NAVIGANT

**Smart Energy Solutions Pilot**

Operations Opt Out/Drop Out Survey

OUTBOUND

Prepared for:
National Grid

nationalgrid

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September 19, 2016

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## CPP Opt-Out/PTRO Program Drop-Out Survey

Sample Variables (to be provided by National Grid):

1. Name
2. Property address
3. Pseudo Account number
4. Email address
5. Phone number
6. Coded as a business? Y__ N___
7.Customer_Class: "CPP" or "PTRO"
9. Technology_Level: 1-4

(NOTE: THIS SURVEY IS FORMATTED FOR TELEPHONE. ONLINE VERSIONS WILL BE ALTERED IN FORMAT ONLY)

Hello, this is (YOUR NAME) from Bellomy Research calling on behalf of National Grid's Smart Energy Solutions Pilot program. (IF CONTACT NAME AVAILABLE, SAY:) May I please speak to…**[INSERT CONTACT NAME FROM SAMPLE]**? (IF NOT AVAILABLE, SCHEDULE A CALLBACK.)

(IF NO CONTACT NAME AVAILABLE, SAY:) May I please speak to one of the persons that was most involved in National Grid's Smart Energy Solutions pilot program? (IF NOT AVAILABLE, SCHEDULE A CALLBACK.)
This is not a sales call or a call about a bill. Your responses will be treated as confidential and if you qualify and complete the entire survey we will send you a $20 check. (IF NOT A CONVENIENT TIME, SCHEDULE A CALLBACK.)

1a. Are you the person in your household who was most involved in National Grid's Smart Energy Solutions Pilot program? (INTERVIEWER: IF NEEDED SAY: "National Grid is testing the impact of new technologies that provide more information about your electric use and cost and electric rates in which your cost of using electricity may go up or down, depending on when you use it.")

1. Yes **[SKIP TO INSTRUCTIONS BEFORE Q3.]**
2. No **[CONTINUE]**
98. Don't Know **[THANK AND TERMINATE]**
99. Prefer not to answer **[THANK AND TERMINATE]**

1b. What is the name of the person who is most involved in the program?
_____ (INTERVIEWER RECORD NAME)
98. Don't Know **[THANK AND TERMINATE]**
99. Prefer not to answer **[THANK AND TERMINATE]**

1c. May I please speak with **[INSERT NAME FROM Q1b]?**

1. Yes available and will speak **[CONTINUE]**
2. Available but not interested **[THANK AND TERMINATE]**
3. Not available now **[ASK 1d]**
98. Don't Know **[THANK AND TERMINATE]**
99. Prefer not to answer **[THANK AND TERMINATE]**

1d. What would be a convenient day and time to re-contact and speak to **[INSERT NAME FROM Q1b]?**
As I said, this will only take a few minutes.
(INTERVIEWER: IF PERSON ON PHONE GIVES YOU A CONVENIENT DAY AND TIME, SCHEDULE A CALLBACK. REMEMBER TO RECORD NAME OF PERSON TO ASK FOR.)
98. Don't Know **[THANK AND TERMINATE]**

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99. Prefer not to answer **[THANK AND TERMINATE]**

**[IF Q1C = 1, DISPLAY "**Hello, this is (YOUR NAME) from Bellomy Research calling on behalf of National Grid's Smart Energy Solutions Pilot program.**]**

**[IF CUSTOMER_CLASS = "CPP", CONTINUE.]**
**[IF CUSTOMER_CLASS = "PTRO", SKIP TO INTRO BEFORE Q18.]**

**CPP Opt-Out Questions Intro:**

~~**[IF TIMING = "RATE GO LIVE", READ THIS STATEMENT. OTHERWISE, SKIP TO Q3.]**~~
According to our records, you chose to switch from the Smart Rewards Pricing Plan to the Conservation Day Rebate plan. (**IF NEEDED**: "Smart Rewards Pricing provides daytime rates lower than your Basic Service rate for 335 days of the year, and even lower rates on nights, weekends, and holidays. On Conservation Days, rates increase significantly during specifically designated hours. The Conservation Day Rebate plan continued your service at the Basic Service rate and if you used less electricity during Conservation Day Peak Events, you could earn bill credits.

We're sorry that Smart Rewards Pricing did not meet your needs and hope you can take a few minutes to tell us what about Smart Rewards Pricing did not work for you.

3. Please let us know why you were no longer interested in participating in Smart Rewards Pricing. (DO NOT READ LIST. RECORD ALL MENTIONS.)

1. Too time consuming
2. Savings didn't justify the effort
3. Liked the Conservation Day Rebate plan better.
4. Too complicated
5. Couldn't get my questions answered
6. Uncertain about what the program's supposed to accomplish
7. Concerned about privacy of my information
8. I did not like changes in prices during the day
9. I thought the prices for some days/hours was too high
10. I don't like to change my energy usage every day
11. I can't change my energy usage to save money on this program
12. I did not like the fact that this program was implemented without my affirmative consent
13. Concerned my bills may increase
14. My bills increased
15. Couldn't get service from National Grid when I needed it
16. The service I got from National Grid was unsatisfactory
17. Just not interested
20. National Grid contacted me too frequently (Other Specify) (INTERVIEWER: Probe for the topics and the frequency that was too much.)
21. National Grid contacted me too much about Conservation Days
19. Didn't change or drop out/Still participate in Smart Rewards Pricing **[THANK AND TERMINATE]**
18. Other (Please Specify)
98. Don't Know **[SKIP TO Q5]**
99. Prefer not to answer **[SKIP TO Q5]**

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**[IF MORE THAN ONE RESPONSE IS GIVEN TO Q3, ASK Q4, OTHERWISE SKIP TO Q5.]**

4. Which ONE of these reasons was the most important in your decision? (READ LIST. RECORD ONE ANSWER ONLY.)

**[ONLY INCLUDE MENTIONS FROM Q3. ALWAYS DISPLAY CHOICES 18, 98, AND 99.]**

1. Too time consuming
2. Savings didn't justify the effort
3. Liked the Conservation Day Rebate plan better
4. Too complicated
5. Couldn't get my questions answered
6. Uncertain about what the program's supposed to accomplish
7. Concerned about privacy of my information
8. I did not like changes in prices during the day
9. I thought the prices for some days/hours was too high
10. I don't like to change my energy usage every day
11. I can't change my energy usage to save money on this program
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14. My bills increased
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16. The service I got from National Grid was unsatisfactory
17. Just not interested
20. National Grid contacted me too frequently (Other Specify) (INTERVIEWER: Probe for the topics and the frequency that was too much.)
21. National Grid contacted me too much about Conservation Days
18. Other (Please Specify)
18. All reasons equally important **[SP]**
98. (DO NOT READ) Don't Know
99. (DO NOT READ) Prefer not to answer

5. National Grid offered Bill Protection to customers who remained on the Smart Rewards Pricing plan for at least 12 months. Bill Protection guarantees that the amount you spend on electricity over the course of the year will not be higher than what you would have paid on the Basic Service rate. Were you aware of the Bill Protection feature of Smart Rewards Pricing?

Were you aware of the Bill Protection feature of Smart Rewards Pricing? (IF RESPONDENT SELECTS "No", Don't Know" OR "Prefer not to answer", READ: National Grid offered Bill Protection to customers who remained on the Smart Rewards Pricing plan for at least 12 months. This was active for both years of the Smart Energy Solutions program. Bill Protection guarantees that the amount you spend on electricity would not be higher than what you would pay on the Basic Service rate. So, if your annual electric bill while on the Smart Rewards Pricing plan was more than it would have been on your Basic Service rate, National Grid would provide you with a credit for the difference at the end of the year.) (CHANGE ANSWER AS NEEDED.)

1. Yes
2. No
98. Don't Know
99. Prefer not to answer

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6. On a scale of 1 to 5, with 1 being "did not understand at all" and 5 being "understood completely" and 3 being "neutral", how well do you feel that you understood National Grid's explanation of Smart Rewards Pricing?

| Did not understand at all | | Neutral | | Understood completely | Don't know | Prefer not to answer |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 98 | 99 |

**[IF Q6 < 3, ASK Q7, OTHERWISE SKIP TO Q8]**

7. What was unclear about Smart Rewards Pricing? (RECORD VERBATIM. PROBE IF NECESSARY.)
_____ **[OPEN END]**

~~**[IF TIMING = "RATE GO LIVE", ASK Q8, OTHERWISE SKIP TO Q10]**~~

8. ~~Did you notice any changes in your monthly bills after January 1, 2015 when the Smart Rewards Pricing began?~~ Did you notice any changes in your monthly bills over the course of your participation in Smart Rewards Pricing, and was this change a factor in deciding you did not want to continue with Smart Rewards Pricing?

1. Yes
2. No **[SKIP TO Q10]**
98. Don't Know **[SKIP TO Q10]**
99. Prefer not to answer **[SKIP TO Q10]**

9. How would you describe the change in your bills? (RECORD VERBATIM. PROBE IF NECESSARY.)
_____ **[OPEN END]**

10. On a scale of 1 to 5, where 1 is "very difficult to change" and 5 is "very easy to change" and 3 is "neutral", please rate how easy it was to change the time of day that you use electricity to take advantage of Smart Rewards Pricing.

| Very difficult to change | | Neutral | | Very easy to change | Don't know | Prefer not to answer |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 98 | 99 |

**[IF Q10 < 3, ASK Q11, OTHERWISE SKIP TO Q12.]**

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11. We recognize that people have different situations that can make it difficult to change their electricity use. I'm going to read you a series of statements; for each one, please tell me if it matches your situation. (READ LIST. RECORD ALL MENTIONS.)

**[RANDOMIZE ORDER]**

1. I need to use electricity during times when the electricity prices are high for health reasons.
2. I need to use electricity during times when the electricity prices are high because there are family members at home during the day.
3. I did not like to have to change the time of day for some tasks to avoid using electricity when prices are high.
4. I need to have my home air conditioned during the day.
5. I found that changing the way I used electricity did not make much difference in my monthly bill.
6. I didn't know my electricity use would cost more at some times of the day (or less at other times).
7. I have essential electricity uses during the day that I cannot change. (INTERVIEWER: IF "YES" TO THIS, ASK: What sorts of equipment?) (Please Specify)
98. (DO NOT READ) Don't Know **[FIXED]**
99. (DO NOT READ) Prefer not to answer **[FIXED]**

**[IF TECHNOLOGY_LEVEL > 1, ASK Q12, OTHERWISE SKIP TO Q15.]**

12. Please rate your experience with the in-home technology you received through the pilot, where 1 is "very negative" and 5 is "very positive" and 3 is "neutral".

| Very negative | | Neutral | | Very positive | Don't know | Prefer not to answer |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 98 | 99 |

**[IF Q12 < 3, ASK Q13, OTHERWISE SKIP TO Q15]**

13. Did your experience with the technology contribute to your decision to stop participating in Smart Rewards Pricing?

1. Yes
2. No **[SKIP TO Q15]**
98. Don't Know **[SKIP TO Q15]**
99. Prefer not to answer **[SKIP TO Q15]**

14. How did your experience with the technology influence your decision to stop participating in Smart Rewards Pricing? (RECORD VERBATIM. PROBE IF NECESSARY.)

_____ **[OPEN END]**

15. What, if anything, could National Grid have done or explained that would make Smart Rewards Pricing more appealing to you? (RECORD VERBATIM. PROBE IF NECESSARY.)

_____ **[OPEN END]**

16. Since you decided not to participate in Smart Rewards Pricing, you chose to be in the Conservation Day Rebate plan. This plan provides you with reductions in your energy bill if you reduce your electricity use during peak hours. Does the Conservation Day Rebate plan appeal to you more than Smart Rewards Pricing? (DO NOT READ LIST. RECORD ONLY ONE MENTION.)

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1. Yes
2. No
3. It doesn't make a difference to me
4. I didn't know I was on that rate plan
98. Don't Know
99. Prefer not to answer

**[IF Q16 = 1, ASK Q17, OTHERWISE SKIP TO Q24]**

17. What is it about the Conservation Day Rebate plan that appeals to you more than Smart Rewards Pricing? (RECORD VERBATIM. PROBE IF NECESSARY.)

_____ **[OPEN END]**

**[IF CUSTOMER_CLASS = "PTRO", CONTINUE. OTHERWISE SKIP TO Q24]**

**PTRO Program Drop-Out Questions Intro:**

According to our records, you are no longer interested in participating in the Smart Energy Solutions program. We're sorry that the Smart Energy Solutions program did not meet your needs and hope you can take a few minutes to tell us what about the program did not work for you.

18. Please let us know why you were no longer interested in participating in the Smart Energy Solutions program. (DO NOT READ LIST. RECORD ALL MENTIONS.)

1. Too time consuming
2. Savings didn't justify the effort
3. Too complicated
4. Couldn't get my questions answered
5. Uncertain about what the program's supposed to accomplish
6. Concerned about privacy of my information
7. Concerned my bills may increase
8. My bills increased
9. The thermostat didn't work right/couldn't set it/couldn't read it
10. The picture frame display was not helpful
11. My home became uncomfortable when National Grid controlled my air conditioning
12. I wasn't notified before one or more events
13. The equipment installed interfered with my Internet, TV, other electronics
14. Couldn't get service from National Grid when I needed it
15. The service I got from National Grid was unsatisfactory
16. Just not interested
17. Could not change my electric uses for electric equipment I needed to use
20. National Grid contacted me too much (Other Specify) (INTERVIEWER: Probe for the topics and the frequency that was too much.)
21. Didn't change or drop out/Still participate in Smart Energy Solutions program **[THANK AND TERMINATE]**
18. Other (Please Specify)
98. Don't Know
99. Prefer not to answer

**[IF MORE THAN ONE RESPONSE IS GIVEN TO Q18, CONTINUE TO Q19, OTHERWISE SKIP TO Q20]**

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19. Which ONE of these reasons was the most important in your decision? (READ LIST. RECORD ONE ANSWER ONLY.)

**[ONLY INCLUDE MENTIONS FROM Q18. ALWAYS DISPLAY CHOICES 19, 98, AND 99.]**

1. Too time consuming
2. Savings didn't justify the effort
3. Too complicated
4. Couldn't get my questions answered
5. Uncertain about what the program's supposed to accomplish
6. Concerned about privacy of my information
7. Concerned my bills may increase
8. My bills increased
9. The thermostat didn't work right/couldn't set it/couldn't read it
10. The picture frame display was not helpful
11. My home became uncomfortable when National Grid controlled my air conditioning
12. I wasn't notified before one or more events
13. The equipment installed interfered with my Internet, TV, other electronics
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15. The service I got from National Grid was unsatisfactory
16. Just not interested
17. Could not change my electric uses for electric equipment I needed to use
20. National Grid contacted me too much (Other Specify) (INTERVIEWER: Probe for the topics and the frequency that was too much.)
18. Other (Please Specify)
19. All reasons equally important **[SP]**
98. (DO NOT READ) Don't Know
99. (DO NOT READ) Prefer not to answer

**[IF TECHNOLOGY_LEVEL > 1, ASK Q20, OTHERWISE SKIP TO Q23]**

20. Please rate your experience with the in-home technology you received through the pilot, where 1 is "very negative" and 5 is "very positive" and 3 is "neutral".

| Very negative | | Neutral | | Very positive | Don't know | Refused |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 98 | 99 |

**[IF Q20 < 3, ASK Q21, OTHERWISE SKIP TO Q23]**

21. Did your experience with the technology contribute to your decision to stop participating in the program?

1. Yes
2. No **[SKIP TO Q23]**
98. Don't Know **[SKIP TO Q23]**
99. Prefer not to answer **[SKIP TO Q23]**

22. How did your experience with the technology influence your decision to stop participating in the program? (RECORD VERBATIM. PROBE IF NECESSARY.)

_____ **[OPEN END]**

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23. What, if anything, could National Grid have done or explained that would make this program more appealing to you? (RECORD VERBATIM. PROBE IF NECESSARY.)

_____ **[OPEN END]**

**[FOR ALL CUSTOMERS]**

24. Is there anything else you would like to tell us about your experience with Smart Rewards Pricing or the Smart Energy Solutions program? (RECORD VERBATIM. PROBE IF NECESSARY.)

_____ **[OPEN END]**

25. We are almost done. Please provided us with your most current phone number, email address and mailing address so that we can mail the $20 gratuity to you. The check will be sent by Bellomy Research and will arrive in approximately 4 weeks. I have your current phone number as…(INTERVIEWER: IF INFORMATION ALREADY PIPED IN, PLEASE READ CURRENT PHONE NUMBER AND EMAIL ADDRESS TO RESPONDENT AND ASK THEM TO CONFIRM. PLEASE CHANGE AS NECESSARY.)

1. Phone (Please specify) (RECORD/CONFIRM PHONE NUMBER)
2. Email (Please specify) (RECORD/CONFIRM EMAIL ADDRESS)
3. Mailing address (Please specify) (RECORD MAILING ADDRESS) **[DO NOT PRE-POPULATE]**
4. Contact Name (Please specify)

**[PROGRAMMER: PLEASE PIPE IN PHONE, EMAIL ADDRESS, AND NAME FROM SAMPLE]**

**[DEMOGRAPHIC/FIRMOGRAPHIC QUESTIONS]**

DEMOS TURNED OFF AS OF 8/13 FOR THE REMAINDER OF THIS PROJECT.

**[CLOSE]**

Those are all the questions I have. Thank you for your time and assistance to us today.

# SMART ENERGY SOLUTIONS 2016 OPT-OUT DROP-OUT SURVEY

PREPARED FOR NATIONAL GRID

OCTOBER 31, 2016

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# OODO SURVEY

- **Opt Out:** Customer opted out of Smart Rewards Pricing & into the Conservation Day Rebate pricing plan
- **Drop Out:** Customer dropped out of the Smart Energy Solutions program entirely
- **Surveyed populations:**
  - 2015: 38 opt outs + 92 drop outs (130 total)
  - 2016: 12 opt outs + 38 drop outs (50 total)

| Technology Type | 2015 | | 2016 | |
|---|---|---|---|---|
| | Opt Out | Drop Out | Opt Out | Drop Out |
| **Total** | **8** | **21** | **2** | **11** |
| IHD | 1 | 6 | 0 | 3 |
| Thermostat | 1 | 1 | 0 | 0 |
| Smart Plug | 1 | 0 | 0 | 2 |
| No Technology | 5 | 14 | 2 | 6 |

 

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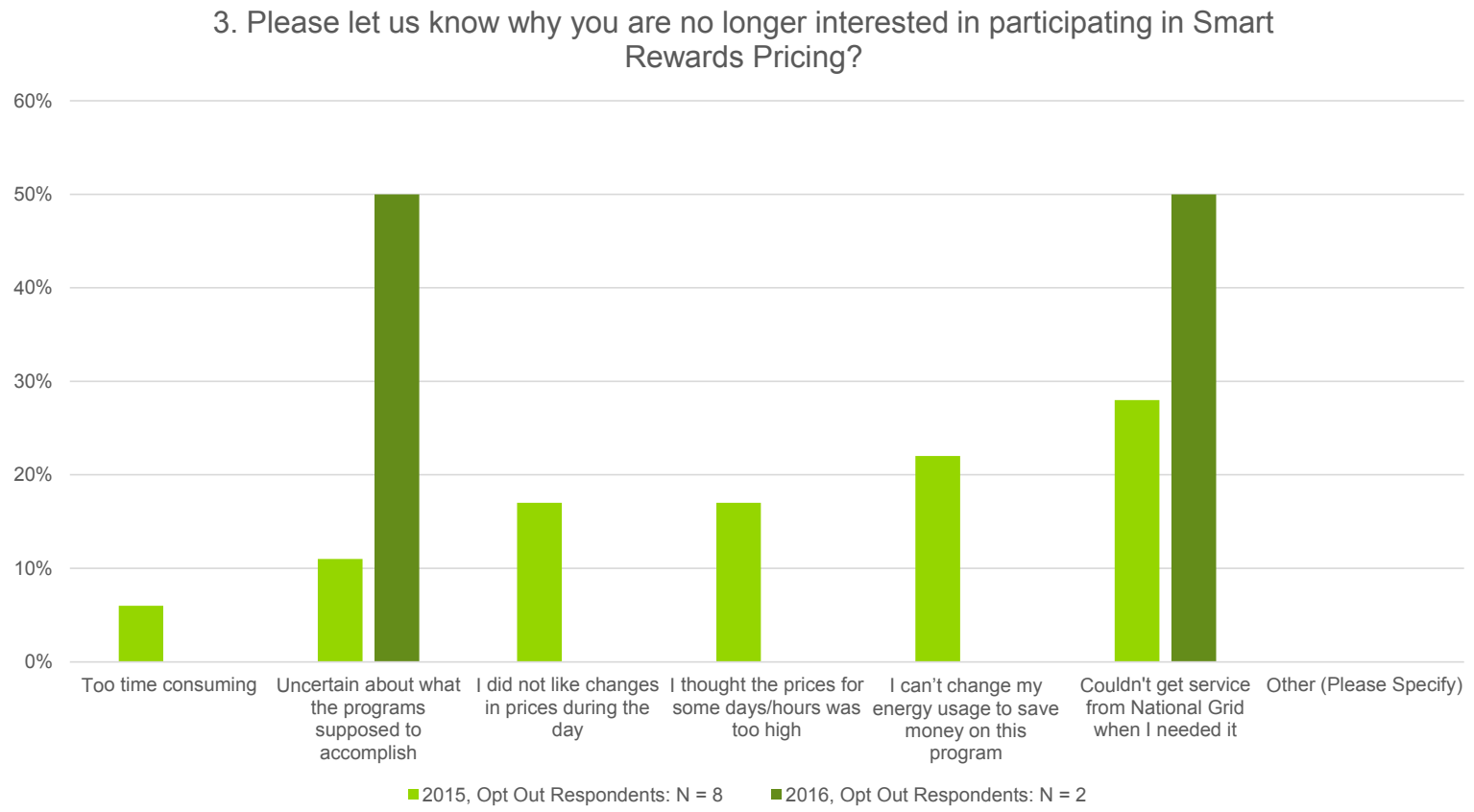
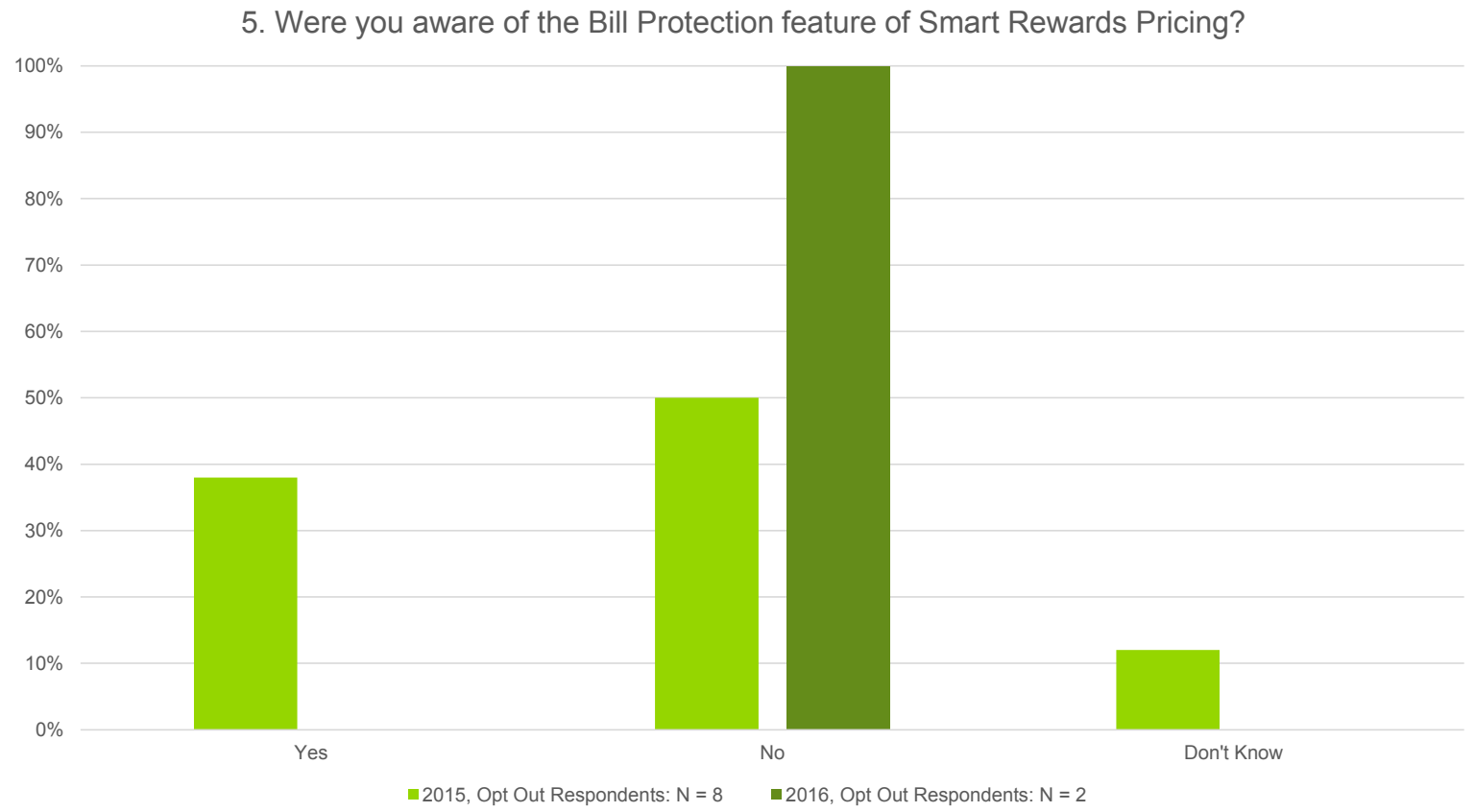
# Over both summers, three out of the ten respondents couldn't get service from National Grid when they needed it



NAVIGANT

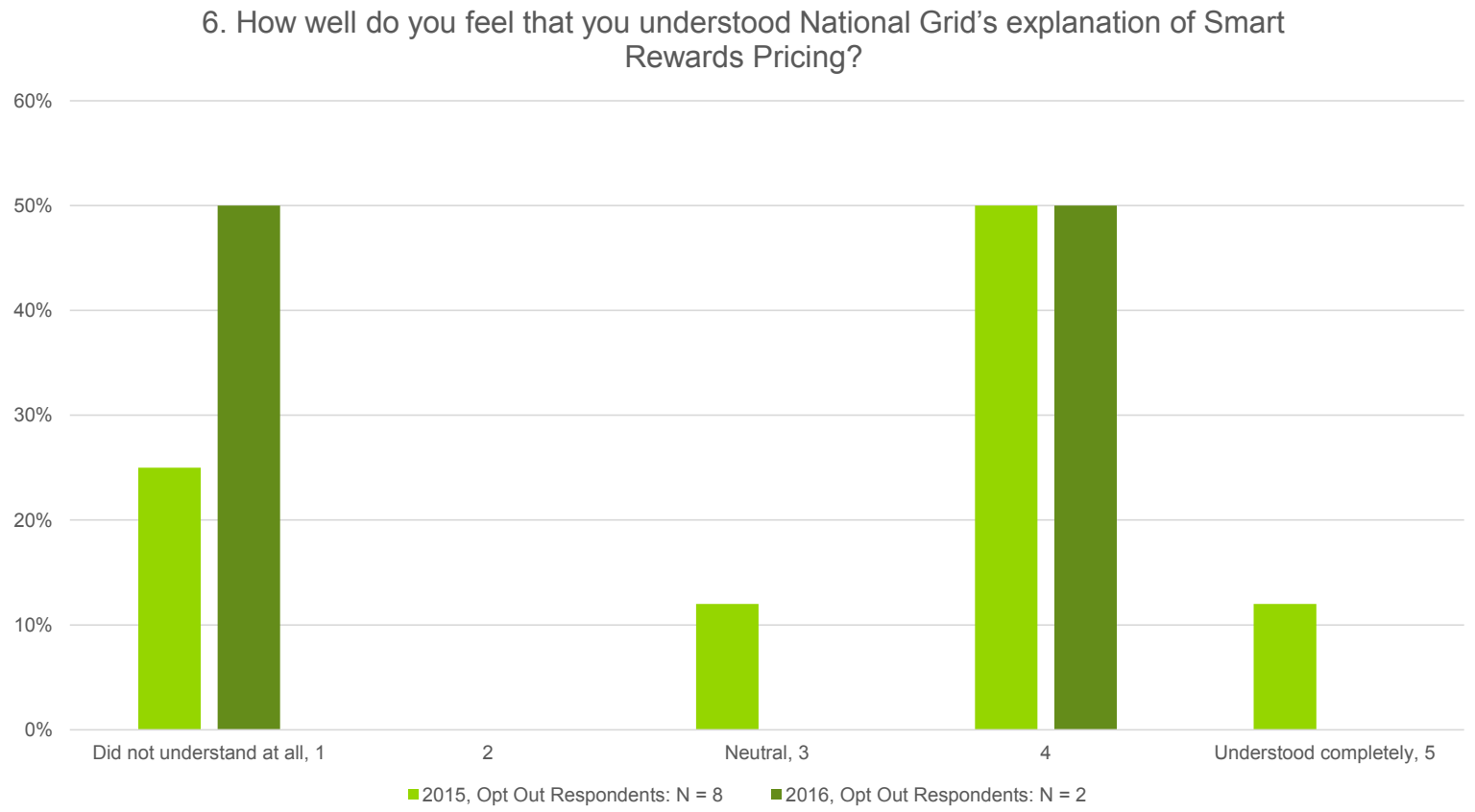
# Over both summers, six out of the ten Opt Out customers were not aware of the Bill Protection feature



NAVIGANT

# Over both summers, six out of the ten Opt Out customers rated their understanding of Smart Rewards Pricing with a '4'



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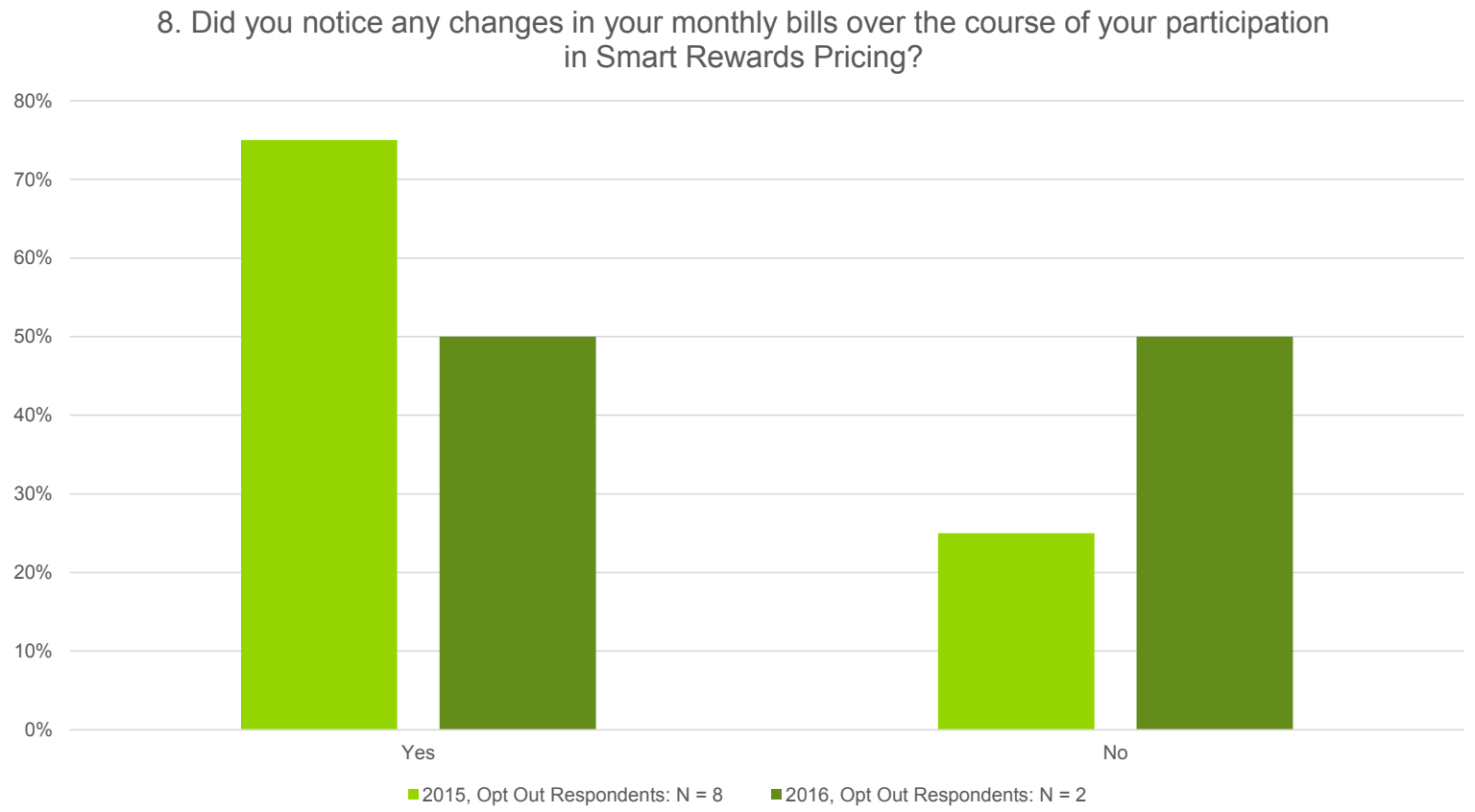
# Over both summers, seven out of the ten Opt Out customers noticed a change in their monthly bills over the course of their participation in Smart Rewards Pricing



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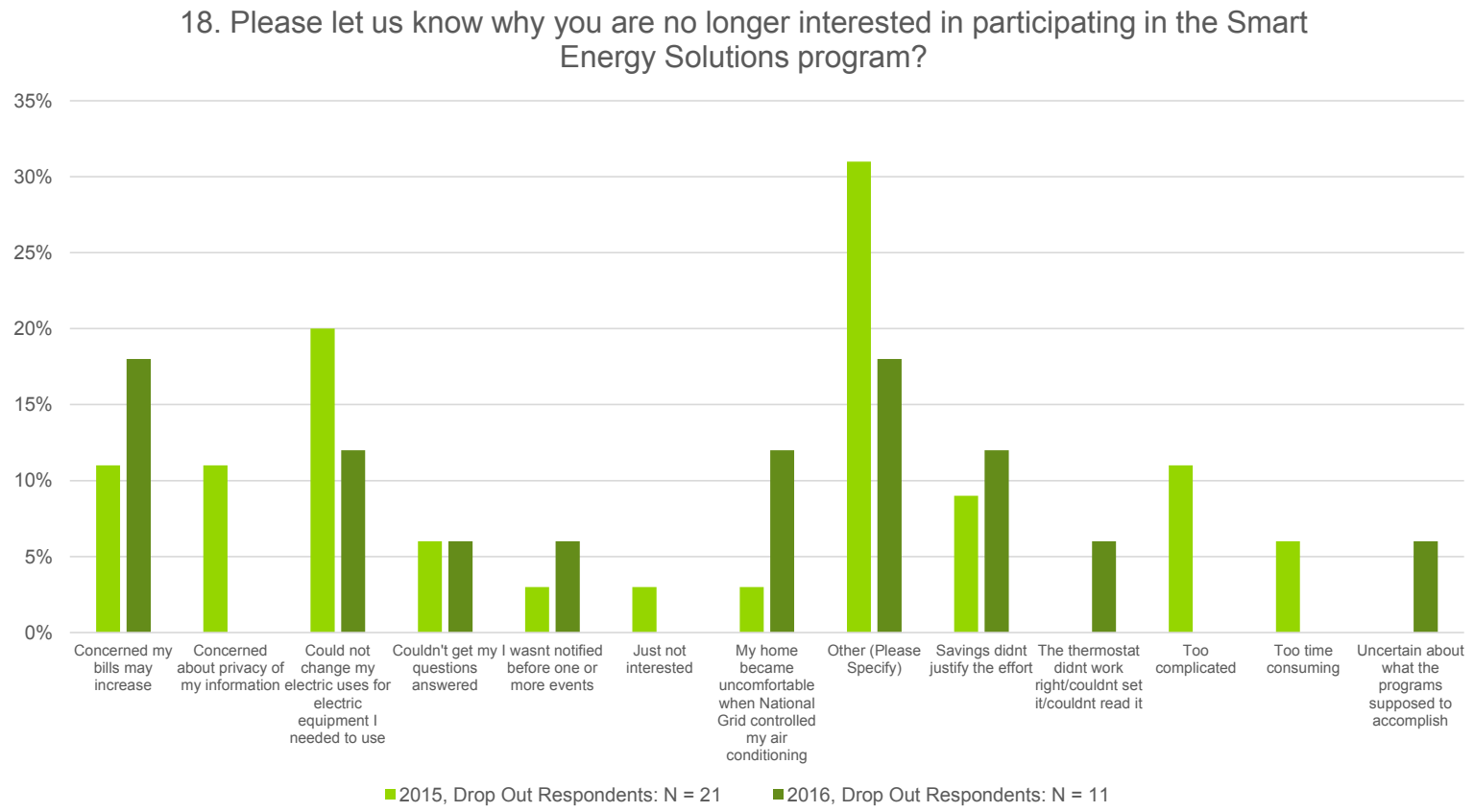
# Reasons for losing interest in the Smart Energy Solutions program varied



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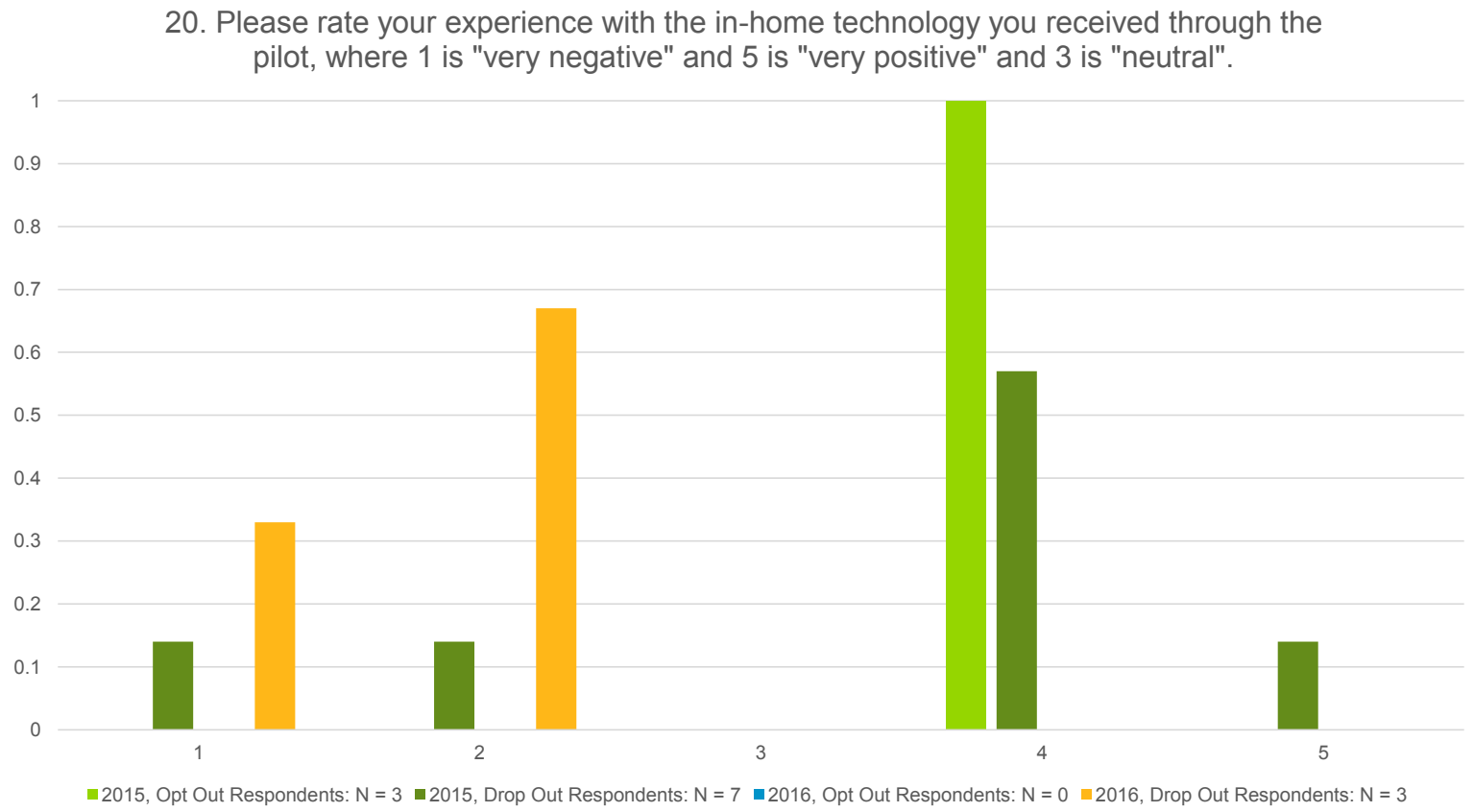
# This year (2016), the three Drop Out respondents rated their experience with the in-home technology as a '1' or '2'



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# VERBATIM RESPONSES

## What, if anything, could National Grid have done or explained that would make this program more appealing to you?

"Make it easier to understand. I was only able to learn my savings by having to do the math myself. Too time consuming."

"I needed better coordination between this program and the sourcing. It kept causing a conflict when I was trying to switch over to 100% wind power sourcing. It shouldn't be a problem, but the kinks haven't been ironed out."

"Somehow make it cheaper for me and cost effective for me to live with a family of five."

## Is there anything else you would like to tell us about your experience with Smart Rewards Pricing or the Smart Energy Solutions program?

"Everything was fine, except they called everyday. Nobody seemed to know how to take me off the program. Not enough communication."

"I don't know what the program was. All they did was give a picture frame hooked up to the meter. I called to fix it. They promised me this and that, but I just got a picture frame."

"I didn't have much of an idea about it, so I don't have much to say about this."

 

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Division 1-46

Request:

Regarding the VVO Pilot Delivery incentive mechanism:

a. Please provide the baseline reduction in energy consumption and peak demand that will be used in the VVO Pilot Delivery incentive mechanism.

b. Please provide all supporting documents for the development of the baseline.

Response:

a. The Company will establish a baseline reduction in energy and capacity benefits by using Measurement and Verification once the Pilot is installed. The Company described the process for establishing a baseline in its response to Division Data Request R-I-33, which was included within Attachment PUC 1-1-1 filed in Docket No. 4783. That request and the corresponding response is attached as Attachment DIV 1-46.

   The Company expects to achieve an approximately one percent incremental reduction, over baseline VVO/CVR-only operation in energy consumption and peak demand by integrating interval voltage data from AMF meters into the optimization algorithms of the VVO/CVR expansion.

b. Please see Attachment R-I-33 in Docket No. 4783, which is reproduced in Attachment DIV 1-46 for supporting documentation for baseline development. This documentation shows the Automated CVR Protocol No. 1 from Utilidata, the Company's VVO vendor.

(This response is identical to the Company's response to Division 5-46 in Docket No. 4770.)

The Narragansett Electric Company
d/b/a National Grid
In Re: Division's Review of FY 2019 Proposed Electric ISR Plan
Responses to Division's First Set of Data Requests
Issued October 19, 2017

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R-I-33

Request:

How do you propose measuring the incremental benefit of AMI over the VVO benefit?

Response:

The measurement and verification (M&V) process would be accomplished by operating the pilot area in both AMI-Enhanced VVO and non-VVO modes on alternating days. A constant Conservation Voltage Reduction (CVR) factor is assumed over the service voltage range observed during the M&V evaluation period in both the AMI-enhanced VVO and non-VVO operating modes. The CVR factor will be estimated using M&V Protocol #1.
See Attachment R-I-33.

When operating in AMI-enhanced VVO mode, voltage and demand data from each AMI meter is evaluated to determine whether the targeted voltage at the distribution primary level can be reduced from what it would have been if only primary voltage sensing and assumed secondary voltage drops were considered. The incremental benefit of incorporating AMI data will be computed by assessing the difference between what the primary voltage setting would have been when operating VVO without AMI and what the primary voltage setting actually was when operating AMI-enhanced VVO. A calculated demand reduction for operating VVO without AMI will be determined by applying the CVR factor to the difference in primary voltage settings with and without AMI data.

Prepared by or under the supervision of: Jacquelyn Bean and James Perkinson

# Automated CVR Protocol No. 1

**Primary Sector and End-Use:**

Electric utility distribution feeders and substations feeding residential, commercial and industrial customers; large industrial or commercial customers that have the ability to implement automated conservation voltage regulation (CVR) within their facility.

**Application Specifications:**

This method applies to automatic CVR systems. These automated systems can be turned on and off on a daily basis, have the voltage set-points changed on a daily basis, have the ability to measure and record period average bus and end-of-line voltages, period kWh, period kVARh on a per feeder basis and measure and record period average temperature. The method is applicable where no previous energy usage information is available

The ideal application would be where the automatic CVR control components could also monitor and store the period data.

**Method Description:**

***Primary Method***

The primary method of verifying energy savings is to operate the system in such a way as to operate at different voltage levels on alternating days. The initial verification period would last one year. The verification would begin with 90 days or three months of one day at full voltage reduction, one day with voltage set at the controlled nominal midpoint above full reduction and one day of open loop (automated CVR off). During the next 9 months the automated CVR would be on continuously. Three out of these nine months would be selected based on season and other factors such as geographic weather patterns etc., to operate the system so that on alternate days the system is at full voltage reduction, and the next day at the controlled nominal midpoint.

Time series analysis procedures, robust statistical methods, and temperature compensation methods are then used to evaluate the total energy conservation by comparing energy use on similar days at different voltage levels. For instance, winter weekdays would be compared against winter weekdays, summer weekdays against summer weekdays, etc. Conservation voltage regulation factors (CVRf) then computed for each feeder the different seasons for weekdays and for weekends.

CVRfs are used to estimate total ongoing energy conservation. CVRfs are verified during similar periods in following periods by running alternating days with full end of line voltage reduction and 2 volts above full end of line voltage reduction for two to four week periods.

***Program Savings***

The program savings are estimated by using the following definition:

Esaved = Eused [(CVRf*Vr%/(1-CVRf*Vr%)]

In which:

Esaved = Energy Conserved for period in kWh, MWh or GWh

Eused = Measured Energy used for period in kWh, MWh or GWh

CVRf = Period conservation voltage reduction factor as computed using time series analysis and robust statistical methods with temperature compensation for specific seasons. CVRf will be different for weekday and weekend. (See estimation method below.)

Vr = Average period end of line voltage reduction

Vr% = Average period end of line voltage reduction in percent

Voc = measured average end of line voltage with automated CVR non operational

Vcvr = measured average end of line voltage with automated CVR operational

Vr = Voc – Vcvr

Vr% = Vr/Voc * 100

***CVRf Estimation (applies to the performance evaluation period)***

Integrated demand profiles, one each for the automated CVR system active and inactive, are estimated on a common ambient temperature basis using the UtiliData CVR Estimation Method ("Estimation of Automated CVR System Performance Using Observed Energy Demand Load Profiles"); the 24-hour sum of the difference between these profiles is the estimated conserved energy for the evaluation. The mean difference of the end of circuit voltages for the automated CVR system active and inactive is estimated. The CVRf is then determined from the ratio of these two quantities, and can be expressed on an absolute or per unit basis (the per unit basis is recommended).

Recognizing (1) the stochastic nature of the energy observations as discussed in the UtiliData CVR Estimation Method, (2) the requirement to evaluate the performance of candidate automated CVR systems using the smallest (least duration) set of energy observations, and (3) that the probability densities of the relevant observations clearly exhibit non-homogeneous variance and are also clearly not Gaussian processes, the required estimations should be carried out using robust statistical procedures. Specifically, the Minimum Covariance Determinant estimators should be applied, because (1) their breakdown point is high and (2) they do not require that the observations exhibit a symmetrical probability density.

***Automated CVR Performance Forecasting***

The UtiliData CVR Estimation Method referenced above, estimates CVR using the observations of the automated CVR system inactive state as a reference. In principle, forecasting for a given circuit then simply requires a base demand profile, a projected end of circuit voltage reduction, and the estimation results from the evaluation period.

**Special Considerations:**

***Temperature***

Correct temperature data is essential to the accurate use of this verification method. It is recommended that the automated CVR system records period temperatures at the substation. Because the substation is usually at the geographic center of the area served this temperature will usually suffice. However, if significant microclimates are known to exist, temperature monitoring and recording may also be required at the feeder end-of-line location, so that an average temperature for the feeder may be obtained.

***Metering and Data***

Data recording periods should be no greater than one hour, and can be as short as the system allows. Weather data should be collected on the same time period as the load data. Data collected is subject to audit.

***Instrumentation***

Voltage monitors should have linearity of better than ½% within the expected ranges of voltage and temperature drift should be less than ½% from -40 degrees C to 65 degrees C. Power monitors should be revenue grade accuracy but need not be revenue class.

***Shop Calibration and Field Verification***

Instruments and meters should be shop calibrated. Field verification and inspections are required to verify correct installation and correct readings.

***Baseline***

The baseline voltage levels are established by the historical regulator or LTC control settings. One or more years of historical regulator or LTC setting information should be made part of the verification data records.

***Re-verification Triggers***

Re-verification will be required when there is a +/- 10% shift in temperature adjusted total annual load, a +/-10% shift in temperature adjusted total load during heating regime hours, a +/-10% shift in temperature adjusted total load during cooling regime hours, or a permanent reconfiguring of the distribution system (not including re-conductoring, transformer replacement, capacitor banks, or other distribution system efficiency project).

If re-verification is triggered by a shift in the loads during heating or cooling regimes, the re-verification protocol will consist of one sixty day period during either the heating or cooling period. If re-verification is triggered by a shift in total annual load or a permanent re-configuration the re-verification protocol will consist of two sixty day periods, one in the heating period and one in the cooling period. During the re-verification periods the system will alternate daily, operating one day at full voltage reduction and the next day at the controlled nominal midpoint.

The new CVRfs determined by these re-verifications will be used in lieu of the original CVRfs.

***Model***

The current model used for the time series analysis includes compensation for temperature. There are a number of additional factors that affect energy use and could be added to the model. Addition of these factors will tend to improve the predictive accuracy and reduce "outlier" data points. Factors that may be considered for inclusion in the model in the future will include daylight and dark hours, solar intensity, day of week, humidity, etc.

Adding any or all of these to the model should not change the basic measurement and verification protocol.

**Control Group:**

No control group required because with on-off and variable voltage set point capability, the application group can act as its own control group during testing periods.

**Recommended Models and Tools:**

***UtiliData Automated CVR Estimation Method Tools***

MatLab® (©1994-2003 by the MathWorks, Inc.) tools are available from PCS UtiliData to use with this protocol.

**References:**

1. Rousseeuw, P J, Leroy AM, 'Robust Regression and Outlier Detection', Wiley 1987.
2. Rousseeuw, P J, 'Introduction to Positive Breakdown Methods', in Handbook of Statistics, Volume 15: Robust Inference, editors G S Maddala and C R Rao, Elsevier 1997.
3. "Estimation of Automated CVR System Performance using Observed Energy Demand Profiles", David Bell, March 15, 2004. (available at www.pcsutilidata.com)

Division 1-47

Request:

Regarding the Time to Interconnection Service Agreement (ISA) metric:

a. Please provide the average time measured in business days necessary for the Company to provide a customer with an executable ISA (commencing from the data a completed application is received) over all processes for the last five years.

b. Please provide the annual number of ISAs completed for the last five years.

c. Please provide the annual number of ISAs completed within the number of business days allowed by the Interconnection Tariff.

d. Please provide the annual number of ISAs not completed within the number of business days allowed by the Interconnection Tariff.

Response:

a. The average number of business days to issue an executable Interconnection Service Agreement (ISA) to a customer was calculated by finding the average number of business days from all applications received to ISAs issued. The reported time excludes force majeure (required storm duty work), customer hold time (throughout the entire process), and State and Federal holidays, the data reported is based on the date the ISA was issued.

| | **Average Business Days from Application Received to ISA Issued** |
|---|---|
| **2013** | 43 |
| **2014** | 69 |
| **2015** | 69 |
| **2016** | 34 |
| **2017** | 44 |

b. Please see the table below. The Company used the same assumptions as in the response to Division 1-47, part a.

Prepared by or under the supervision of: Meghan McGuinness and Timothy R Roughan

| | Number of ISAs Issued |
|---|---|
| **2013** | 89 |
| **2014** | 156 |
| **2015** | 643 |
| **2016** | 1,792 |
| **2017** | 2,165 |

c. Please see the table below. The Company used the same assumptions as in its response to Division 1-47, part a.

| | Total Number of ISAs Issued on Time | Percentage on Time |
|---|---|---|
| **2013** | 87 | 98% |
| **2014** | 153 | 98% |
| **2015** | 632 | 98% |
| **2016** | 1,788 | 99.8% |
| **2017** | 2,125 | 98% |

d. Please see the table below. The Company used the same assumptions as in its response to Division 1-47, part a.

| | Total Number of ISAs Not Issued on Time | Percentage Not on Time |
|---|---|---|
| **2013** | 2 | 2% |
| **2014** | 3 | 2% |
| **2015** | 11 | 2% |
| **2016** | 4 | 0.2% |
| **2017** | 40 | 2% |

(This response is identical to the Company's response to Division 5-47 in Docket No. 4770.)

Division 1-48

Request:

Regarding the Average Days to System Modification metric:

a. Please provide the average time measured in business days necessary for the Company to complete system modifications (commencing from the date of execution of the ISA) over all processes for the last five years.

b. Please provide the annual number of system modifications completed for the last five years.

c. Please provide the annual number of system modifications completed within the number of business days allowed by the Interconnection Tariff.

d. Please provide the annual number of system modifications not completed within the number of business days allowed by the Interconnection Tariff.

Response:

a. The average business days to system modifications metric is the average number of business days between the date any system modification payments were received and the date system modifications were completed by the Company. The working days exclude force majeure days and State and Federal holidays. All Standard projects (as defined by the Interconnection Tariff) require a witness test, and this must be scheduled a minimum of 10 days before the witness test and/or authority to interconnect is granted. Given that the Company was not tracking the system modification completion date for Standard applications in its tracking system (it was tracking the date when the authority to interconnect was granted), the Company has assumed the date of system modification completion is 10 business days before the date of authority to interconnect. For Expedited applications, the system modification completion date is assumed to be the date authority to interconnect is granted.

| Year SM Completed | Average Number of Business Days to Complete System Modifications |
|---|---|
| **2013** | 95 |
| **2014** | 113 |
| **2015** | 205 |
| **2016** | 230 |
| **2017** | 310 |

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b. Please see the table below. The Company used the same assumptions as in its response to Division 1-48, part a.

| Year SM Completed | Total Number of System Modifications Completed Per Year |
|---|---|
| **2013** | 13 |
| **2014** | 10 |
| **2015** | 6 |
| **2016** | 15 |
| **2017** | 17 |

c. Prior to July 1, 2017, there was no timeframe in the Rhode Island Interconnection Tariff to which the system modification completion date can be compared.

d. Prior to July 1, 2017, there was no timeframe in the Rhode Island Interconnection Tariff to which the system modification completion date can be compared.

(This response is identical to the Company's response to Division 5-48 in Docket No. 4770.)

Division 1-49

Request:

Regarding the Interconnection Support Estimate versus Actual Cost incentive:

a. Please discuss whether the employees developing the actual costs will have access to the cost estimates.

b. If the answer to (a) is yes, please discuss how the Company will mitigate the incentive for an employee to modify the actual cost so that it better matches the estimated cost.

c. Please discuss whether any independent review of the data is contemplated.

Response:

a. The employees who compile the actual costs will have access to the original cost estimate to determine variances. The original cost estimate is documented within the Impact Study provided to the Interconnecting Customer and also within the Interconnection Service Agreement.

b. Actual costs (i.e. costs spent on the project) are reconciled against cost estimates only after upgrades have been built. The reconciliation exercise is undertaken by the final accounting group – this group would have no ability to modify actual costs.

c. An independent review of the data is not being contemplated as the Company continues to provide more accurate estimates based on the reconciliations performed.

(This response is identical to the Company's response to Division 5-49 in Docket No. 4770.)

Prepared by or under the supervision of: Meghan McGuinness and Timothy R. Roughan

Division 1-50

Request:

Please provide the calculations used to arrive at the Company WACC that is used in Workpaper 9.4 – Incentive Benefits in a machine-readable Excel document.

Response:

Attachment DIV 1-50 provides the calculations used to arrive at the Company WACC in Workpaper 9.4 – Incentive Benefits. The Company used the after-tax WACC calculated in Attachment DIV 1-50.

Note that the Company used a value of 0.075 in Workpaper 9.4 – Incentive Benefits, rather than the 0.0751 shown in Attachment DIV 1-50. In both this analysis and the individual Power Sector Transformation Plan program benefit cost analyses (with the exception of AMF), the value was rounded to three decimal places.

Because the performance incentive mechanisms included in Workpaper 9.4 apply only to Narragansett Electric, the Company may have more appropriately used the electric-only after-tax WACC of 0.0743. However, the Company opted to use the combined gas and electric WACC to provide for consistent assumptions across the various benefit cost analyses included in the Power Sector Transformation Plan.

(This response is identical to the Company's response to Division 5-50 in Docket No. 4770.)

THE NARRAGANSETT ELECTRIC COMPANY
COST OF CAPITAL FOR RATE YEAR

**Electric & Gas Distribution Cost of Capital**

| | Capitalization Ratio | Cost Rate | Weighted Average Cost (After-Tax) | Weighted Average Cost (Pre-Tax) |
|---|---|---|---|---|
| Long-Term Debt | 48.5% | 4.84% | 2.34% | 2.34% |
| Short-Term Debt [1] | 0.4% | 1.76% | 0.01% | 0.01% |
| Preferred Stock | 0.1% | 4.50% | 0.00% | 0.00% |
| Common Equity | 51.0% | 10.10% | 5.15% | 7.92% |
| Total [2] | 100.0% | | 7.51% | 10.28% |

[1] Cost rate is the average short-term debt interest rate projected for the Rate Year.

[2] Capitalization ratios include impact of refinancing and exclude goodwill and accumulated other comprehensive income.

Division 1-51

Request:

Please provide estimates of savings from reduced capacity share that will benefit customers in the years 2020 and 2021 from the Forward Capacity Market Peak Demand Reduction targets.

Response:

Estimates of the potential savings to customers in 2020 and 2021 due to capacity share reductions that result from the Company's achievement of the minimum, target, and maximum Forward Capacity Market Peak Demand Reduction targets in 2019 and 2020 are provided in the table below. Detailed calculations are provided in Attachment DIV 1-51.

| | 2020 | 2021 |
|---|---|---|
| Min | $ 370,660 | $ 707,130 |
| Target | $ 722,456 | $ 1,493,560 |
| Max | $ 1,206,880 | $ 2,283,953 |

(This response is identical to the Company's response to Division 5-51 in Docket No. 4770.)

Prepared by or under the supervision of: Meghan McGuinness and Timothy R. Roughan

**Estimate of potential savings from capacity share reductions in 2020 and 2021 due to Forward Capacity Market peak reduction target**

**1. Approximation of projected capacity share of total ISO-NE peak based on peak forecast**

**a. Peak Forecast**

| | 2019 | 2020 |
|---|---|---|
| Company | 1,691 | 1,679 |
| ISO-NE | 26,409 | 26,298 |
| **b. Capacity share** | 0.0640 | 0.0638 |

*Note: assumes 100% peak coincidence in both years; ISO-NE forecast from 2017 ISO-NE CELT Report, reference case accounting for BTM PV and passive DR; Company forecast adjusted for PV and energy efficiency*

**2. Estimate of change in capacity share calculated in CY 2019 and 2020 due to achievement of peak reduction targets**

**a. Peak Reduction Targets for 2019 and 2020 Expressed as Incremental Reduction to Company Forecast**

| | 2019 | 2020 |
|---|---|---|
| Min | 7 | 13 |
| Target | 13 | 27 |
| Max | 22 | 42 |

**b. Company Peak Adjusted for Targets (1.a-2.a)**

| | 2019 | 2020 |
|---|---|---|
| Min | 1,684 | 1,666 |
| Target | 1,677 | 1,651 |
| Max | 1,668 | 1,637 |

**c. ISO-NE Peak Adjusted for Company Targets (1.a-2.a)**

| | 2019 | 2020 |
|---|---|---|
| Min | 26,403 | 26,285 |
| Target | 26,396 | 26,271 |
| Max | 26,387 | 26,256 |

**d. Capacity Share after Target Achievement (2.b/2.c)**

| | 2019 | 2020 |
|---|---|---|
| Min | 0.0638 | 0.0634 |
| Target | 0.0635 | 0.0629 |
| Max | 0.0632 | 0.0623 |

**e. Change in Capacity Share after Target Achievement (1.b-2.d)**

| | 2019 | 2020 |
|---|---|---|
| Min | 0.0002 | 0.0005 |
| Target | 0.0005 | 0.0010 |
| Max | 0.0008 | 0.0015 |

**3. Calculation of CY 2020 and 2021 Savings**

**Relevant CY 2021 Capacity Load Obligation and NRCP by Month**

| | CCP 2019-2020 | | | | | CCP 2020-2021 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2020-01 | 2020-02 | 2020-03 | 2020-04 | 2020-05 | 2020-06 | 2020-07 | 2020-08 | 2020-09 | 2020-10 | 2020-11 | 2020-12 |
| **a. Capacity Load Obligation (MW)** | N/A | N/A | N/A | N/A | N/A | 34,284 | 34,284 | 34,284 | 34,284 | 34,544 | 34,544 | 34,544 |
| **b. NRCP ($/kW-month)** | N/A | N/A | N/A | N/A | N/A | 6.341 | 6.341 | 6.341 | 6.341 | 6.325 | 6.325 | 6.324 |

*Source: ISO-NE Forward Capacity Market Net Regional Clearing Price and Effective Charge-Rate Forecast*

**c. 2020 Avoided MW of CLO due to reduced 2019 capacity share (3.a*2.e)**

| | 2020-01 | 2020-02 | 2020-03 | 2020-04 | 2020-05 | 2020-06 | 2020-07 | 2020-08 | 2020-09 | 2020-10 | 2020-11 | 2020-12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Min | | | | | | 8.33 | 8.33 | 8.33 | 8.33 | 8.40 | 8.40 | 8.40 |
| Target | | | | | | 16.24 | 16.24 | 16.24 | 16.24 | 16.36 | 16.36 | 16.36 |
| Max | | | | | | 27.13 | 27.13 | 27.13 | 27.13 | 27.34 | 27.34 | 27.34 |

**d. 2020 Savings (3.c*3.b*1000)**

| | | | | | | | | | | | | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Min | $ 52,838 | $ 52,838 | $ 52,838 | $ 52,838 | $ 53,105 | $ 53,105 | $ 53,096 | **$** | **370,660** |
| Target | $ 102,988 | $ 102,988 | $ 102,988 | $ 102,988 | $ 103,507 | $ 103,507 | $ 103,491 | **$** | **722,456** |
| Max | $ 172,044 | $ 172,044 | $ 172,044 | $ 172,044 | $ 172,911 | $ 172,911 | $ 172,884 | **$** | **1,206,880** |

**Relevant CY 2021 Capacity Load Obligation and NRCP by Month**

| | CCP 2020-2021 | | | | | CCP 2021-2022 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2021-01 | 2021-02 | 2021-03 | 2021-04 | 2021-05 | 2021-06 | 2021-07 | 2021-08 | 2021-09 | 2021-10 | 2021-11 | 2021-12 |
| **e. Capacity Load Obligation (MW)** | 34,544 | 34,544 | 34,544 | 34,544 | 34,544 | *34,544* | *34,544* | *34,544* | *34,544* | *34,544* | *34,544* | *34,544* |
| **f. NRCP ($/kW-month)** | 6.324 | 6.324 | 6.324 | 6.325 | 6.325 | *6.325* | *6.325* | *6.325* | *6.325* | *6.325* | *6.325* | *6.325* |

*Source: ISO-NE Forward Capacity Market Net Regional Clearing Price and Effective Charge-Rate Forecast (forecast for CCP 2021-2022 not available, so values assumed to remain at 5/2021 levels)*

**g. 2021 Avoided MW of CLO due to reduced 2020 capacity share (3.e*2.e)**

| | 2021-01 | 2021-02 | 2021-03 | 2021-04 | 2021-05 | 2021-06 | 2021-07 | 2021-08 | 2021-09 | 2021-10 | 2021-11 | 2021-12 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Min | 15.97 | 15.97 | 15.97 | 15.97 | 15.97 | 15.97 | 15.97 | 15.97 | 15.97 | 15.97 | 15.97 | 15.97 | |
| Target | 33.73 | 33.73 | 33.73 | 33.73 | 33.73 | 33.73 | 33.73 | 33.73 | 33.73 | 33.73 | 33.73 | 33.73 | |
| Max | 51.59 | 51.59 | 51.59 | 51.59 | 51.59 | 51.59 | 51.59 | 51.59 | 51.59 | 51.59 | 51.59 | 51.59 | |

**f. 2021 Savings (3.g*3.f*1000)**

| | | | | | | | | | | | | | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Min | $ 101,003 | $ 101,003 | $ 101,003 | $ 101,019 | $ 101,019 | $ 101,019 | $ 101,019 | $ 101,019 | $ 101,019 | $ 101,019 | $ 101,019 | $ 101,019 | **$ 707,130** |
| Target | $ 213,332 | $ 213,332 | $ 213,332 | $ 213,366 | $ 213,366 | $ 213,366 | $ 213,366 | $ 213,366 | $ 213,366 | $ 213,366 | $ 213,366 | $ 213,366 | **$ 1,493,560** |
| Max | $ 326,227 | $ 326,227 | $ 326,227 | $ 326,279 | $ 326,279 | $ 326,279 | $ 326,279 | $ 326,279 | $ 326,279 | $ 326,279 | $ 326,279 | $ 326,279 | **$ 2,283,953** |

Division 1-52

Request:

Please describe the value the EV Off-Peak Charging Rebate is expected to provide in understanding customer response to time-differentiated price signals. Please provide examples of how this understanding will assist the development of time-differentiated price signals via AMF deployment.

Response:

Narragansett Electric's proposed EV Off-Peak Charging Rebate will inform the design of potential time-differentiated Standard Offer Service pricing under AMF deployment, as well as the design of relevant customer outreach and education.

The Off-Peak Charging Rebate Pilot's simple pricing structure (rebate of 6 cents per kWh in summer months and 4 cents per kWh in all other months) will seek to demonstrate the effectiveness of easily-understandable, energy price differentials that apply to discrete time periods. The Pilot will test the response rate to an opt-in program that is tailored and targeted to a specific type of energy user (i.e., EV drivers) and evaluate the system impacts from this response. An understanding of how these self-selected (and, therefore, prone to be responsive) customers behave under this pricing structure can help Narragansett Electric understand customer expectations for, and potentially identify improvements in the design of, future electric supply rates that may broadly apply to all customers. Although the Pilot will test a rebate mechanism as a means of encouraging off-peak charging, rather than imposing a higher price for charging at peak times, the lessons learned from participating customer behavior and customer satisfaction will be valuable as it defines the considerations and approach to progressing towards design time-varying electric supply rates that are understandable and provide opportunities for customers to save on their electricity bills.

Experience gained in designing and targeting a program to a specific type of energy user will help Narragansett Electric develop outreach strategies for future time-varying electric supply rates. Surveys of participating customers will help the Company identify any potential improvements in customer outreach and education that can be improved upon when AMF enables new rate options.

(This response is identical to the Company's response to Division 5-52 in Docket No. 4770.)

Prepared by or under the supervision of: Carlos Nouel

Division 1-53

Request:

Refer to Schedule PST-1, Chapter 9, page 21. Please list the system efficiencies that are expected to occur through the combination of AMF and VVO/CVR.

Response:

The integration of interval voltage data from AMF meters into the optimization algorithms of the VVO/CVR expansion has the potential to deliver a 1 percent incremental reduction in energy consumption and peak demand, over and above the 3 percent reduction that is expected through VVO/CVR on a standalone basis.

(This response is identical to the Company's response to Division 5-53 in Docket No. 4770.)