question to answer the research question:

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics

Use as a control variable in regression analyses regarding hardship, actions taken, satisfaction, and other relevant research topics

**Research Question 3:**

What are the changes in customer behavior during the pilot, and cause(s) of these changes? Are customers changing how they use appliances and technology because of the rate?

**Survey Question:**

The following survey question from the TOU instrument will be analyzed for answering the research question:

Since the beginning of this summer, how often, if at all, did you take the following actions to reduce your household's electricity usage in the afternoon and evenings? 1) Increased the temperature on my thermostat in the afternoon and evening. 2) Turned off air conditioning during the afternoon and evening. 3) Avoided doing laundry during the afternoon and evenings. 4) Avoided running the dishwasher during the afternoon and evenings. 5) Avoided running my spa or pool pump during the afternoon or evenings. 6) Avoided cooking during the afternoon or evenings. 7) Turned off lights not in use during the afternoon and evening. 8) Turned off office equipment (computer, printer, etc.) during the afternoon and evening. 9) Turned off entertainment systems (TV, Nintendo, etc.) during the afternoon and evening. 10. Pre-cooled the home by running air conditioning earlier in the day. (Q19)

**Analyses:**

The team will perform the following analyses with the survey question to answer the research question:

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics

Use as a dependent variable in regression analyses to determine predictors of the energy saving actions customers took or did not take

## General Attitudes and Awareness Towards Energy Efficiency and Demand Response

**Research Question:**

What are customers' attitudes and behaviors towards EE and DR?

**Survey Question:**

The following survey question from the TOU instrument will be analyzed for answering the research question:

Using a scale of 0 to 10 where 0 means do not agree at all, and 10 means completely agree, please tell me how much you agree with each statement. 1) I often worry whether there is enough money to pay my electricity bill. 2) I am very concerned about how my energy use affects the environment. 3) It is my responsibility to use as little energy as possible to help the environment. 4) I feel guilty if I use too much energy. 5) I conserved electricity in my home this summer. 6) If my electricity bill goes up, I feel like I must do something to reduce it. (Q22)

**Analyses:**

The team will perform the following analyses with the survey question to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics
- Use as a control variable in regression analyses regarding hardship, action taken, satisfaction, and respondents' awareness and use of DR technologies

## Use of Website, Tools, and Apps

**Research Question 1:**

What is customers' awareness and frequency of use of the apps and websites?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

- Since your rate changed this summer, [IOU] has sent you information to help you manage your electricity use, including a welcome packet, and seasonal packets. Which of the following sources of information do you remember receiving? 1) A welcome packet. 2) A summer newsletter with tips. 3) A fall newsletter with tips. 4) An invitation to download a smartphone app by Bidgely to manage your electricity use. 5) SDG&E's smartphone app that can alert you when your rate changes throughout the day. (Q40)
- Since summer began, have you visited the following websites? 1) Your rate plan study website. 2) The [IOU] MyAccount website. (Q41)
- When your rate changed this summer, [IOU NAME] invited you to download a smartphone app that notifies customers like you of when electricity rates change during the day. It also allows you to check your electricity usage. Are you aware of this app? (Q45)
- Have you downloaded the app? (Q46)
- Please indicate whether or not you have used each of the following features of the app. For each feature you have tried, please indicate how helpful you find this feature on a scale of 0 to 10, where 0 means not helpful at all and 10 means extremely helpful. 1) Alerts during the day that the electricity rates have changed. 2) Information about the current pricing period. 3) Access to your monthly projected bill amount. 4) Summary of monthly usage by peak period. 5) Access to

more detailed information about your household energy use patterns. 6) Information about your electricity use by “always on” and “cooling” usage. (Q47)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics
- Use to create TOU subgroups (app users, website visitors) for analyses
- Use as a control variable in regression analyses regarding actions taken, satisfaction, and other research topics
- Use questions 41 and 46 as dependent variables in regression analyses to determine predictors of which customers visited the website and/or which customers downloaded the app

**Research Question 2:**

Are customers satisfied with the app, alerts, and are they useful/valuable?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

- For each of the sources of information you used, please rate how useful you found the information in managing your electricity use, where 0 is not useful at all and 10 is extremely useful. 1) Your rate plan study website. 2) The [IOU] My Account website. (Q42)
- Thinking about all the things that [IOU] has done to communicate with you about your new rate, including the welcome packet, your bills, other mailings and emails, and the website, how satisfied are you with [IOU]’s communications overall? (Q44)
- On a scale of 0 to 10, where 0 means do not agree at all and 10 means completely agree, to what extent do you agree with the following statements about the app? 1) The app is easy to use. 2) The information provided in the app is useful. 3) The alerts have helped me reduce my electricity use during peak periods. 4) The feedback on my electricity use has helped me reduce my electricity use during peak periods. 5) The app does <u>not</u> provide enough information about my household’s usage for me to take action. 6) There are too many alerts. 7) I would recommend this app to friends and family. (Q48)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics
- Use questions 42 and 44 as dependent variables in regression analyses to determine predictors of satisfaction with the website and/or app

**Research Question 3:**

What are the best features of and any improvements that should be made to the app(s)/alerts?

**Survey Question:**

The following survey question from the TOU instrument will be analyzed for answering the research question:

- On a scale of 0 to 10, where 0 means do not agree at all and 10 means completely agree, to what extent do you agree with the following statements about the app? 1) The app is easy to use. 2) The information provided in the app is useful. 3) The alerts have helped me reduce my electricity use during peak periods. 4) The feedback on my electricity use has helped me reduce my electricity use during peak periods. 5) The app does not provide enough information about my household's usage for me to take action. 6) There are too many alerts. 7) I would recommend this app to friends and family. (Q48)

**Analyses:**

The team will perform the following analyses with the survey question to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics

**Research Question 4:**

What is the level of awareness, uptake, and interest in smart thermostats?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

- You noted that you have installed a smart thermostat such as a Nest or Ecobee smart thermostat. On a scale of 0 to 10, where 0 means not satisfied at all and 10 means extremely satisfied, how satisfied are you with your smart thermostat? (Q49)

On a scale from 0 to 10, where 0 means do not agree at all and 10 means completely agree, please indicate the extent to which you agree with each of the following statements about your smart thermostat. 1) It is easy to use. 2) My thermostat has helped me manage my electricity use during this study. 3) It helps me lower my electricity bill. 4) It helps me keep my home at a comfortable temperature. (Q50)

Smart thermostats like Nest and Ecobee have the ability to turn down your cooling to help save more electricity when your rates are higher, like during on-peak hours. This can help you save money on your electricity bills without having to actively change your thermostat settings when rates are higher. On a scale of 0 to 10 where 0 is not interested at all to 10 extremely interested, how interested are you in using this feature? (Q51)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question.

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics

Use to create TOU subgroups (smart thermostat users) for analyses

Use questions 49 and 51 as dependent variables in regression analyses to determine predictors of which customers have smart thermostats, customer satisfaction with smart thermostats, and customer interest in smart thermostats

**Research Question 5:**

Are there differences in actions taken, satisfaction, or understanding of rates by thermostat/app users vs. non-users?

**Survey Questions:**

The following survey questions from the TOU instrument will be analyzed for answering the research question:

Which of the following best describes your home's thermostat? (Q38)

Have you downloaded the app? (Q46)

**Analyses:**

The team will perform the following analyses with the survey questions to answer the research question:

Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments

- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics
- Use in regression analyses regarding hardship, satisfaction, actions taken, understanding of rates, and other relevant research topics

## Motivations for Participating in the Pilot

**Research Question:**

What are customers' motivation(s) for opting-in and participating in the pilot?

**Survey Question:**

The following survey question from the TOU instrument will be analyzed for answering the research question:

- What motivated you to participate in this study? Please select the one main reason for participating. 1) To save money on my electricity bills. 2) To earn a total $200 bill credit. 3) Bill protection for the first 12 months meant I have nothing to lose. 4) It was the environmentally responsible thing to do. 5) To be one of the first to learn about the new rates. 6) To give the [IOU NAME] my feedback on my study rate plan. (Q2)

**Analyses:**

The team will perform the following analyses with the survey question to answer the research question:

- Calculate descriptive statistics (frequencies, means, etc.) by all RCT groups and TOU segments
- Conduct statistical comparisons (t-tests, chi-squares, ANOVA, etc.) across RCT groups, TOU segments and other key demographic and household characteristics
- Use as a dependent variable in regression analyses to determine predictors of customer motivations
- Use as a control variable in regression analyses regarding hardship, action taken, satisfaction, and other research topics

# Hardship Analysis

The remainder of this document describes the steps we will take to identify whether there is an incremental increase in hardship for pilot participants due to TOU rates. We will attempt to answer the following hardship-related research questions in our analysis of the 2016 survey.

- Do TOU rates increase hardship compared to the control rate?
- Does the level or existence of hardship vary by rate?
- Which TOU segments show the largest incremental increase in hardship due to TOU rates?

To answer the targeted hardship research questions, we first need to create several metrics – particularly metrics for economic/financial hardship and health hardship. **Table 12** provides a list of the metrics we plan to calculate for this hardship analysis. To create the TOU-specific hardship metrics, we will run exploratory factor analyses (EFAs) to identify which survey questions consistently measure financial or health hardship, and, if possible, to create two continuous variables that adequately measure the concepts of financial hardship and health hardship. We anticipate using a Maximum Likelihood extraction method with an orthogonal rotation (most probably Varimax). If we find evidence that factors may be correlated, we will consider using an oblique rotation method.

Once we have identified survey questions that adequately measure financial hardship and health hardship, we will assess the metric's internal consistency using Cronbach's alpha tests. Finally, to the extent possible, we will assess construct validity by conducting associative tests to see whether the metric correlates with associated items. This will be challenging since financial and health hardship, as measured for this pilot, goes beyond more traditional, static metrics, such as energy burden. Nevertheless, we will run correlations between energy burden calculations, the CFPB financial well-being scale (if not included in the metric itself), and household income. In **Table 12Table 15**, we list the set of groups and metrics we will use to help answer the research questions listed above.

**Table 15: Anticipated Metrics We Will Generate for the Hardship Analysis**

| Metrics | Description |
|---|---|
| Financial Hardship | Scaled combination of survey responses on hardship questions focused on finances |
| Health Hardship | Scaled combination of survey responses on hardship questions focused on health |
| CFPB Financial Well-Being | Scaled combination of CFPB survey responses |
| Summer electric energy burden | Sum of summer electricity bills divided by summer gross household income |
| Annual electric energy burden | Sum of all electricity bills divided by gross household income |
| Bill Impacts | Dollar amount showing difference between original rate and treatment rate |

Once we have developed these metrics, we will use them to identify whether there are differing levels of hardship between the control and treatment groups. We will use a series of OLS regression or ANOVA models to identify a) whether there is an increase in hardship for the treatment groups in comparison to the control rates, and b) whether the increase varies by a specific group (such as seniors, CARE/FERA customers, or hot climate zone customers). To align with Nexant's impact analysis plan, we will run separate regression models for all eight rate treatments as well as models to estimate incremental hardship for specific customer segments included in the design of the pilot. We will then compare results across these statistical models to gauge whether there are similar findings across statistical models, allowing us to identify whether there is an increase in incremental hardship for a specific customer segment (e.g. CARE/FERA seniors in the hot climate zone).

## Identifying CARE/FERA Eligible – Data Imputation Process to Estimate Income for Item Non-Responders

To estimate CARE/FERA eligibility for each survey respondent, we will need to use data from the survey, namely self-reported household income and the number of persons in the household. Historically, income questions often suffer from a high rate of non-response by survey takers. This section outlines our approach to impute data, if we observe a high-level of non-response for our income question.

To impute income data, we will first identify the non-response rate for this survey question and assess whether there are differences in non-response rates by TOU segments. If we see a higher non-response rate in non-senior and non-CARE/FERA groups – groups less vital to assessing hardship for the 745 decision - we will proceed with the following plan:

1. Use responses from the 2016 survey if available.
2. If they are not available, we will use responses from the enrollment survey.
3. Finally, if those data are not available, we will use third party data as an approximate income level for each household.

However, if we see a higher non-response rates in critical populations, such as CARE/FERA groups, we will run the regressions described below with three income variants:

1. A model that includes only data from those who provided their income in the 2016 survey.
2. A model that also includes the imputed data described above, and
3. A model that excludes income altogether from the model.

We will compare whether these models and see whether the models provide statistically significant differences, if they do, we will assess the use of income in our regression models.

# Appendix C: Research Questions Mapped to CPUC Resolution E-476

**Research Questions Mapped to CPUC Resolution E-4762**

| **CPUC Deliverable** | **TOU Working Group Research Questions** |
|---|---|
| The impact of a given TOU rate on how seniors and economically vulnerable customers in hot climate zones change their energy usage and on these customers' choices regarding other household expenses. (pg. 21) | Which customers experience issues with paying their bills (any bill and/or electric bill)?<br><br>Do TOU rates cause or enhance economic, or lifestyle hardship?<br><br>How do customers' perceptions of their energy bills under TOU differ by pilot group (treatment and control) and what is considered too much (and why)?<br><br>What household/structural characteristics correlate with customers' ability to change behavior and/or saving energy?<br><br>How easy or difficult is it for customers to take action to save energy or shift load?<br><br>What are the barriers to taking action?<br><br>Do customers show persistence of taking actions?<br><br>What are the changes in customer behavior during the pilot, and cause(s) of these changes? Are customers changing how they use appliances and technology because of the rate? |
| The impact of a given TOU rate on how CARE/FERA customers and non-CARE/FERA customers – in PG&E's entire territory and in the hot, moderate and cool climate regions separately – change their energy usage and on these customers' choices regarding other household expenses. (pg. 23) | Which customers experience issues with paying their bills (any bill and/or electric bill)?<br><br>Do TOU rates cause or enhance economic, or lifestyle hardship?<br><br>How do customers' perceptions of their energy bills under TOU differ by pilot group (treatment and control) and what is considered too much (and why)?<br><br>What household/structural characteristics correlate with customers' ability to change behavior and/or saving energy?<br><br>How easy or difficult is it for customers to take action to save energy or shift load?<br><br>What are the barriers to taking action?<br><br>Do customers show persistence of taking actions?<br><br>What are the changes in customer behavior during the pilot, and cause(s) of these changes? Are customers changing how they use appliances and technology because of the rate? |
| The level of customer understanding, | Are customers aware they are in the pilot and that they were not on TOU |

| | |
|---|---|
| acceptance, and engagement while taking service on a given TOU rates among various customer segments. (pg. 23) | rates before?<br><br>Do customers understand TOU rates, generally what peak periods are, and why they are designed this way?<br><br>Are customers satisfied overall and with various aspects of their TOU rate plan? Does satisfaction differ by RCT group?<br><br>Do customers perceive a benefit from TOU rates and do customers understand how they can be successful in managing their bill? |
| The impact of smartphone applications on energy usage and/or customer understanding, acceptance, and engagement while taking service on a given TOU rate. (pg. 24) | Are customers aware they are in the pilot and that they were not on TOU rates before?<br><br>Do customers understand TOU rates, generally what peak periods are, and why they are designed this way?<br><br>Are customers satisfied overall and with various aspects of their TOU rate plan? Does satisfaction differ by RCT group? |
| The impact of education and outreach (E&O) materials that are tailored to various customer segments (including seniors, renters, and non-English speaking customers) and to certain cognitive profiles/customer personas on customer understanding of, acceptance of, and engagement with a TOU rate. (pg. 24) | Did customers receive, read, and understand materials?<br><br>What is the relevance of the materials and their self-reported impact on customer's actions/behaviors?<br><br>What is the frequency and mode of communication of the materials preferred by customers? |

## Appendix D: Final 2016 Survey

# CA TOU Opt-In Pilot: 2016 Pilot

## Web/Booklet Version

| Research Objectives | Research Issues | Associated Questions |
|---|---|---|
| Which customers experience issues with paying their bills (any bill and/or electric bill)? | Issues paying energy bill/Tradeoffs under TOU | Q14, Q13 |
| | Financial well-being | Q14, Q15 |
| | Sources of hardship | Q27, Q28, Q29 |
| Do TOU rates cause or enhance economic, or lifestyle hardship? | TOU cause/enhance hardships | Q16, Q17 |
| How do customers' perceptions of their energy bills under TOU differ by pilot group and what is considered too much (and why)? | Perception of energy bills under TOU | Q18 |
| What are the demographic and lifestyle characteristics of customers, and do these characteristics predict self-reported hardship, level of curtailment, satisfaction and acceptance of rates, and ability to take action? | Age of respondent | Q23 |
| | Education of respondent | Q24 |
| | Annual household income | Q26 |
| | Employment status of respondent | Q25 |
| | Number and age of household members | Q30 |
| | Household members with disability/medical condition | Q29 |
| What household/structural characteristics correlate with customers' ability to change behavior and/or saving energy? | Own/rent home | Q33 |
| | Type of building/home | Q34 |
| | Size of home (bedrooms) | Q35 |
| | Household occupancy times | Q32 |
| | Type of cooling equipment in home | Q36 |
| Do enabling technologies (e.g. smart thermostat) help customers to change behavior and/or save energy? (ACTIONS TAKEN can get at changes in behavior) | Thermostat for cooling and/or heating in home | Q38 |
| | Type of thermostat | Q39 |
| | Thermostat settings | Q40 |
| | Satisfaction with smart thermostat | Q50 |
| Are customers satisfied overall and with various aspects of their TOU rate plan, and why/why not? Does satisfaction differ by RCT group? | Overall satisfaction with the rate | Q3 |
| | Satisfaction with TOU components and benefits received | Q4 |
| What are customers' perceptions of their utility? | Favorability towards utility | Q3 |
| Did customers receive, read, and understand materials? | Awareness and consumption of the program materials (kit) | Q5, Q7, Q41 |
| What is the relevance of the materials and their self-reported impact on customer's actions/behaviors? | Satisfaction with the program materials in relation to the relevance to customer's behaviors | Q6, Q8, Q43 |
| Are customers aware they are in the opt-in pilot and that they were not on TOU rates before? | Awareness of TOU rate change | Q1 |
| | General awareness of TOU concept | Q9 |
| Do customers understand TOU rates, what peak periods generally are, and why the rates are designed this way? | Awareness of TOU plan details | Q10 |
| | Awareness of reasons for TOU rates | Q11 |
| Do customers perceive a benefit from TOU rates and do customers understand how they can be successful in managing their bill? | Understand how to manage bill | Q3, Q9, Q11, Q19 |

| | | |
|---|---|---|
| How easy or difficult is it for customers to take action to save energy or shift load? | Extent of behavior change implemented | Q19 |
| | Level of ease to implementing behavior change | Q19 |
| What are the barriers to taking action? | Barriers to implementing behavior change | Q21 |
| What are the changes in customer behavior during the pilot, and cause(s) of these changes? Are customers changing how they use appliances and technology because of the rate? | Behavior changes implemented | Q19 |
| What is customers' awareness and frequency of use of the apps and websites? | Awareness of the pilot website | Q42 |
| | Usefulness of pilot website | Q43 |
| | Awareness of the pilot app for smart phone users | Q46 |
| | Rate of downloading the pilot app | Q47 |
| | Ways participants are using the pilot app | Q48 |
| Are customers satisfied with the app, and what are the best features of and any improvements that should be made to the app(s)/alerts? | App/Alert features and satisfaction | Q48, Q49 |
| What are customers' motivation(s) for opting-in and participating in the pilot? | Motivations for opting-in / participating | Q2 |
| What are customers' attitudes and behaviors towards EE and DR? | Awareness, knowledge, attitudes | Q22 |

## Motivations for Participating in the Study

To begin, these first few questions ask about why you decided to participate in the study, and your understanding of and satisfaction with your current electricity rate.

Q1. According to our records, your household signed up with [IOU NAME] to participate in a rate study, called the [IOU STUDY NAME], that began this summer (2016) and ends in December next year (2017).

[DISPLAY IF RCTGROUP=0] As part of the study, your rate may have changed or stayed the same.

Do you recall participating in this study?

1 Yes
2 No → Please go to Q3

Q2. What motivated you to participate in this study? Please select the <u>one</u> main reason for participating.

1 To save money on my electricity bills
2 To earn a total $200 bill credit
3 Bill protection for the first 12 months meant I have nothing to lose
4 It was the environmentally responsible thing to do
5 To be one of the first to learn about the new rates
6 To give the [IOU NAME] my feedback on my study rate plan
7 Other. Please specify ______________________________
98 Don't know______________________________

## Satisfaction with Rate

Q3. On a scale of 0 to 10, where 0 means not satisfied at all and 10 means extremely satisfied, how satisfied are you overall with the following? Please select one for each item.

| Item | 0<br>Not satisfied at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10<br>Extremely Satisfied |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Your current electricity rate plan | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| [IOU NAME] | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |

[ASK ALL]

Q4. On a scale of 0 to 10, where 0 means do not agree at all and 10 means completely agree, to what extent would you agree with the following statements about your current study rate plan?

| Item | 0<br>Do not agree at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10<br>Completely agree |
|---|---|---|---|---|---|---|---|---|---|---|---|
| The rate is easy to understand | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| The rate is fair | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| The rate provides me with opportunities to save money | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| [ASK IF RCTGROUP<>0, ASK IF TREATMENT GROUPS] The new rate is better than my old rate | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| The rate works with my household's schedule | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| The rate is affordable | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| My electricity bill is easy to understand | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| [ASK IF RCTGROUP<>0, ASK IF TREATMENT GROUPS] My electricity bill helps me understand the time of day I'm spending the most money on electricity | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| [ASK IF RCTGROUP<>0, ASK IF TREATMENT GROUPS] The peak and off-peak time periods are easy to remember | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| I would recommend my electricity rate plan to friends or family | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| [ASK IF RCTGROUP<>0, ASK IF TREATMENT GROUPS] I want to stay on my new rate plan | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| after this study ends | | | | | | | | | | | |

[ASK IF RCTGROUP<>0, ASK IF TREATMENT GROUPS]

Q5. At the beginning of the summer, did you receive and look through the welcome packet that came from [IOU NAME]? This "welcome packet" included information about your rate plan and tips to save on your energy bill.

1 Yes, received the packet and looked through it
2 Yes, received the packet, but did not look though it → Please go to Q9
3 No, did not receive the packet → Please go to Q9
98 Don't know → Please go to Q9

Q6. On a scale of 0 to 10, where 0 means do not agree at all and 10 means completely agree, please indicate the extent to which you agree with each of the following statements about the welcome packet you received.

| Item | 0<br>Do not agree at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10<br>Completely agree |
|---|---|---|---|---|---|---|---|---|---|---|---|
| The items in the packet were easy to understand | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| The information clearly explained how the price of electricity is different depending on the time of day and the season of the year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| After looking at the packet, I completely understood how the new rate works | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| I have used many of the tips provided in the packet | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| The decals or stickers in the packet were helpful | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |

[ASK IF WEB+PHONE=1 & RCTGROUP=0 & IOU=PG&E, ASK IF PG&E CONTROL GROUP ON WEB/PHONE]

Q7. At the beginning of the summer, did you receive and look through the welcome packet that came from PG&E? This "welcome packet" included information about your study rate plan and tips to save on your energy bill.

1 Yes, received the packet and looked through it
2 Yes, received the packet, but did not look through it → Please go to Q9
3 No, did not receive the packet → Please go to Q9
98 Don't know → Please go to Q9

[IF Q7=1, RECEIVED AND LOOKED THROUGH WELCOME KIT]

Q8. On a scale of 0 to 10, where 0 means do not agree at all and 10 means completely agree, please indicate the extent to which you agree with each of the following statements about the welcome packet you received.

| Item | 0 Do not agree at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 Completely agree |
|---|---|---|---|---|---|---|---|---|---|---|---|
| The packet was easy to understand | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| The information clearly explained what to expect during the study | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| I have used many of the tips provided in the packet | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |

# Understanding of How Rates Work

[ASK ALL]

Q9. Please select all the statements below that describe the price of electricity for your rate as of June 2016, the beginning of summer.

"Under my current study rate the price of electricity is different depending on… "

1 The time of day
2 The day of the week (weekdays versus weekends)
3 The season
4 The weather or temperature
5 The total amount of electricity you use
6 None of the above
98 Don't know

[ASK IF RCTGROUP<>0, ASK IF TREATMENT GROUPS]

Q10. To the best of your knowledge, during what times on weekdays in the summer months is electricity the most expensive to use based on your current study rate plan? Mark all the hours when electricity is most expensive to use.

| AM | 12 midnight | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| PM | 12 noon | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Q11. To the best of your knowledge, why do you think California electric utilities are changing to time of use rates? Select one response for each item.

| | Yes | No | Don't know |
|---|---|---|---|
| To help customers save money on electricity bills | 1 | 2 | 3 |
| To improve the reliability of the electricity power grid and avoid power outages | 1 | 2 | 3 |
| To better align the price customers pay for electricity to the actual cost to produce and deliver electricity | 1 | 2 | 3 |
| To help reduce the need to build new power plants | 1 | 2 | 3 |
| To balance the electric grid due to the growing amount of renewable energy, like solar energy, generated in California | 1 | 2 | 3 |
| To give customers an incentive to reduce use at times when electricity use is high. | 1 | 2 | 3 |
| To help [IOU NAME] make more money | 1 | 2 | 3 |
| To help [IOU NAME] keep energy costs down | 1 | 2 | 3 |

## Which Customers Experience Issues with Paying Their Bills?

[ASK ALL]

Q12. Since June 2016, how well does this statement describe you and your situation? Please select one for each statement.

| | Not at all | Very little | Somewhat | Very well | Completely |
|---|---|---|---|---|---|
| Because of my money situation, I feel like I will never have the things I want in life | 1 | 2 | 3 | 4 | 5 |
| I am just getting by financially | 1 | 2 | 3 | 4 | 5 |
| I am concerned that the money I have won't last | 1 | 2 | 3 | 4 | 5 |

[ASK ALL]

Q13. How often does this statement apply to you?

| | Never | Rarely | Sometimes | Often | Always |
|---|---|---|---|---|---|
| I have money left over at the end of the month | 1 | 2 | 3 | 4 | 5 |
| My finances control my life | 1 | 2 | 3 | 4 | 5 |

[ASK ALL]

Q14. Since June 2016, how many times, if at all, has your household had difficulty paying your bills? Please select one response for each type of bill.

| | None | 1 time | 2 times | 3 or more times | Not sure |
|---|---|---|---|---|---|
| Electricity bill | 0 | 1 | 2 | 3 | 4 |
| Bills for other basic needs such as food, housing, | 0 | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| medicine, and other important bills | | | | | |

[ASK ALL]

Q15. How did your household afford to pay electricity bills and/or other basic needs this summer? Select all that apply.

1 Use your household’s current income
2 Use your household’s savings or other investments
3 Cut back on non-essential spending for things your household wants
4 Reduce your household energy usage
5 Borrow money from family, friends, or peers
6 Borrow money using a short term loan
7 Use a credit card that you can't pay off right away
8 Leave rent/mortgage unpaid
9 Leave some household bills unpaid past the due date
) Received emergency assistance from [IOU NAME]
! Received emergency assistance from other city or regional programs
@ None of the above

## Do TOU Rates Cause or Enhance Economic or Lifestyle Hardship?

[ASK ALL]

Q16. Since June 2016, how often, if ever, were you or any members of your household uncomfortably hot inside your home because you were trying to save money on your electricity bill?

1 Never
2 Rarely
3 Sometimes
4 Most of the time
5 Always
98 Don’t know

[ASK ALL]

Q17. Since June 2016, how often, if ever, did you or any members of your household need medical attention because it was too hot inside your home? Please select only one

| Never | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | More than 10 times | Don’t know |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | |

[ASK ALL]

Q18. Since June 2016, has your household's electricity bills been high, lower, or about the same as you expected?

1 Higher than you expected
2 About the same as you expected
3 Lower than you expected
4 Did not have any expectation
98 Don't know

## Actions Taken

These next questions ask about what your household has done, if anything, to change when or how electricity is used in your home since June 2016.

[ASK ALL]

Q19. Since the beginning of this summer, how often, if at all, did you take the following actions to reduce your household's electricity usage in the afternoon and evenings?

| Item | Never | Rarely | Sometimes | Usually | Always | NA |
|---|---|---|---|---|---|---|
| Increased the temperature on my thermostat in the afternoon and evening | 0 | 1 | 2 | 3 | 4 | 5 |
| Turned off air conditioning during the afternoon and evening | 0 | 1 | 2 | 3 | 4 | 5 |
| Avoided doing laundry during the afternoon and evenings | 0 | 1 | 2 | 3 | 4 | 5 |
| Avoided running the dishwasher during the afternoon and evenings | 0 | 1 | 2 | 3 | 4 | 5 |
| Avoided running my spa or pool pump during the afternoon or evenings | 0 | 1 | 2 | 3 | 4 | 5 |
| Avoided cooking during the afternoon or evenings | 0 | 1 | 2 | 3 | 4 | 5 |
| Turned off lights not in use during the afternoon and evening | 0 | 1 | 2 | 3 | 4 | 5 |
| Turned off office equipment (computer, printer, etc.) during the afternoon and evening | 0 | 1 | 2 | 3 | 4 | 5 |
| Turned off entertainment systems (TV, Nintendo, etc.) during the afternoon and evening | 0 | 1 | 2 | 3 | 4 | 5 |
| Pre-cooled the home by running air conditioning earlier in the day | 0 | 1 | 2 | 3 | 4 | 5 |

[ASK IF Q19<>NEVER FOR ALL ITEMS]

Q20. Since the beginning of this summer, how easy was it for you or members of your household to take action to reduce your electricity usage in the afternoon and evenings? Please use a 0 to 10 scale where 0 means not easy at all and 10 means extremely easy.

| 0<br>Not at all Easy | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10<br>Extremely Easy |
|---|---|---|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

[ASK ALL]
Q21. Which of the following, if any, has kept you from reducing or shifting your electricity usage <u>in the afternoon and evenings</u>? Please select all that apply.

1 Nothing keeps me from shifting my usage
2 I can't think of anything else to do
3 My household already uses very little electricity
4 My home gets uncomfortable if I try to reduce electricity usage
5 Child(ren) in household make it difficult to change our routines
6 Disabled household member makes it difficult to change our routines
7 Elderly household member makes it difficult to change our routines
8 Working from home makes it difficult to use less electricity
9 My schedule doesn't allow me to reduce my usage
) I am at home most of the day
! I have old appliances that use a lot of energy
@ I can afford to use as much electricity as I want
# I don't know what actions to take to lower my electricity bill.

## General Attitudes and Awareness Towards EE & ER

Q22. Using a scale of 0 to 10 where 0 means do not agree at all, and 10 means completely agree, please tell me how much you agree with each statement.

| Item | 0<br>Do not agree at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10<br>Completely agree |
|---|---|---|---|---|---|---|---|---|---|---|---|
| I often worry whether there is enough money to pay my electricity bill. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| I am very concerned about how my energy use affects the environment. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| It is my responsibility to use as little energy as possible to help the environment. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| I feel guilty if I use too much energy. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| I conserved electricity in my home this summer. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| If my electricity bill goes up, I feel like I must do something to reduce it. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |

# Demographic Characteristics

[ASK ALL]
Q23. In what year were you born?

1. YYYY

[ASK ALL]
Q24. Which of the following best describes the highest level of education you completed?

1 Some high school or less
2 High school graduate or equivalent
3 Some college, no degree
4 Technical college degree or certificate
5 Two-year college degree
6 Four-year college degree
7 Graduate or professional degree

[ASK ALL]
Q25. Which of the following best describes your household's annual income in 2015, before taxes?

1 Less than $12,000
2 $12,000 to less than $17,000
3 $17,000 to less than $21,000
4 $21,000 to less than $25,000
5 $25,000 to less than $29,000
6 $29,000 to less than $33,000
7 $33,000 to less than $37,000
8 $37,000 to less than $41,000
9 $41,000 to less than $50,000
) $50,000 to less than $100,000
! $100,000 or more
98 Don’t know

[ASK ALL]
Q26. What is your current employment status? Select all that apply.

1 Employed full-time
2 Employed part-time
3 Seasonally employed

4 Employed, but working non-daytime shifts
5 Unemployed, looking for work
6 Unemployed, not looking for work
7 Homemaker
8 Student
9 Retired
) Unable to work due to a disability

[ASK ALL]
Q27. Since June 2016, have you or other members of your household experienced any of the following? Select all that apply.

1 Lost a job or became unemployed
2 Had work hours or pay reduced
3 Received foreclosure or eviction notice
4 Divorced or separated from spouse/domestic partner
5 Had a death of a household member
6 Had a baby
7 Cared for elderly or disabled household member
8 Became disabled or seriously ill
9 None of the above

[ASK ALL]
Q28. Do any of following apply to you or others in your household? Please check Yes or No for each item.

| | Yes | No | Don't know |
|---|---|---|---|
| Has a serious disability, respiratory condition, or other serious medical condition | 1 | 2 | |
| Receives disability payments | 1 | 2 | |

[ASK ALL]
Q29. Does anyone in your household have a disability or serious medical condition that requires any of the following item? Please check Yes or No for each item.

| | Yes | No | Don't know |
|---|---|---|---|
| Your home to be cooled in the summer | 1 | 2 | |
| You to use more energy for medical equipment | 1 | 2 | |
| Them to be home most of the day | 1 | 2 | |

[ASK ALL]
Q30. How many people in each of the following age categories lived in your home this summer, **not** including yourself?

| | 0 None | 1 | 2 | 3 | 4 | 5 | 6 | 7 or more |
|---|---|---|---|---|---|---|---|---|
| Under 6 years old | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Between 6 and 17 years old | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Between 18 and 64 years old | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Between 65 and 74 years old | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Between 75 and 84 years old | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 85 years or older | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

[ASK ALL]
Q31. Which categories describe you? Please select all that apply

1 American Indian or Alaska Native (For example, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, Nome Eskimo Community, etc.)
2 Asian (For example, Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese, etc.)
3 Black or African American (For example, African American, Jamaican, Haitian, Nigerian, Ethiopian, Somalian, etc.)
4 Hispanic, Latino, or Spanish origin (For example, Mexican or Mexican American, Puerto Rican, Cuban, Salvadorian, Dominican, Colombian, etc.)
5 Native Hawaiian or Other Pacific Islander (For example, Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, Marshallese, etc.)
6 Middle Eastern or North African (For example, Lebanese, Iranian, Egyptian, Syrian, Moroccan, Algerian, etc.)
7 White (For example, German, Irish, English, Italian, Polish, French, etc.)
8 Some other race, ethnicity, or origin
98 Don’t know

# Household Characteristics

[ASK ALL]
Q32. In the summer, is there someone usually home during each of the following times on weekdays and weekends?

| | Weekday | | | | Weekend | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | No | Not sure | Decline to answer | Yes | No | Not sure | Decline to answer |
| Morning | | | | | | | | |
| Afternoon | | | | | | | | |
| Evening | | | | | | | | |
| Night | | | | | | | | |

[ASK ALL]
Q33. Do you or others in your household own your home, rent your home without subsidized housing assistance, or rent your home with subsidized housing assistance?

1 Owned by you or someone else in your household
2 Rented without subsidized housing assistance (such as Section 8)
3 Rented with subsidized housing assistance (such as Section 8)
98 Don't know

[ASK ALL]
Q34. What kind of house or building do you live in?

1 Single-family detached house
2 Duplex, triplex, or four-plex
3 Apartment or condo building
4 Townhome
5 Manufactured or mobile home
6 Boat, RV, van, camper, or other mobile unit
98 Don't know

[ASK ALL]
Q35. How many bedrooms are in your home?

0 None/Studio
1 One
2 Two
3 Three
4 Four
5 Five or more

[ASK ALL]
Q36. a) Do you have the following items in your home? Please mark Yes or No for each item.

b) For the items you have in your home, please mark how often you've used them to cool your home this past summer.

| Item | Yes | No | | Daily | Several days a week | Several days a month | Never |
|---|---|---|---|---|---|---|---|
| Central air-conditioning system | ☐ | ☐ | → | ○ | ○ | ○ | ○ |
| Room air conditioning unit that is portable or attached to your window | ☐ | ☐ | → | ○ | ○ | ○ | ○ |
| Evaporative or swamp cooler | ☐ | ☐ | → | ○ | ○ | ○ | ○ |
| Heat pump | ☐ | ☐ | → | ○ | ○ | ○ | ○ |
| Ceiling or portable fan(s) | ☐ | ☐ | → | ○ | ○ | ○ | ○ |

[ASK ALL]

Q37. Is your name on the bill you receive from [IOU NAME]?

[SINGLE RESPONSE]

1 Yes
2 No
98. Don't know

[ASK ALL]
Q38. Does your home have a thermostat to control your cooling and/or heating equipment?

1 Yes, a thermostat that turns on and off my *heating* system only
2 Yes, a thermostat that turns on and off my *cooling* system only
3 Yes, a thermostat that turns on and off *both* my heating and cooling systems
4 No thermostat
98 Don't know

[ASK IF Q38=1 OR Q38=2 OR Q38=3, HAS THERMOSTAT]
Q39. Which of the following best describes your home's thermostat? Please select one

1. A standard thermostat that you must manually adjust when you want to change the temperature in the home
2. A programmable thermostat that can be automatically set to different temperatures at different times of the day
3. A smart thermostat (like a Nest, Lyric, or Ecobee) that works like a programmable thermostat but has additional features like a touch screen, smartphone app, connection to your home's Wi-Fi, or automatic temperature adjustment based on whether someone is home

[IF Q38=2 OR Q38=3, HAS COOLING THERMOSTAT]
Q40. In late afternoon and evening times during the **summer**, what temperature do you typically set your thermostat at for weekdays and weekends? Please select one for weekdays and one for weekends

| | Weekdays | Weekends |
|---|---|---|
| Off | 1 | 1 |
| Below 68 F | 2 | 2 |
| 69 F to 71 F | 3 | 3 |
| 72 F to 74 F | 4 | 4 |
| 75 F to 77 F | 5 | 5 |
| 78 F to 80 F | 6 | 6 |
| 81 F or higher | 7 | 7 |

## Website, Tools, & App Use

[ASK IF WEB+PHONE=1 AND IF RCTGROUP<>0, TREATMENT GROUPS]

Q41. Since your rate changed this summer, [IOU] has sent you information to help you manage your electricity use, including a welcome packet, and seasonal packets. Which of the following sources of information do you remember receiving? Select all that you remember.

1 A welcome packet
2 A summer newsletter with tips
3 A fall newsletter with tips
4 [IF IOU=PG&E AND APPINVITE=1] An invitation to download a smartphone app by Bidgely to manage your electricity use
5 [IF IOU=SDG&E AND APPINVITE=1] SDG&E's smartphone app that can alert you when your rate changes throughout the day

[ASK IF WEB+PHONE=1 AND IF RCTGROUP<>0, TREATMENT GROUPS]

Q42. Since summer began, have you visited the following websites? Please select all that you have visited.

1 [IF IOU=SDG&E] Your rate plan study website (sdge.com/MyWhenergy)
2 [IF IOU=SDG&E] The SDG&E My Account website
3 [IF IOU=PG&E AND IF RCTGROUP=1] Your rate plan study website (pdgestudy4to9pm.com)
4 [IF IOU=PG&E AND IF RCTGROUP=2] Your rate plan study website (pdgestudy6to9pm.com)
5 [IF IOU=PG&E AND IF RCTGROUP=3] Your rate plan study website (pdgestudythreeseasons.com)
6 [IF IOU=PG&E] The PG&E My Account website
7 [IF IOU=SCE AND IF RCTGROUP=1] Your rate plan study website (on.sce.com/tousave)
8 [IF IOU=SCE AND IF RCTGROUP=2] Your rate plan study website (on.sce.com/toushift)
9 [IF IOU=SCE AND IF RCTGROUP=3] Your rate plan study website (on.sce.com/touseason)
) [IF IOU=SCE] The SCE My Account website

[ASK IF WEB+PHONE=1 AND IF RCTGROUP<>0, TREATMENT GROUPS, AND IF (Q41<>98, or 99, OR Q42<> 98, or 99)]

Q43. For each of the sources of information you used, please rate how useful you found the information in managing your electricity use, where 0 is not useful at all and 10 is extremely useful.

[MATRIX QUESTION: SCALE]

| Item | 0 Not useful at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 Extremely useful |
|---|---|---|---|---|---|---|---|---|---|---|---|
| [PIPE IN SELECTED FROM Q41] | | | | | | | | | | | |
| [PIPE IN SELECTED FROM Q42] | | | | | | | | | | | |

[ASK IF WEB+PHONE=1 AND IF LANGPREF<>ENGLISH]

Q44. Our records indicate that your household received information in both English and [LANGPREF] On a scale from 0 to 10, where 0 is not important at all and 10 is extremely important, how important was it for you to receive this information in [LANGPREF]?

[SINGLE RESPONSE]

1. SCALE 0 to 10
98. Not sure

[ASK IF WEB+PHONE=1 AND IF RCTGROUP<>0, TREATMENT GROUPS, AND IF (Q41<>98, or 99, OR Q42<> 98, or 99)]

Q45. Thinking about all the things that [IOU] has done to communicate with you about your new rate, including the welcome packet, your bills, other mailings and emails, and the website, how satisfied are you with [IOU]'s communications overall?

[MATRIX QUESTION: SCALE]

| 0 Not satisfied at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 Extremely satisfied |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

[ASK IF WEB+PHONE AND IF PG&E OR SDG&E + APP INVITATION RECIPIENT]

Q46. When your rate changed this summer, [IOU NAME] invited you to download a smartphone app that notifies customers like you of when electricity rates change during the day. It also allows you to check your electricity usage. Are you aware of this app?

1. Yes
2. No
98. Don't know

[ASK IF WEB+PHONE=1 AND IF Q46=1, AWARE, AND IF PG&E OR SDG&E + APP INVITATION RECIPIENT]

Q47. Have you downloaded the app?

1. Yes
2. Tried to download the app but couldn't make it work
3. No
98. Don't know

[ASK IF WEB+PHONE=1 AND IF Q47=1, DOWNLOADED, AND IF PG&E OR SDG&E + APP INVITATION RECIPIENT]

Q48. Please indicate whether or not you have used each of the following features of the app. For each feature you have tried, please indicate how helpful you find this feature on a scale of 0 to 10, where 0 means not helpful at all and 10 means extremely helpful.

| Item | Used |
|---|---|

| 0 Not helpful at | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 Extremely helpful |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | all | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [DISPLAY IF IOU=SDG&E] Alerts during the day that the electricity rates have changed | | → | | | | | | | | | | | |
| [DISPLAY IF IOU=PG&E] Information about the current pricing period | | → | | | | | | | | | | | |
| Access to your monthly projected bill amount | | → | | | | | | | | | | | |
| [DISPLAY IF IOU=SDG&E] Summary of monthly usage by peak period | | → | | | | | | | | | | | |
| Access to more detailed information about your household energy use patterns | | → | | | | | | | | | | | |
| [DISPLAY IF IOU=PG&E] Information about your electricity use by "always on" and "cooling" usage | | → | | | | | | | | | | | |

[ASK IF WEB+PHONE=1, AND IF PG&E OR SDG&E + APP INVITATION RECIPIENT]

Q49. On a scale of 0 to 10, where 0 means do not agree at all and 10 means completely agree, to what extent do you agree with the following statements about the app?

| Item | 0<br>Do not agree at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10<br>Completely agree |
|---|---|---|---|---|---|---|---|---|---|---|---|
| The app is easy to use | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| The information provided in the app is useful | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| [DISPLAY IF IOU=SDG&E] The alerts have helped me reduce my electricity use during peak periods | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| [DISPLAY IF IOU=PG&E] The feedback on my electricity use has helped me reduce my electricity use during peak periods | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| The app does not provide enough information about my household's usage for me to take action | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| [DISPLAY IF IOU=SDG&E] There are too many alerts | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| I would recommend this app to friends and family | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |

[ASK IF WEB+PHONE=1 AND Q39=3, HAS SMART THERMOSTAT]

Q50. You noted that you have installed a smart thermostat such as a Nest or Ecobee smart thermostat. On a scale of 0 to 10, where 0 means not satisfied at all and 10 means extremely satisfied, how satisfied are you with your smart thermostat?

| 0<br>Not satisfied at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10<br>Extremely satisfied |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |

[ASK IF WEB+PHONE=1 AND IF Q39=3, HAS SMART THERMOSTAT]

Q51. On a scale from 0 to 10, where 0 means do not agree at all and 10 means completely agree, please indicate the extent to which you agree with each of the following statements about your smart thermostat

| Item | 0<br>Do not agree at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10<br>Completely agree |
|---|---|---|---|---|---|---|---|---|---|---|---|
| It is easy to use | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| My thermostat has helped me manage my electricity use during this study | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| It helps me lower my electricity bill | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |
| It helps me keep my home at a comfortable temperature | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |

[ASK IF WEB+PHONE=1 AND Q39=3, HAS SMART THERMOSTAT AND RCTGROUP <>0]

Q52. Smart thermostats like Nest and Ecobee have the ability to turn down your cooling to help save more electricity when your rates are higher, like during on-peak hours. This can help you save money on your electricity bills without having to actively change your thermostat settings when rates are higher. On a scale of 0 to 10 where 0 is not interested at all to 10 extremely interested, how interested are you in using this feature?

[MATRIX QUESTION: SCALE]

| 0<br>Not interested at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10<br>Extremely interested |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ) |

# Final Questions

[ASK ALL]

Q53. We want to make sure we fully understand your experience with this study. If we have further questions for you, can we contact you to ask a few more in-depth questions? This would be outside of the planned 2nd survey we will send to you next summer and you would receive an additional incentive for participating.

[SINGLE RESPONSE]

1 Yes
2 No

# Appendix E: Example Invitation Letters for Survey

## Memorandum

To: Andrew Lee, Dana Santana, and Miriam Fischlein
From: Alex Dunn, Benn Messer, and Jane Peters, Research Into Action

Date: September 13, 2016

Re: TOU Survey Letters, Postcards, and Emails

The team created first drafts of the letters, postcards, and emails that will be sent to the sample of TOU customers. TOU customers will be divided into two groups for purposes of the survey, based on whether a customer email address is available: a Mail+Phone group of customers without email address and an Email+Mail+Phone group of customers with email address. Table 1 shows the contacts each group will receive.

Table 1: TOU Survey Contacts[1]

| | First Contact | Second Contact | Third Contact | Fourth Contact | Fifth Contact | Sixth Contact |
|---|---|---|---|---|---|---|
| Mail+Phone Group | Invitation Letter | First Reminder Postcard | Survey Booklet & Letter | Second Reminder Postcard | Phone Calls | |
| Email+Mail+Phone Group | Invitation Letter | First Reminder Email | Second Reminder Email | Survey Booklet & Letter | First Reminder Postcard | Phone Calls |

[1] Letters and postcards mailed to respondents via U.S. Postal Service; emails sent to respondents through WSU SESRC email server.

**ME&O NOTES:**

**SCE:** Called "Time of Use Rate Plan Study"; $200 bill credit incentive ($100 sign-up, $50 first survey, $50 second survey)

**SDG&E:** Called "Time of Use Study"; $200 bill credit incentive ($75 bill credit in August, $50 after first survey, and $75 after second survey; couldn't find credit amounts for each)

**PG&E:** Called "Electric Rates Study"; $200 bill credit incentive ($75 sign-up, $50 first survey, $75 second survey)

**LETTER/EMAIL/PHONE INPUTS:**

[IOU NAME]: Pacific Gas and Electric Company (PG&E); San Diego Gas & Electric (SDG&E); Southern California Edison (SCE)

[IOU SHORT NAME]: PG&E, SDG&E, SCE

[IOU STUDY NAME]: Electric Rates Study {PG&E name}; Time of Use Study {SDG&E name}; Time of Use Rate Plan Study {SCE name}

[IOU TEAM NAME]: Pacific Gas and Electric Company Electric Rates Study Team; San Diego Gas and Electric Time of Use Study Team; Southern California Edison Time of Use Rate Plan Study Team

[IOU PHONE NUMBER]: Phone number for IOU call center

[IOU EMAIL]: IOU-specific email set up for study (e.g. SCEtoupilot@sce.com)

[IOU ADDRESS]: TBD

[WSU NAME]: the organization name “WSU”

[WSU PHONE NUMBER]: Phone number for WSU SESRC’s call center

[WSU EMAIL]: IOU-specific email for WSU SESRC’s call center (e.g. *PGE*_RateSurvey@wsu.edu)

[IOU TOTAL INCENTIVE]: $200 or $300

[IOU SURVEY 1 INCENTIVE]: $50, $75, or $100

## WEB & SURVEY BOOKLET INTRODUCTION [Displayed on Survey Webpage & Printed on Front of Booklet]

We want to thank you for your participation in this survey and in the [IOU NAME] [IOU STUDY NAME]!

As you may recall, your household enrolled to participate in the [IOU SHORT NAME] [IOU STUDY NAME] that began this past summer and will end in December 2017. As part of your participation, it is important that we get early feedback about your experience in this study thus far to help us design electricity rates that work better for customers like you.

- Please have an adult 18 years or older who makes decisions about your household's electricity usage and bills complete [IF MAIL: and return] this short 20-minute survey.
- [IOU SHORT NAME] will credit one of your next two upcoming electricity bills with [IOU SURVEY 1 INCENTIVE]. This [IOU SURVEY 1 INCENTIVE] bill credit is part of the total [IOU TOTAL INCENTIVE] in bill credits being provided by [IOU SHORT NAME] for your participation in the surveys for the [IOU STUDY NAME]. This [IOU SURVEY 1 INCENTIVE] credit is available <u>only</u> to those who complete [IF MAIL: and return] this survey.
- [IF WEB:] Please be sure to click the Submit button at the end of the survey to send your answers.
- Your responses are voluntary and will be kept confidential. If you have any questions about this survey, please contact [WSU NAME] by phone at [WSU PHONE NUMBER] or by email at [WSU EMAIL].

# INVITATION LETTER [First Contact for Mail+Phone and Email+Mail+Phone Groups]

Dear [CUSTOMER NAME],

As you may recall, your household enrolled to participate in [IOU's] [IOU STUDY NAME], which began this past summer and will end in December 2017.

**It is very important that we get your feedback on your experience in this study thus far so that we can understand how changes to electricity rates impact your life and your electricity bills. This will help us design electricity rates that work better for customers like you. To provide your feedback, please have an adult 18 years or older who makes decisions about your household's energy usage and bills complete this short 20-minute survey.**

To complete this survey, please enter the webpage address below into your Internet browser and then type in the passcode to begin the survey. (NOTE: Please enter the webpage address in the address space in your Internet browser, not the space for Google, Yahoo, or other web searches.)

**Webpage address:** < TBD >

**Passcode:** <#########>

Once we've processed your completed survey, [IOU SHORT NAME] will apply **a [IOU SURVEY 1 INCENTIVE] bill credit** to one of your next two upcoming electricity bills. This [IOU SURVEY 1 INCENTIVE] credit is part of the total [IOU TOTAL INCENTIVE] in bill credits to be provided by [IOU SHORT NAME] for participating in the study's surveys. This [IOU SURVEY 1 INCENTIVE] credit is available only if you complete this survey.

Your responses are voluntary and will be kept confidential. Washington State University's Social & Economic Sciences Research Center is conducting this survey on behalf of [IOU SHORT NAME]. If you have any questions about this survey, please contact [WSU NAME] by phone at [WSU PHONE NUMBER] or by email at [WSU EMAIL].

We request that you complete the survey as soon as possible, and look forward to receiving your responses.

Sincerely,

[IOU TEAM NAME]

[IOU ADDRESS]

FOOTER:

If you would like to verify [IOU SHORT NAME]'s sponsorship of this survey, please contact [IOU SHORT NAME]'s [IOU STUDY NAME] line [IOU PHONE NUMBER] or e-mail us at [IOU EMAIL]

# FIRST REMINDER EMAIL [Second Contact for Email+Mail+Phone Group]

SUBJECT: Your [IOU] [IOU STUDY NAME] Survey and [IOU SURVEY 1 INCENTIVE] Bill Credit

Dear [CUSTOMER NAME],

We're pleased to announce that it is now time for you to receive your <u>electricity bill credit of [IOU SURVEY 1 INCENTIVE]</u> for participating in the [IOU NAME] [IOU STUDY NAME]. This [IOU SURVEY 1 INCENTIVE] incentive is part of the total [IOU TOTAL INCENTIVE] in bill credits promised by [IOU SHORT NAME] for participating in the study and is available only if you complete the survey.

Last week we sent you a letter requesting you to complete a feedback survey about your household's experience participating in the [IOU SHORT NAME] [IOU STUDY NAME]. If you or someone in your household has already completed the survey, please accept our sincere thanks.

**If you have not completed the survey, we do need your feedback and request that you or an adult 18 years or older who makes decisions about your household's electricity usage and bills please complete the survey at the earliest convenience. Your answers to our survey are very important for informing [IOU] about your household's experience in the study so that we can design electricity rates that work for customers like you.**

Completing the survey is short and easy. Just click the link to the webpage below, or type it into your Internet browser, and then type in the passcode to begin the survey. It should take about 20 minutes to complete.

**Webpage address:** < TBD >

**Passcode:** <#########>

Your responses are voluntary and will be kept confidential so that no individual can be identified by the answers they give. Washington State University's Social & Economic Sciences Research Center is conducting this survey on behalf of [IOU SHORT NAME]. If you have any questions about this survey, please contact [WSU NAME] by phone at [WSU PHONE NUMBER] or by email at [WSU EMAIL].

Thank you for participating in this survey and we look forward to receiving your feedback in the next few days.

Sincerely,

[IOU TEAM NAME]

[IOU ADDRESS]

FOOTER:

If you would like to verify [IOU SHORT NAME]'s sponsorship of this survey, please contact [IOU SHORT NAME]’s [IOU STUDY NAME] line [IOU PHONE NUMBER] or e-mail us at [IOU EMAIL].

[IOU NAME] Privacy Notice & Terms and Conditions

To stop receiving this survey from [IOU SHORT NAME], please unsubscribe. Your removal request will be honored within 10 business days.

[IOU COPYRIGHT]

# SECOND REMINDER EMAIL [Third Contact for Email+Mail+Phone Group]

SUBJECT: Reminder: Provide [IOU SHORT NAME] with Feedback and Earn Your [IOU SURVEY 1 INCENTIVE] [IOU STUDY NAME] Bill Credit

Hello [CUSTOMER NAME],

Your bill credit of [IOU SURVEY 1 INCENTIVE] for participating in the [IOU NAME] [IOU STUDY NAME] is now available.

**To receive the [IOU SURVEY 1 INCENTIVE] bill credit on one of your next two upcoming electricity bills, please have an adult 18 years or older who makes decisions about your household's electricity usage and bills complete our short feedback survey about your household's experience participating in the study.**

This [IOU SURVEY 1 INCENTIVE] incentive is part of the total [IOU TOTAL INCENTIVE] in bill credits promised by [IOU SHORT NAME] for participating in the [IOU STUDY NAME] and is available only if you complete this survey by October 28th.

We've made it easy to complete this survey. Just click the link to the webpage below, or type it into your Internet browser, and then type in the passcode to begin the survey. It should take about 20 minutes to complete.

**Webpage address:** < TBD >

**Passcode:** <#########>

In the past couple of weeks, you may have received a letter and email asking you to complete this survey and, if you or someone in your household has completed it, please accept our sincere thanks. If not, we still need to hear back from you. **Your feedback is very important for helping [IOU SHORT NAME] design electricity rates that work for household's like yours.**

Your responses are voluntary and will be kept confidential so that no individual can be identified by the answers they give. Washington State University's Social & Economic Sciences Research Center is conducting this survey on behalf of [IOU SHORT NAME]. If you have any questions about this survey, please contact [WSU NAME] by phone at [WSU PHONE NUMBER] or by email at [WSU EMAIL].

Thank you for your participation and we look forward to your receiving your feedback very soon.

Sincerely,

[IOU TEAM NAME]

[IOU ADDRESS]

FOOTER:

If you would like to verify [IOU SHORT NAME]'s sponsorship of this survey, please contact [IOU SHORT NAME]'s [IOU STUDY NAME] line [IOU PHONE NUMBER] or e-mail us at [IOU EMAIL].

[IOU NAME] Privacy Notice & Terms and Conditions

To stop receiving this survey from [IOU SHORT NAME], please unsubscribe. Your removal request will be honored within 10 business days.

[IOU COPYRIGHT]

# FIRST REMINDER POSTCARD [Second Contact for Mail+Phone Group]

Dear [CUSTOMER NAME],

We're pleased to announce that it is now time for you to receive your bill credit of [IOU SURVEY 1 INCENTIVE] for participating in the [IOU NAME] [IOU STUDY NAME].

**To receive the [IOU SURVEY 1 INCENTIVE] bill credit on one of your next two upcoming electricity bills, have an adult 18 years or older who makes decisions about your household's electricity usage and bills please complete our short feedback survey about your household's experience participating in the study.**

Completing the survey is short and easy. Just type the link to webpage below into your Internet browser, and then type in the passcode to begin the survey. It should take about 20 minutes to complete.

**Webpage address:** < TBD >

**Passcode:** <#########>

In the past couple of weeks, you may have received a letter requesting you to complete our feedback survey. If you or someone in your household has already completed the survey, please accept our sincere thanks. If not, we do need your feedback and request that you please complete the survey at by October 28th.

**Your answers to the survey are very important for informing [IOU SHORT NAME] about your household's experience in the study so that we design electricity rates that work for customers like you.** Plus, when your survey answers are processed [IOU SHORT NAME] will give you a [IOU SURVEY 1 INCENTIVE] credit on one of your next two upcoming electricity bills. This [IOU SURVEY 1 INCENTIVE] incentive is part of the total [IOU TOTAL INCENTIVE] in bill credits to be provided by [IOU] for timely participating in this study survey, and is available only if you complete the survey.

Your responses are voluntary and will be kept confidential so that no individual can be identified by the answers they give. Washington State University's Social & Economic Sciences Research Center is conducting this survey on behalf of [IOU SHORT NAME]. If you have any questions about this survey, please contact [WSU NAME] by phone at [WSU PHONE NUMBER] or by email at [WSU EMAIL].

Thank you for participating in the [IOU NAME] [IOU STUDY NAME] and we look forward to receiving your feedback in the next few days.

Sincerely,

[IOU TEAM NAME]

[IOU ADDRESS]

FOOTER:

If you would like to verify [IOU SHORT NAME]'s sponsorship of this survey, please contact [IOU SHORT NAME]'s [IOU STUDY NAME] line [IOU PHONE NUMBER] or e-mail us at [IOU EMAIL].

# SURVEY BOOKLET LETTER [Third Contact for Mail+Phone Group & Fourth Contact for Email+Mail+Phone Group]

Dear [CUSTOMER NAME],

Thank you for participating in the [IOU NAME] [IOU STUDY NAME]! Now is the time for you to receive your next [IOU SURVEY 1 INCENTIVE] bill credit on your electricity bill for participating in the study. All you have to do is provide some feedback in our short survey.

As you may recall, your household enrolled to participate in [IOU SHORT NAME] [IOU STUDY NAME], which began this past summer and will end in December 2017. By enrolling in the study, your electricity rate may have changed during the summer or it may have remained the same.

[IOU SHORT NAME] is conducting this electricity rate study to prepare for a potential transition of all eligible residential electric customers to a time-of-use rate plan across California in 2019. Thank you for participating!

**It is very important we get your feedback on your experience in the study this summer so that [IOU SHORT NAME] can better understand how new rates are impacting customers' lives and electricity bills. This will help us design electricity rates that work better for customers like you. To provide your feedback, please have an adult 18 years or older who makes decisions about your household's electricity bills complete the short 20-minute survey we included, and kindly return it in the postage-paid envelope we have provided.**

When your completed survey is returned and processed, [IOU SHORT NAME] will apply a [IOU SURVEY 1 INCENTIVE] bill credit to one of your next two upcoming electricity bills, which is a part of the total [IOU TOTAL INCENTIVE] in bill credits promised by [IOU SHORT NAME] for participating in the study. This [IOU SURVEY 1 INCENTIVE] credit is available only if you complete and return this survey by October 28th.

Your responses are voluntary and will be kept confidential so that no individual can be identified by the answers they give. Washington State University's Social & Economic Sciences Research Center is conducting this survey on behalf of [IOU SHORT NAME]. If you have any questions about this survey, please contact [WSU NAME] by phone at [WSU PHONE NUMBER] or by email at [WSU EMAIL].

Thank you in advance for providing your valuable feedback.

Sincerely,

[IOU TEAM NAME]

[IOU ADDRESS]

FOOTER:

If you would like to verify [IOU SHORT NAME]'s sponsorship of this survey, please contact [IOU SHORT NAME]’s [IOU STUDY NAME] line [IOU PHONE NUMBER] or e-mail us at [IOU EMAIL].

## SECOND REMINDER POSTCARD [Fourth Contact for Mail+Phone Group & Fifth Contact for Email+Mail+Phone Group]

Dear [CUSTOMER NAME],

Last week, we mailed you a letter and survey for you to complete as part of your participation in the [IOU NAME] [IOU STUDY NAME] and to receive a [IOU SURVEY 1 INCENTIVE] credit on one of your next two upcoming electricity bills. If you or someone in your household completed and returned this survey, please accept our sincere thanks.

**If you have not completed this survey, we still need to hear from you about your experience in the study this past summer. If you received the survey in the mail, please have an adult 18 years or older who makes decisions about your household’s electricity usage and bills complete and return it at your earliest convenience using the postage-paid return envelope we provided.**

If you did not receive our survey in the mail, you can request another survey by calling [WSU NAME] at [WSU PHONE NUMBER] or sending an email to [WSU EMAIL].

You can also complete the survey on the Internet using the webpage address and passcode below, or you can call [WSU PHONE NUMBER] at your convenience to complete the survey over the phone with one of our interviewers, just mention the “[IOU SHORT NAME] Electricity Rates Study”.

**Webpage address:** < TBD >

**Passcode:** <#########>

**Your answers to the survey are very important for informing [IOU SHORT NAME] about your household’s experience in the study this summer so that we can design electricity rates that work for customers like you.** Plus, when your survey answers are processed, [IOU SHORT NAME] will give you a [IOU SURVEY 1 INCENTIVE] credit on one of your next two upcoming electricity bills! This [IOU SURVEY 1 INCENTIVE] bill credit is part of the total [IOU TOTAL INCENTIVE] in bill credits promised by [IOU SHORT NAME] for participating in the study and is available only if you complete this survey by October 28th.

Your responses are voluntary and will be kept confidential so that no individual can be identified by the answers they provide. Washington State University’s Social & Economic Sciences Research Center is conducting this survey on behalf of [IOU SHORT NAME]. If you have any questions about this survey, please contact [WSU NAME] by phone at [WSU PHONE NUMBER] or by email at [WSU EMAIL].

Thank you for your participation in the study and we look forward to receiving your feedback very soon.

Sincerely,

[IOU TEAM NAME]

[IOU ADDRESS]

FOOTER:

If you would like to verify [IOU SHORT NAME]'s sponsorship of this survey, please contact [IOU SHORT NAME]'s [IOU STUDY NAME] line [IOU PHONE NUMBER] or e-mail us at [IOU EMAIL].

# OUTBOUND PHONE CALL-OUT INTRODUCTION [Fifth Contact for Mail+Phone Group & Sixth Contact for Email+Mail+Phone Group]

Hello, may I speak with [CUSTOMER NAME]? Is someone else available who makes decisions about your household's electricity bill?

I am [INTERVIEWER NAME] from Washington State University, calling on behalf of [IOU NAME]. Our records show that your household is participating in the [IOU SHORT NAME] [IOU STUDY NAME] that began this past summer and will end in December 2017. I am calling to ask a few questions about your experience in the study so far. By completing these questions, [IOU SHORT NAME] will credit one of your next two upcoming electricity bills with [IOU SURVEY 1 INCENTIVE]. The [IOU SURVEY 1 INCENTIVE] bill credit is a part of the total [IOU TOTAL INCENTIVE] that [IOU SHORT NAME] promised you as part of your participation in the [IOU STUDY NAME] and is available only to those who complete this survey.

Do you have about 20 minutes to answer our questions?

Your responses are voluntary and confidential so that no individual can be identified by the answers they give to our questions.

Do you have any questions before we get started?

IF NEEDED:

- [IOU SHORT NAME] is conducting this study you are participating in to prepare for the California Public Utilities' Commission's planned statewide transition of all eligible residential electric customers to a time-of-use rate plan in 2019. Other TOU rate options may be provided too, and all customers will be able to opt out onto a tiered monthly rate if they do not prefer a TOU rate.
- [IOU SHORT NAME] is conducting this survey to get feedback on your experience in the study so far, including how changes to electricity rates impact your life and electricity bills, so that [IOU SHORT NAME] can design electricity rates that work for customers like you.
- If you have any questions about this survey, please contact [WSU NAME] by phone at [WSU PHONE NUMBER] or by email at [WSU EMAIL].
- I work for Washington State University's Social and Economic Sciences Research Center and we've been selected by [IOU SHORT NAME] to conduct this survey. If you would like to verify [IOU SHORT NAME]'s sponsorship of this survey, please contact [IOU SHORT NAME]'s [IOU STUDY NAME] line [IOU PHONE NUMBER] or e-mail us at [IOU EMAIL].

**Cell Phone Safety Questions**

Are you currently talking to me on a regular landline phone or a cell phone?

1. Landline phone
2. Cell phone

[IF CELL PHONE] Are you currently in a place where you can talk safely and answer my questions?

1. Yes
2. No → Schedule callback

# INBOUND PHONE CALL-IN INTRODUCTION [For Customers Who Call to Request a Phone Interview]

Hello and thanks for calling. My name is [INTERVIEWER NAME] and I'll be guiding you through our survey.

First, what is your name and address? → CONFIRM IOU NAME BASED ON CUSTOMER ADDRESS

Are you an adult in your household who makes decisions about your home's electricity bill?

1. Yes
2. No → ASK FOR ADULT 18 OR OLDER WHO MAKES DECISIONS ABOUT HOUSEHOLD'S ELECTRICITY BILL

Great, I'll be asking you some questions about your experience in the [IOU SHORT NAME] [IOU STUDY NAME] that began this past summer and will end in December 2017. By completing these questions, [IOU SHORT NAME] will credit one of your next two upcoming electricity bills with [IOU SURVEY 1 INCENTIVE]. The [IOU SURVEY 1 INCENTIVE] bill credit is a part of the total [IOU TOTAL INCENTIVE] that [IOU SHORT NAME] promised you as part of your participation in the [IOU STUDY NAME] and is available only to those who complete this survey.

Do you have about 20 minutes to answer our questions?

Your responses are voluntary and confidential so that no individual can be identified by the answers they give to our questions.

IF NEEDED:

- Your electricity rate may have changed this past summer or it may have stayed the same.
- [IOU SHORT NAME] is conducting this study you are participating in to prepare for the California Public Utilities' Commission's planned statewide transition of all eligible residential electric customers to a time-of-use rate plan in 2019. Other TOU rate options may be provided too, and all customers will be able to opt out onto a tiered monthly rate if they do not prefer a TOU rate.
- [IOU SHORT NAME] is conducting this survey to get feedback on your experience in the study so far, including how changes to electricity rates impact your life and electricity bills, so that [IOU SHORT NAME] can design electricity rates that work better for customers like you.
- If you have any questions about this survey, please contact [WSU NAME] by phone at [WSU PHONE NUMBER] or by email at [WSU EMAIL].
- I work for Washington State University's Social and Economic Sciences Research Center and we've been selected by [IOU SHORT NAME] to conduct this survey. If you would like to verify [IOU SHORT NAME]'s sponsorship of this survey, please contact [IOU SHORT NAME]'s [IOU STUDY NAME] line [IOU PHONE NUMBER] or e-mail us at [IOU EMAIL].

# Appendix F- Example Booklet Covers

**Figure 3: Example Treatment Condition Cover**

Pacific Gas and Electric Company

## Electric Rates Study
## 2016 Participant Survey

Please have an adult 18 years or older who makes decisions about your household's electricity usage and bills complete the survey.

For the following questions, please mark your response by filling in the bubbles or squares.

**Q1. According to our records, your household signed up with Pacific Gas and Electric Company (PG&E) to participate in a rate study, called the PG&E Electric Rates Study, that began this summer (2016) and ends in December next year (2017). Do you recall participating in this study?**

① Yes

② No → Skip to question 3 on the next page

**Q2. If YES, what motivated you to participate in this study?**
*Please select **one main reason** for participating.*

① To save money on my electricity bills
② To earn a total $200 bill credit
③ Bill protection for the first 12 months meant I have nothing to lose
④ It was the environmentally responsible thing to do
⑤ To be one of the first to learn about the new rates
⑥ To give PG&E my feedback on my study rate plan
⑦ Don't know
⑧ Other

**Figure 4: Example Control Condition Cover**