

# PV General Population Survey Delivery

## Summary

The PV General Population survey was a panel survey fielded to single-family homeowners who did not have rooftop PV at the time of the survey, and provides a basis for understanding opinions about and interest in solar, and how these relate to household demographics and other conditions.

This document describes the survey process for the General Population survey, covering instrument development, sampling, fielding, and the creation of a final data set for analysis. It also gives a brief summary of basic household and respondent characteristics of the General Population survey sample, by state, as revealed in this data.

## Project Overview

Three different household-level surveys were fielded for this project: one for households who had installed PV on their current home or had signed a contract to do so (the Adopter survey), one for households that had seriously considered PV but had not installed it (the Considerer survey), and one for the general population who did not have PV on their current home (the General Population survey or GPS).

By collecting similar data from three fairly different “statuses” with respect to adoption, the surveys provide a basis for understanding how those who do not have rooftop PV differ from those who have, for how and why people do (or don’t) transition from not having to having rooftop PV on their home, and for understanding the characteristics and viewpoints of households who have scarcely, or not at all, entered the “PV consideration” track. All three surveys covered single-family owner-occupied households in each of the four target states used in the project -- Arizona, California, New Jersey, and New York – allowing a comparative approach to understanding how the factors that affect PV adoption vary by geography and policy conditions.

## Instrument Development

Survey instrument development drew from existing PV adoption survey instruments, PV adoption literature, and research team experience, as well as from past work on household interest in energy efficiency, environmental attitudes, purchasing tendencies, and related knowledge. Early interviews and discussions with installers and others in the PV industry were also taken into consideration.

The General Population survey instrument was tested using Amazon’s Mechanical Turk, sampling respondents who identified themselves as being single-family homeowners in the United States. While the Mechanical Turk sample would be too specialized to be expected to match the general population of single-family homeowners, it was a useful method for testing questions, minimizing likely redundancies, and otherwise tailoring and reducing the length of

the survey. After analyzing the survey responses resulting from the Mechanical Turk fielding, a final survey instrument was designed.

The three surveys together were developed to support major goals and requirements of the project, including:

- (a) Developing agent-based models of solar adoption with particular attention to social networks;
- (b) Strengthening general knowledge about: opinions on, and concerns and experience with, residential rooftop PV, along with socio-demographic, economic, and technical data, and related information on environmental and energy use attitudes, purchasing practices, social networks, and other psychological and social aspects with respect to adoption and consideration status. This approach thus supplies more information on how people figure into PV adoption, versus studies that focus primarily on technical and/or economic characteristics;
- (c) Characterizing population segments and mapping these segments to interest and non-interest in solar and to solar adoption and non-adoption, especially in a way that can be compared across states and to other SEEDS research on solar adoption.

## Survey Content

In addition to basic tracking and administrative data, a wide range of data types were collected, including:

- Geographic location (zip code)
- Interest in solar panels for their home
- Beliefs about potential benefits, drawbacks, and suitability of solar PV for their home
- Exposure to solar PV from their social network, neighborhood, media, etc.
- Trust in various potential sources of information about solar PV
- Interest in learning more about particular aspects of solar PV
- Electricity costs
- Respondent “innovativeness”
- A “Value-Belief-Norm”-style battery of questions<sup>1</sup> (see Stern et al. 1999), covering attitudes and opinions about environment, energy use, and climate change, and general purchasing habits
- Living area of their house
- Political leanings and affiliation
- Respondent details (e.g., male versus female, age, education, whether they are retired) and household details (e.g., number of adults and number of children, income, financial situation)
- Open-ended comments, as volunteered by the respondent

## Deployment

Table 1 summarizes the sampling and fielding results for the General Population survey by state. The GPS sampling used a commercial panel of respondents, applying age-based and

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<sup>1</sup> Summarized in Stern, P.C., Dietz, T., Abel, T.D., Guagnano, G.A. and Kalof, L., 1999. A value-belief-norm theory of support for social movements: The case of environmentalism. *Human ecology review*, 6(2), p.81-97.

education-based quotas by state. Screening eliminated respondents who had solar PV on their rooftop or were not single-family homeowners in one of the four target states. The survey was fielded in June and July of 2014.<sup>2</sup>

**Table 1. Response summary for the General Population homeowner surveys.**

Recruitment Source	When Fielded	Response Rate Estimate	Responses Passing Data Quality Checks				Total
			AZ	CA	NJ	NY	
Panelists	June/July 2014	Not applicable	351	338	315	337	1341

Between 300 and 400 surveys passing quality checks were obtained for each state. Median survey complete times were 13.5 minutes.

## Data Cleaning and Recoding

The raw data sets resulting from fielding the surveys were cleaned and recoded. The full treatment has been documented, and archival (for the duration of the project) reference data sets have been created, with any updates recorded and shared amongst the team.

The raw data set resulting from fielding the General Population survey was cleaned and recoded. The survey included an “attention check” question embedded in a question bank, where respondents were directed to select one particular value. A subset of the surveys received did not pass either the attention check (259 out of 1611 total returned surveys failed) or a “straight-liner” quality check, which eliminated respondents who had checked the same box across a bank for at least six of eight banks of questions (an additional 11 respondents eliminated). Table 1 above excludes these surveys from the count, for a total of 1341 surveys passing quality checks.

Additional cleaning and recoding steps were applied to the data set, in particular:

- Converting open-end numerical responses into numerical values
- Creating derived variables based on response data, e.g. a Boolean variable for “have kids” based on response for the number of children, or combining parallel questions across branches.

## Public Data File Preparation

A final step was completed to support the public release of the General Population survey dataset while protecting respondent confidentiality. This step involved:

- Matching variable names and response codes in this survey to those in the other two surveys where possible to facilitate combined analysis across the three surveys
- Withholding open-ended text responses and several other variables
- Top coding, bottom coding, and general recoding of several variables to protect confidentiality.

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<sup>2</sup>The next section details the quality checks used to eliminate respondent records that did not appear valid.

No full responses were removed from the dataset in this step, so the response numbers in Table 1 apply to the public release dataset. Basic quality checks were performed to ensure that overall sample statistics were not compromised by this processing.

## Basic Comparison of Sample Characteristics

Table 2 summarizes central tendencies of some basic individual and household characteristics for the General Population survey samples, by state. Survey respondents are more often female (56% to 62%), and respondents are often 55 or older and often retired (over one in three).

**Table 2. Central tendencies of basic household and respondent characteristics of General Population survey samples, by state.**

	General Population Survey			
	AZ	CA	NJ	NY
Respondent: % female	62	59	62	56
Respondent: % 55 or older	54	50	50	54
Household: % reporting income of \$100,000/year or more	29	37	42	35
Respondent: % retired	40	35	35	34
Respondent: % holding 4-year degree or higher	42	43	50	45
Households: Summer electricity bill				
% with bills \$100/month or more	85	50	80	65
% with bills \$150/month or more	63	32	62	39
Households: Winter electricity bill				
% with bills \$100/month or more	39	45	60	65
% with bills \$150/month or more	16	24	35	38