U.S. Department of Energy Smart Grid Investment Grant Technical Advisory Group Guidance Document #9

Topic: Preferences for DOE Required Data Collection via Survey Instruments

July 6, 2011

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OBJECTIVE

This guidance document describes the demographic and other data elements that are to be collected either during the enrollment process or via survey instruments. These data elements are to be included as part of the Project Data reporting requirements for recipients undertaking Consumer Behavior Studies (CBS) in conjunction with Smart Grid Investment Grants (SGIG). The document:

- Describes the value of collecting high-quality customer characteristic data in order to address key public policy issues;
- Details the preferred set of customer characteristic data elements and how they will fit into DOE's efforts to learn lessons across the recipient's CBS projects;
- Identifies the preferred method for collecting this information when survey instruments are used; and
- Provides two versions of a residential market response survey instrument (a mail survey version and a telephone survey version), a single version of a commercial market response

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* The following individuals on the Lawrence Berkeley National Laboratory Technical Advisory Group (TAG) drafted and/or provided input and comments on one or more of the U.S. Department of Energy Smart Grid Investment Grant (SGIG) Technical Advisory Group Guidance Documents: Peter Cappers, Andrew Satchwell, Annika Todd, and Charles Goldman (LBNL), Karen Herter (Herter Energy Research Solutions, Inc.), Roger Levy (Levy Associates), Theresa Flaim (Energy Resource Economics, LLC), Rich Scheer (Scheer Ventures, LLC), Lisa Schwartz (Regulatory Assistance Project), Richard Feinberg (Purdue University), Catherine Wolfram, Lucas Davis, Meredith Fowlie, and Severin Borenstein (University of California at Berkeley), Miriam Goldberg, Curt Puckett and Roger Wright (KEMA), Ahmad Faruqui, Sanem Sergici, and Ryan Hledik (Brattle Group), Michael Sullivan, Matt Mercurio, Michael Perry, Josh Bode, and Stephen George (Freeman, Sullivan & Company), Mary Sutter and Tami Buhr (Opinion Dynamics). In addition to the TAG members listed above, Bernie Neenan and Chris Holmes of the Electric Power Research Institute also provided comments.

survey instrument (a mail version) and three questions for post-treatment surveys that recipients should ideally incorporate into their own survey efforts to collect the information that DOE is seeking for customers in treatment and control groups.

BACKGROUND

Tables D-2 and D-3 of the Benefits and Metrics Guidebook included a comprehensive listing of demographic information (Tables D-2 and D-3) that was expected to be collected from all SGIG recipients undertaking consumer behavior studies.[1] Given that much of this information is not currently in the possession of the recipients, it must be collected either at the time experimental subjects are enrolled in experimental conditions or shortly thereafter in pre-treatment surveys of experimental subjects in both treatment and control conditions. To ensure that this customer-level, masked data can be used by DOE in future meta-analysis studies, the use of common survey questions, methods and procedures is *critical*. The research questions that such a future analysis effort can address are contingent on the actual content and objectives of recipients' consumer behavior studies. As such, the list of required demographic survey data has been refined to better reflect what is actually being studied by the SGIG recipients, not just what was proposed, and how the different study designs can feed into a broader analysis effort across the studies at a later date.[2]

We also know that many recipients are interested in collecting high-quality survey data from as many of their study participants as possible in order to provide the appropriate context for future policy-making related to:

1. *The effects of demographic/firmographic characteristics on customer acceptance of treatment offers and other participation decisions* (e.g., demographic/firmographic differences that may be present for control and treatment groups, for those who accept or reject treatment and for those who migrate out of the experiment during the course of study as opposed to those that do not);
2. *The magnitude of load shifting and energy consumption impacts for customers with different demographic/firmographic characteristics* (e.g. how load impacts vary with age, income, daytime occupancy, business type, size of facility, etc.); and
3. *The influence of customer education on response to time-based rate programs*.

We understand that SGIG recipients will be undertaking their own surveys to collect information; thus, the guidelines contained in this document are provided to help SGIG recipients understand

[1] U.S. Department of Energy, "Guidebook for ARRA Smart Grid Program Metrics and Benefits," Washington, DC, December 7, 2009.

[2] An updated comprehensive listing of all data that recipients undertaking consumer behavior studies are to report to DOE will be contained in a subsequent Guidance Document and reporting template(s).

the importance of using, as directly as possible, the set of survey questions, both in form and content, presented in Appendices A, B, C, D and E of this document to collect the required data in order to maximize the number of study participants who complete the surveys as well as to ensure conformity and consistency of their reported responses.

POLICY QUESTIONS OF INTEREST

Recently, intervenors and some policymakers have raised concerns about the likely residential customer acceptance of and ability to respond to time-based rate programs in regulatory proceedings related to advanced metering infrastructure (AMI).[3] This is an important issue because the potential economic benefit from customer participation in time-based rate programs may be a significant component of a utility's "business case" for AMI and Smart Grid investments.

For example, it has been argued that low income customers, seniors, disabled customers and customers with medical devices are unable to respond to time-based rate programs. Furthermore, some contend that this population is more likely than others to experience serious economic harm as a result of participating in such rate options. Correspondingly, it is argued that these customers should not be exposed to time-based rate alternatives or should at the very least be afforded special protections in the event that they accept such pricing alternatives.

These and other claims are being used by interveners as a basis to shape policy in state regulatory bodies regarding the decision to offer time-based rate programs to customers at all and if so, what kinds of customers should be targeted (or protected) and what efforts utilities should undertake to mitigate any risks of harm to consumers from participating in these rates. There is great value in undertaking a more thorough empirical investigation of these claims; results from SGIG studies can be used to address these important issues provided the information that is collected describing customer demographics is scientifically robust.

Regulators, policymakers and utilities are also interested in understanding the impacts of customer education on customer acceptance and demand response. It is likely that study-to-study variations in demand response will result to some extent from differences in the effectiveness of customer education programs incorporated into the different studies. The effects of such programs may be quite significant both for future policy making regarding funding for education programs related to demand response and for future program design. Careful surveys of customers are needed to assess the likely impacts of the different customer education programs that will be implemented in the context of the CBS studies.

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[3] This guidance document focuses nearly exclusively on residential customers, as they are the ones' most universally affected by the implementation of AMI. There are, however, several SGIG recipients who are including small commercial customers in their consumer behavior studies, so a single survey document has been developed for these commercial customers to illustrate the information these recipients are to collect.

DOE is proposing to augment survey information that is likely already being collected by SGIG recipients in an attempt to collect comparable information from all recipients that can be used to address these and other policy questions in a future DOE-funded meta-analysis. To enable the collection of the highest quality data possible from as many study participants as possible for such an analysis effort, this document provides formal guidelines governing the collection of survey data in conjunction with the CBS studies.

SURVEY GUIDELINES

Survey Content

The aggregation of survey responses across the separate CBS studies requires the use of certain common survey questions across *all* SGIG studies. That is, certain survey questions used in the course of the CBS studies should be asked in *exactly* the same manner and in *exactly* the same order across *all* studies. This is because even minor changes in question design and question order can alter the results of a scientific survey.

Table 1 contains information that DOE expects all SGIG CBS recipients to provide for each residential study participant. The questions fall into three basic categories:

1. Questions about household characteristics;
2. Questions about key appliance holdings;
3. Questions about business characteristics; and
4. Questions about customer awareness and education.

Table 1. Critical Survey Questions for Meta-Analysis and When they Should be Collected

Question Concepts (specific wording and order provided in Appendices)	Enrollment or Pre-Treatment **(Appendix A, B or C)**	After Event or Post-Treatment **(Appendix D)**
Own/rent of home	**X**	
Type of dwelling	**X**	
Presence of a central air conditioner	**X**	
Presence and number of room air conditioners	**X**	
Presence and programming of a programmable thermostat	**X**	
Presence of an electric clothes dryer in the home	**X**	

Question Concepts (specific wording and order provided in Appendices)	Enrollment or Pre-Treatment **(Appendix A, B or C)**	After Event or Post-Treatment **(Appendix D)**
Number of people living in the home (broken down by age)	**X**	
Presence of person with chronic illness or medical disability in the home	**X**	
Presence of person in the home on Monday to Friday between 1 PM and 5 PM	**X**	
Presence of person working full time and if person works out of the home	**X**	
Remembrance of receiving the pilot solicitation	**X**	
Usefulness of solicitation information	**X**	
Primary language spoken in home	**X**	
Income range	**X**	
Level of education	**X**	
Business classification	**X**	
Size of facility	**X**	
Number of employees	**X**	
Business income	**X**	
Electricity's share of operating costs	**X**	
Remembrance of information from electric utility to educate person around behaviors to reduce impact of rates		**X**
Usefulness of the educational information		**X**
Whether any of the educational information was acted upon		**X**

Whenever possible, the questions on customer characteristics and appliance holdings (Appendix A, B and C) should be collected as experimental subjects are *enrolled* in experimental conditions (i.e., as part of the process of enrolling customers into treatment and control groups). With this approach, there is no need to collect information on customer characteristics using separate surveys.[4]

However, this approach to survey data collection may not be possible in all cases because enrollment occurred before this guidance was provided; the enrollment protocols do not require direct contact with customers (e.g., classic randomized control trial design); or, it is impractical to contact all subjects in all treatment conditions (e.g., recipients using random encouragement designs). When the information on customer characteristics cannot be collected from all treatment and control subjects at intake, recipients must collect this demographic and customer characteristics information using scientific survey methods.

Guidance on Survey Design

SGIG participants may undertake several different types of surveys in the course of their experiments. These surveys fall into four basic categories:

1. Market Response Surveys – studies of consumers' reactions to enrollment mechanisms (i.e., after consumers have been offered participation in the study and accepted or refused assignment to treatment conditions);[5]
2. Pre-treatment Surveys – studies of baseline conditions in households prior to exposure to the experiment(i.e., after the subject has been accepted into the study, but before exposure to the experimental conditions occurs);

[4] The intake process for enrolling customers in study cells will vary from recipient to recipient. Some grantees will enroll customers using third party call center support organizations (e.g., Commonwealth Edison's Customer Applications Program or the California Statewide Pricing Pilot) or will use their own utility call centers. The integration of customer enrollment information collection with standard utility operations (i.e., utility call centers) may pose significant project management challenges that should be considered in deciding whether to outsource the enrollment function. These include: accounting for the impact of enrollment processing on call center operations and statistics; development of cost effective methods for collecting information that should be collected on intake (e.g. demographic information, customer preferences for program alternatives); and training of call center personnel to collect the required information; and quality assurance required to ensure compliance with survey measurement protocols.

[5] Market Response surveys should be conducted as soon as possible after the completion of recruiting efforts. It is expected that important information (i.e., recall of recruiting campaign particulars, what convinced them to volunteer, etc.) can be obtained from study volunteers at the time they are enrolled in the study. However, for parties who do not volunteer, separate statistical surveys should be carried out to determine recall and awareness of advertising messages for parties who decided not to enroll along with their reasons for their lack of interest in the offer.

3. Post-treatment Surveys – studies of conditions in households after exposure to the experiment (i.e., after the experiment has concluded); and
4. Within Experiment Surveys– studies of conditions in households immediately following experimental events (e.g., CPP event days) or at periodic intervals during the experiment.

Each type of survey is targeted to specific groups of people:

- Market Response Survey (#1) designs should provide for measurements of the responses of representative samples of parties who volunteered for the experiment *and those who did not* volunteer when the experimental treatment was offered so that comparisons can be made between responses given by those who enrolled and those who did not.
- In Pre-treatment[6] and Post-treatment surveys (#2, and #3), responses from representative samples of treatment and control groups should be measured so that it will be possible to compare the responses of subjects in treatment and control conditions before and after exposure to the treatment.[7]
- In surveys taken during experiments (#4), responses of treatment and control group members should be measured so that they may be compared.

If information describing customer characteristics and appliance holdings in Table 1 (i.e., Appendix A, B or C) was not collected during the enrollment process, then it should be collected in a Pre-treatment survey of participants in all study cells. These surveys should be carried out using the four step contact protocol for mail surveying described in "Internet, Mail and Mixed Mode Surveys: The Tailored Design Method", by Don Dillman, (2009).[8] This is to ensure that non-response to these surveys is minimized and that comparable response rates are obtained for treatment and control groups. Appendix D questions are only collected after an event or at the end of the experiment (i.e., post-treatment or within experiment surveys).

Telephone survey methods for collecting information about household characteristics or appliance holdings should be avoided *unless* accurate telephone contact information was obtained for all

[6] Depending on the planned design, it is possible that the Market Response and Pre-treatment surveys may occur at the same time.

[7] As explained above, in some cases it may be possible to collect pre-treatment data on customer demographics from study volunteers at the time they are enrolled in the studies. This is the best possible approach for collecting this information because it will eliminate virtually all non-response on key demographic variables. Recognizing that this may not always be possible or practical, the guidance has outlined survey techniques and supplied survey questions that should be used in pre-treatment surveys.

[8] This requirement is based on current research findings describing the relative effectiveness of different survey strategies. For a discussion of the strengths and weaknesses of different survey modes see: "Response rate and measurement differences in mixed-mode surveys using mail, telephone, interactive voice response (IVR) and the Internet", Don A. Dillman, Glenn Phelps, Robert Tortora, Karen Swift, Julie Kohrell, Jodi Berck, and Benjamin L. Messer, Social Science Research 38 (2009) 1–18

study participants during the enrollment process. If telephone surveys are used in this application, care must be taken to minimize non-response. In general, this requires the use of intensive efforts to contact and interview parties in the households under study. This usually involves the use of an advance letter to each target household explaining that a surveyor will be calling, an offer of a modest financial incentive (between $2 and $5) for participation in the letter, repeated call backs (up to 10) scheduled at varying times over the course of a two week period and efforts to convert refusals for households that initially refuse the interview.[9]

Survey questions concerning the subjects' awareness of information provided during the experiment and its usefulness (Appendix D) can be collected either during Within Experiment Surveys or during a Post-Treatment Survey. Telephone survey methods are appropriate for surveying treatment and control group customers during the course of the study. However, these surveys should follow the same protocols for surveying households described in the preceding paragraph.

Regardless of the survey method chosen, an effort should be made to achieve the highest possible response rate available given available resources. Response rates RR3 and RR4 (see discussion below) in excess of 60% are achievable within reasonable expenditure of resources and should be the targets used when talking with survey suppliers about expected performance.

Appendix A provides a template for a residential *mail survey* that collects the required data to be reported to DOE, as indicated in Table 1, while Appendix B provides a template for a residential *phone survey* to collect the same information. Appendix C contains five questions for a commercial *mail survey*. Appendix D contains three questions regarding possible educational value found in utility information. The order in which these questions are asked and the wording of these questions have been carefully developed to both maximize customer response and ensure the greatest consistency in the provided answers across projects. It is anticipated that SGIG recipients will integrate these questions, in both form and content, into intake questionnaires or survey instruments already being considered or under-development for CBS study participants. In order to eliminate problems that may arise from posing questions in different order, the questions described in Appendices A, B and C should precede or follow any other questions that are to be asked on the customer surveys.

Sample Design

Pre-treatment and Post-treatment surveys should be carried out with statistically representative samples of target populations. That is, samples for such surveys should be drawn at random from treatment and control groups. Sample sizes in each study cell should be sufficient to estimate statistical parameters of interest to within plus or minus 5% precision with 95% confidence. You

[9] "Telephone Survey Methods: Sampling, Selection, and Supervision, Edition 2", by Paul Lavrakas, (1993).

must get explicit approval from your TAG if you want to depart from sample sizes that are calculated to achieve plus or minus 5% precision with 95% confidence. Procedures for calculating sample sizes are identified in Appendix E.[10]

Non-Response Analysis

Survey response rates should be calculated using the guidelines set forth by the American Association for Public Opinion Research (AAPOR) for calculating RR3 and RR4[11]. These calculations will allow the recipient to determine if significant non-response is present. Formulae for calculating these response statistics are provided in Appendix F. They should be reported for all surveys conducted in the course of CBS studies. DOE requests that this information be reported for each survey so that the analysts performing the cross-CBS project analysis will be able to determine the degree of non-response and assess the need to control for it in their meta-analysis studies.[12]

Recipients are advised to undertake a careful analysis of non-response bias to ensure that the conclusions being reached from an analysis of survey results for study groups are not simply the result of non-response bias. To do so, recipients should collect information on each study participant that can be used ultimately to assess and control for non-response bias. This information includes:

1. Usage (provided in the normal course of the study);
2. Property value[13] (obtainable from various sources using address information);[14] and

[10] Statistical surveying intended to describe demographic characteristics of the customers is designed to provide reasonably precise statistical descriptions of the populations participating in the study groups. Therefore the sample sizes should be designed using conventional computing formulae for describing population parameters to within plus or minus 5% precision with 95% confidence. The statistical power of these samples is not an issue.

[11] "*Standard Definitions,* Final Dispositions of Case Codes, and Outcome Rates for Surveys: Revised 2011", American Association of Public Opinion Researchers.

[12] More information on the cross-CBS project analyses will be provided in a forthcoming guidance document.

[13] More information on how to properly report property value data (e.g., rounded to nearest $5,000) will be provided in a forthcoming guidance document.

[14] Obtainable from local assessor records for a small fee or from marketing information suppliers such as Lexus-Nexus, Claritas or Experian for approximately $1 per address. In general, this involves a two step process in which property value information is obtained through address matching using digital files. This first phase will generally result in a 60-70% match rate. Then for addresses that do not match in the automated process, a manual search is done by accessing the records through the web. If collecting the information for all of the study participants (treatment and control) is impractical because of population size and/or cost, sampling is a viable option for preparing these files.

3. Census Block Group Number, which is a 12 digit value identifying the state (2 digit), county (3 digit), tract (6 digit), and block group (1 digit). This information is obtainable from various sources using address information.[15]

Measurements of these comparison variables will be included as part of the DOE reporting requirement and should be attached to *each* survey observation for respondents and non-respondents alike.

Surveying to Measure Behavior Change

Surveys can be used to measure changes in household energy use related behavior. However, the technical requirements for collecting reliable measurements of behavior change are very difficult to achieve. While there is no harm in asking experimental subjects whether they have changed their behavior, self reported measurements of behavior change are subject to all kinds of demand effects in surveying and are generally not a reliable basis for inferring changes in behavior. Instead, studies of behavior change should be carried out by observing the reported energy use related behavior of treatment and control group subjects before and after treatment. That is, the change in behavior is inferred by observing differences in reported behavior before and after exposure to the experimental treatment. To accomplish this measurement requires observation of the reported behavior at, at least two points in time. The sample sizes required to detect even modest changes (i.e., 10%) in energy use-related behavior are relatively large, and care must be taken to construct the survey contact protocols so as not to undermine the validity of the overall experimental design by repeatedly raising the awareness of subjects of the fact that they are being studied.[16]

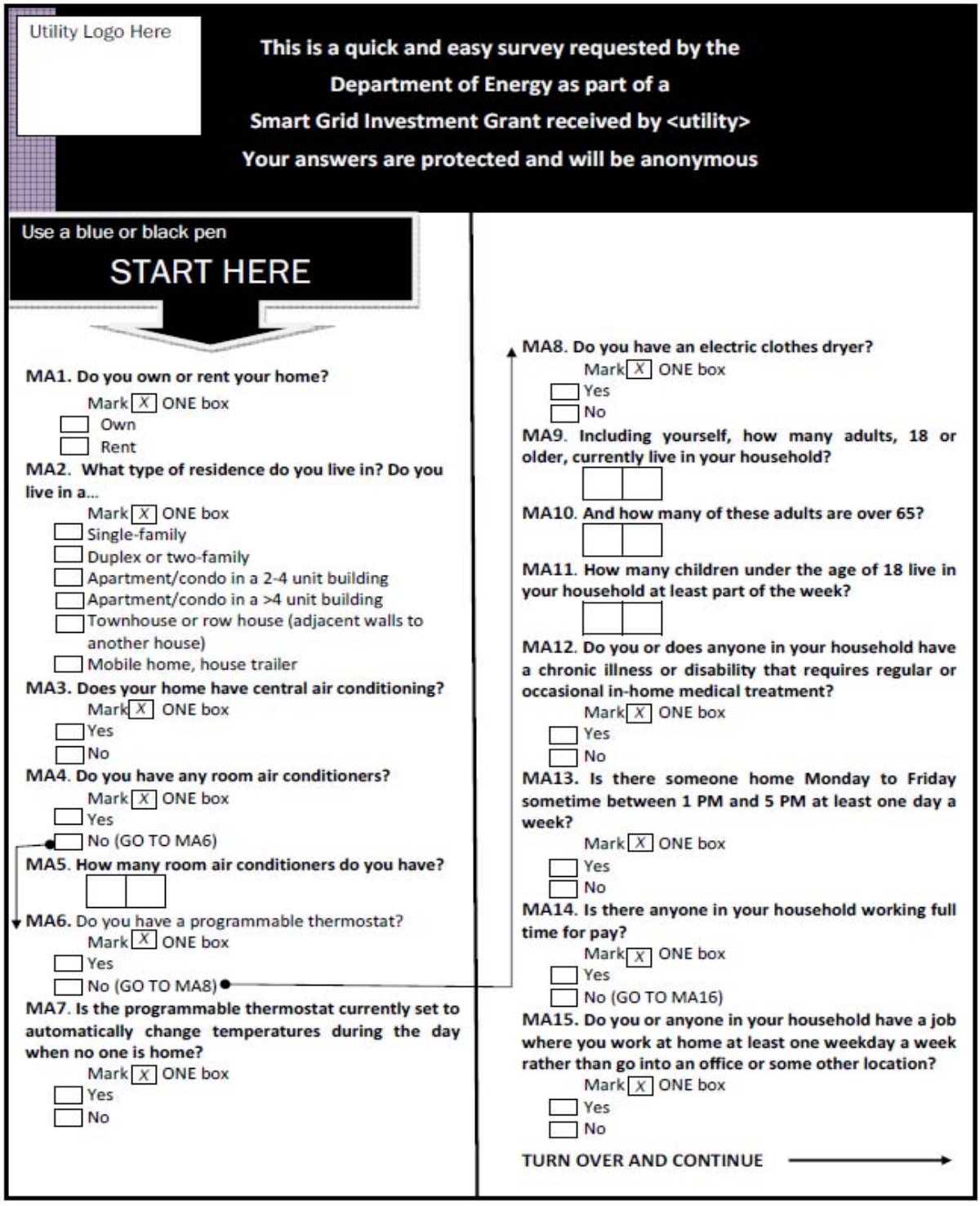
Reporting Requirements

SGIG recipients will be expected to provide digital files containing survey responses to the questions included in Appendices A, B or C, with an identifier that allows the results of surveying to be linked to the load measurement files. More details about the data submittal process, along with specific data templates for the Data Hub, will be forthcoming in Q2 or Q3 of 2011.

[15] This information can be obtained for a small fee ($.10-.20 per address) from several suppliers (e.g., Experian, Claritas, etc.).

[16] "Guidelines for Designing Effective Energy Information Feedback Pilots: Research Protocols". EPRI Report Number 1020855, April 2010, pp. 5-6 through 5-9.

APPENDIX A – RESIDENTIAL MARKET RESPONSE SURVEY TEMPLATE FOR MAIL MODALITY


Utility Logo Here
This is a quick and easy survey requested by the
Department of Energy as part of a
Smart Grid Investment Grant received by <utility>
Your answers are protected and will be anonymous
Use a blue or black pen
START HERE
MA1. Do you own or rent your home?
Mark X ONE box
Own
Rent
MA2. What type of residence do you live in? Do you live in a...
Mark X ONE box
Single-family
Duplex or two-family
Apartment/condo in a 2-4 unit building
Apartment/condo in a >4 unit building
Townhouse or row house (adjacent walls to another house)
Mobile home, house trailer
MA3. Does your home have central air conditioning?
Mark X ONE box
Yes
No
MA4. Do you have any room air conditioners?
Mark X ONE box
Yes
No (GO TO MA6)
MA5. How many room air conditioners do you have?
MA6. Do you have a programmable thermostat?
Mark X ONE box
Yes
No (GO TO MA8)
MA7. Is the programmable thermostat currently set to automatically change temperatures during the day when no one is home?
Mark X ONE box
Yes
No
MA8. Do you have an electric clothes dryer?
Mark X ONE box
Yes
No
MA9. Including yourself, how many adults, 18 or older, currently live in your household?
MA10. And how many of these adults are over 65?
MA11. How many children under the age of 18 live in your household at least part of the week?
MA12. Do you or does anyone in your household have a chronic illness or disability that requires regular or occasional in-home medical treatment?
Mark X ONE box
Yes
No
MA13. Is there someone home Monday to Friday sometime between 1 PM and 5 PM at least one day a week?
Mark X ONE box
Yes
No
MA14. Is there anyone in your household working full time for pay?
Mark X ONE box
Yes
No (GO TO MA16)
MA15. Do you or anyone in your household have a job where you work at home at least one weekday a week rather than go into an office or some other location?
Mark X ONE box
Yes
No
TURN OVER AND CONTINUE

MA16. Do you remember receiving information from your electric utility asking you to participate in a utility pilot program?

Mark [X] ONE box

- ☐ Yes
- ☐ No (GO TO MA18)

MA17. Was the information useful in helping you decide whether or not to participate in the pilot?

Mark [X] ONE box

- ☐ Yes
- ☐ No

MA18. What is the primary language spoken in your home?

Mark [X] ONE box

- ☐ English
- ☐ Spanish
- ☐ Chinese
- ☐ Korean
- ☐ Vietnamese
- ☐ Russian
- ☐ Other

[NOTE TO UTILITY: The choices in MA18 should be kept, but if you have additional languages that are relevant to your service territory, add them between "Russian" and "Other"]

MA19. Last year -- that is, in 2010 -- what was your total household income from all sources, before taxes?

Mark [X] ONE box

- ☐ Less than $10,000
- ☐ $10,000 to less than $20,000
- ☐ $20,000 to less than $30,000
- ☐ $30,000 to less than $40,000
- ☐ $40,000 to less than $75,000
- ☐ $75,000 to less than $90,000
- ☐ $90,000 to less than $100,000
- ☐ $100,000 to less than $150,000
- ☐ $150,000 or more

MA20. What is the LAST grade or class that you COMPLETED in school?

Mark [X] ONE box

- ☐ None, or grade 1-8
- ☐ High School incomplete (grade 9-11)
- ☐ High School graduate (grade 12 or GED certificate)
- ☐ Technical, trade or vocational school AFTER high school
- ☐ Some college, no four-year degree (includes associate degree)
- ☐ College graduate (B.S., B.A., or other four-year degree)
- ☐ Post-graduate or professional schooling after college (e.g., towards a Master's degree or Ph.D; law or medical school)

APPENDIX B – RESIDENTIAL MARKET RESPONSE SURVEY TEMPLATE FOR TELEPHONE MODALITY

The Market Response Survey is to be used when initially enrolling customers OR before treatment begins.

The beginning of any survey is critical as the introduction can keep the person on the phone depending on the language used. We suggest something such as: "Hello, this is <name> calling on behalf of <utility>. This is not a sales call. We are calling to…" The reason for the call needs to be very short and to the point. If the name of the customer is known, we suggest asking to speak with that person. These suggestions are standard to any telephone survey, but are provided for any recipient who has not performed many such surveys. We expect that the utilities will work with their survey contractor to provide the best introduction to the survey.

Question responses that are in parenthesis should not be read during a phone survey.

MA1. Do you own or rent your home?

1. Own
2. Rent
3. (Other)
98. (Don't Know)
99. (Refused)

MA2. What type of residence do you live in? Do you live in a…(READ CATEGORIES)

1. Single-family
2. Duplex or two-family
3. Apartment/condo in a 2-4 unit building
4. Apartment/condo in a >4 unit building
5. Townhouse or row house (adjacent walls to another house)
6. Mobile home, house trailer
7. (Other)
98. (Don't Know)
99. (Refused)

MA3. Does your home have central air conditioning?

1. Yes

2. No

98. (Don’t Know)

99. (Refused)

MA4. Do you have any room air conditioners?

(If asked of the telephone interviewer: A room air conditioner is a small unit that sits in your window to cool one or more rooms.)

1. Yes

2. No (GO TO MA6)

98. (Don’t Know) (GO TO MA6)

99. (Refused) (GO TO MA6

MA5. How many room air conditioners do you have?

_____ (Numeric open end from 1 to 20, set to 98 if don’t know and 99 if refused.)

MA6. Do you have a programmable thermostat?

1. Yes

2. No (GO TO MA8)

98. (Don’t Know) (GO TO MA8)

99. (Refused) (GO TO MA8)

MA7. Is the programmable thermostat currently set to automatically change temperature during the day when no one is home?

1. Yes

2. No

98. (Don’t Know)

99. (Refused)

MA8. Do you have an electric clothes dryer?

1. Yes

2. No

98. (Don’t Know)

99. (Refused)

MA9. Including yourself, how many adults, 18 or older, currently live in your household?

_____ (Numeric open end from 1 to 20, set to 99 if refused.)

MA10. And how many of these adults are over 65?

_____ (Numeric open end from 0 to 20, set to 99 if refused.)

(Put logic in place to make sure that MA10 cannot be larger than MA9)

MA11. How many children under the age of 18 live in your household at least part of the week?

_____ (Numeric open end from 0 to 20, set to 99 if refused.)

MA12. Do you or does anyone in your household have a chronic illness or disability that requires regular or occasional in-home medical treatment?

1. Yes
2. No
98. (Don't Know)
99. (Refused)

MA13. Is there someone home on Monday to Friday sometime between 1 PM and 5 PM at least one day a week?

(If asked of the telephone interviewer: If your schedule varies, please think about your typical week or what is most common when answering this question.)

1. Yes
2. No
98. (Don't Know)
99. (Refused)

MA14. Is there anyone in your household working full time for pay?

1. Yes
2. No (GO TO MA16)
98. (Don't Know) (GO TO MA16)
99. (Refused) (GO TO MA16)

MA15. Do you or anyone in your household have a job where you work at home at least one weekday a week rather than go into an office or some other location?

(If asked of the telephone interviewer: If your schedule varies, please think about your typical week or what is most common when answering this question.)

1. Yes

2. No

98. (Don't Know)

99. (Refused)

MA16. Do you remember receiving information from your electric utility asking you to participate in a utility pilot program?

1. Yes

2. No (GO TO MA18)

98. (Don't Know) (GO TO MA18)

99. (Refused) (GO TO MA18)

MA17. Was the information useful in helping you decide whether or not to participate in the pilot?

1. Yes

2. No

98. (Don't Know)

99. (Refused)

MA18. What is the primary language spoken in your home?

[NOTE TO UTILITY: The choices here should be kept, but if you have additional languages that are relevant to your service territory, add them between options 6 and 7.]

1. English

2. Spanish

3. Chinese

4. Korean

5. Vietnamese

6. Russian

7. Other

99. (Refused)

MA19. Last year -- that is, in 2010 -- what was your total household income from all sources, before taxes? Just stop me when I get to the right category. (READ)

1. Less than $10,000

2. $10,000 to less than $20,000

3. $20,000 to less than $30,000

4. $30,000 to less than $40,000

5. $40,000 to less than $75,000

6. $75,000 to less than $90,000

7. $90,000 to less than $100,000

8. $100,000 to less than $150,000

9. $150,000 or more

98. (Don't Know)

99. (Refused)

MA20. What is the LAST grade or class that you COMPLETED in school? (DO NOT READ)

1. (None, or grade 1-8)

2. (High School incomplete (grade 9-11))

3. (High School graduate (grade 12 or GED certificate))

4. (Technical, trade or vocational school AFTER high school)

5. (Some college, no four-year degree (includes associate degree))

6. (College graduate (B.S., B.A., or other four-year degree))

7. (Post-graduate or professional schooling after college (e.g., towards a Master's degree or Ph.D; law or medical school))

98. (Don't know)

99. (Refused)

DONE WITH DOE QUESTIONS

APPENDIX C – COMMERCIAL MARKET RESPONSE SURVEY TEMPLATE FOR MAIL MODALITY

1. Which one of the following categories best describes your business? Please check just one.

❑ Agriculture/Agricultural Processing	❑ Office
❑ Assembly/Light Industry	❑ Oil/Gas Extraction
❑ Chemicals/Paper/Refining	❑ Retail
❑ Food Processing	❑ Stone/Glass/Clay/Cement
❑ Grocery store/restaurant	❑ Transportation
❑ Lodging (hotel, health care facility, dormitory, prison, etc.)	❑ Utility
❑ High Tech	❑ Other (please specify):
❑ Lumber/Mining/Plastics	_____

2. What is the approximate square footage of the facility? (Note: "facility" refers to the building(s) that your business occupies at the location shown on the front page of this survey)

   _____ Square feet

3. How many **full-time** (30+ hours per week) employees are employed by your business at this location?

   _____ Full-time employees

4. What is the approximate value of your business's annual operations or services (income)?

   $_____ per year

5. Approximately what percentage of your business's annual operating budget is spent on electricity?

_____ %

APPENDIX D – POST-TREATMENT SURVEY TEMPLATE FOR TELEPHONE MODALITY

Post Treatment Survey is to be used after event OR at end of pilot period.

There are three questions that should be added to surveys after an event or at the end of the pilot period. If multiple surveys are fielded, these questions need be asked only once.

ED1. Do you remember personally receiving any information from your electric utility that told you how you could save money on your current electric bill by changing what activity you do in your home or when you do the activity?

1. Yes
2. No (GO TO NEXT SECTION)
98. (Don't Know) (GO TO NEXT SECTION)
99. (Refused) (GO TO NEXT SECTION)

ED2. Did you think the information was useful?

1. Yes
2. No
98. (Don't Know)
99. (Refused) (GO TO NEXT SECTION)

ED3. Did you do anything that was suggested by this utility information to help you save money?

1. Yes
2. No
98. (Don't Know)
99. (Refused)

APPENDIX E – PROCEDURES FOR CALCULATING MINIMUM SAMPLE SIZE FOR CBS STUDIES

Minimum sample sizes for statistical surveys used in the CBS studies should be designed to estimate population parameters to within plus or minus 5% precision with 95% confidence within cells of the experimental study. For example, if the study consists of a single treatment group of 1,000 customers and a control group of 1,000 customers, then sample sizes should be derived for each of these cells that are sufficient to provide the desired statistical precision within the cells. If the study contains 20 such cells (including stratification) then sample sizes should be derived for each cell.

All of the survey measurements requested by DOE (in Table 1) are categorical variables. So sample sizes should be calculated for proportions. To be conservative, sample sizes should be derived using the assumption that the proportion of interest in the population (P) is .5. The conventional computing formula for calculating the sample size for estimating a proportion to within a designated amount of sampling error is:

$$n_0 = Z^2(P(1-P))/e^2$$

where :

Z = the value in the Z distribution associated with the desired level of statistical confidence (α).

P = the design population proportion

e = the designated level of sampling error

Solving for n_0 assuming P = .5, e = .05 and alpha = .05 the sample size for the number of completed surveys within experimental cells is:

$$384 = 1.96^2(.5(1-.5))/.05^2$$

Since the populations of interest are small (i.e., subjects in the experimental cells), the resulting n_0 should be adjusted using the Finite Population Correction. This adjustment is defined as

$$n = n_0N/(n_0+(N-1))$$

So, for example, if there are 1,000 observations in the treatment cell, then the survey sample size would be:

$$278 = 384 \times 1{,}000 / (384 + (1{,}000 - 1))$$

The above calculation should be repeated for each cell in the experimental design to obtain an appropriate survey sample size for each cell. For example, in the simple two group experiment (i.e., treatment and control), each with 1,000 subjects, two survey samples of 278 would be selected – one from each group.

The above calculations apply to observed or "completed" surveys. Since there will be some non-response, it is necessary to inflate the sample sizes derived from the above calculations according to the expected non-response rate (NRR) in each survey cell. For example, if only 50% of the population is expected to respond to the survey, then the sample size n for sending out a mail survey or beginning a phone survey should be doubled to account for the losses that will occur as a result of the expected non-response. In general, the formula for this adjustment is:

$$n' = n/NRR$$

in the present example with a non-response rate of 50%

$$555 = 278/.5$$

With small sample sizes in the experimental cells (e.g., less than 500), it may be necessary to survey all the subjects in the experimental cells when significant survey non-response is expected. In such situations, there is no sampling error because an attempt has been made to observe every member of the population (i.e., it is a census or certainty sample). Correspondingly, it is inappropriate to report confidence intervals or statistical significance testing when this is the case.

APPENDIX F – CALCULATING AAPOR RESPONSE RATES

The American Association of Public Opinion Researchers (AAPOR) has published standard guidelines for calculating response rates to statistical surveys. These response rates are based on counts of the number of survey attempts that fall into certain categories. Two response rate calculations (RR3 and RR4) are required for surveys conducted during the CBS studies. The categories into which survey attempts are to be classified for purposes of estimating these rates are described in Table F-1.

Table F-1: Survey Response Statistics

Response Statistic	Mail	Telephone
I	number of returned surveys completed	number of completed interviews
P	number of surveys returned partially completed	number of partially completed interviews
R	number of surveys returned unopened by postal service marked household refuses to accept mail survey or returned uncompleted	number of households that refuse to be interviewed
NC	number of surveys delivered by postal service but not returned by households or the postal service as undeliverable.	number of households not contacted (i.e., spoken with), including households for which no working telephone number is available
O	number of surveys returned incomplete for miscellaneous reasons (i.e., deceased, language barrier, incapacitated, otherwise unavailable)	number of households not interviewed for miscellaneous reasons (i.e., deceased, language barrier, incapacitated, otherwise unavailable)
UH	N/A – should not occur because target population are continuing	N/A – should not occur because target population are continuing study

	study participants	participants
UO	N/A – should not occur because target population are continuing study participants	N/A – should not occur because target population are continuing study participants
e	Estimated fraction of cases with unknown eligibility that are eligible	Estimated fraction of cases with unknown eligibility that are eligible

The response rates are calculated as follows:

$$RR3 = \frac{I}{(I + P) + (R + NC + O) + e(UH + UO)}$$

$$RR4 = \frac{(I + P)}{(I + P) + (R + NC + O) + e(UH + UO)}$$

Because the populations being studied in the CBS studies are experimental subjects that are known to reside at the addresses selected for surveying, it should be assumed all of the target respondents for these surveys are eligible for the survey. Therefore UH and UO should both be set to zero in the above calculations – eliminating the quantity e(UH+UO) from the calculations.

For each survey, recipients should supply a table indicating the number of observations that fall into the above categories along with the calculated response rates RR3 and RR4. Table F-2 shows an example of the required table for a mail survey.

Table F-2: Example Table for Reporting Response Statistics for Mail Survey

Response Statistic	**Mail**	**Observations**
C	number of returned surveys completed	500

Response Statistic	Mail	Observations
P	number of surveys returned partially completed	24
R	number of surveys returned unopened by postal service marked household refuses to accept mail survey or returned uncompleted	11
NC	number of surveys delivered by postal service but not returned by households or the postal service as undeliverable.	230
O	number of surveys returned incomplete for miscellaneous reasons (i.e., deceased, language barrier, incapacitated, otherwise unavailable)	6
UH	N/A – should not occur because target population are continuing study participants	0
UO	N/A – should not occur because target population are continuing study participants	0
e	Estimated fraction of cases with unknown eligibility that are eligible	0
RR3	500/(500+24+11+230+6)	.65
RR4	(500+24)/(500+24+11+230+6)	.68

APPENDIX G – EXAMPLE OF DATA TO BE PROVIDED

This appendix provides an example of exactly what data needs to be provided from the surveys.

Each completed survey must have a table as shown in E-2 (for mail or telephone survey) that provides the disposition of the survey sample as well as RR3 and RR4 response rates. Each disposition should have the survey specifics (i.e., survey modality, date of survey effort, type of survey, and identifier that can be matched to the customer data) so it can easily be referenced.

Data from the phone or mail survey must be provided electronically with a single record per respondent for each survey effort. An example of the layout of the data is provided below in Tables G-1 and G-2:

Table G-1: Example of format of survey response information datasets

Utility ID	Unique Customer ID	Date of Survey	Survey Modality[a]	Type of Survey[b]	Property Value	Census Block Group Number[c]	MA1	MA2	~~Etc.	MA10	MA11
A	123456	06/10/11	1	1	45,600	340010014001	1	2		.	.
A	123456	12/15/12	1	3	45,600	340010014001	.	.		1	2
A	789101	06/10/11	1	1	128,000	340010024003	2	1		.	.

[a] 1=Phone, 2=Mail

[b] 1=enrollment, 2=pre-treatment, 3=event, 4=post-treatment

[c]State, county, tract, block group (wwxxxyyyyyyz)

Table G-2: Example of format of survey response characteristics datasets

Utility ID	Date of Survey	Survey Modality[a]	Type of Survey[b]	C[c]	P[c]	R[c]	NC[c]	O[c]	RR3[c]	RR4[c]
A	6/10/2011	1	1	500	24	11	230	6	0.65	0.66
A	12/15/2012	1	3	500	24	11	230	6	0.65	0.66
A	6/10/2011	1	1	500	24	11	230	6	0.65	0.66

[a] 1=Phone, 2=Mail

[b] 1=enrollment, 2=pre-treatment, 3=event, 4=post-treatment

[c] Refer to Table E-2 for more details.