Appendix B

How the Surveys Were Conducted

The RECS and CBECS reports differ in some ways from survey year to survey year: sample sizes fluctuate, target populations change, data questionnaires are reworded, and data collection methods vary slightly. Both the RECS and CBECS reports are products of an evolving process of data collection designed to meet the needs of our customers at that particular time and to eliminate difficulties encountered in past surveys. This appendix briefly describes the survey methodologies of the RECS and CBECS, as well as sampling and nonsampling errors and response rates.

Survey Methodologies

The RECS and the CBECS were designed to collect data on energy consumption, energy expenditures, and energy-related characteristics of residential and commercial buildings. The surveys are conducted in two stages: (1) A Household (RECS)/Building (CBECS) Survey and an Energy Suppliers Survey. The Household/Building Characteristics Survey consists of personal interviews with knowledgeable respondents at each sample household/building. The only exception occurred in 1983, when the CBECS was conducted by Computer Assisted Telephone Interview (CATI). The interview covered topics such as physical characteristics of the structure, occupancy patterns, major equipment, conservation practices, and the types and uses of energy in the structure.

At the end of the interview, respondents were asked to provide the names and addresses of the companies that supply energy to their household/building in the form of electricity, natural gas, fuel oil, or district heating and cooling (CBECS only), and to sign a form authorizing the EIA to collect billing information directly from these energy supply companies. A separate mail survey, the Energy Suppliers Survey, asks these energy suppliers to provide data on the amounts and costs of energy delivered to the household/building during the survey year.

Tables B1 and B2 are provided for readers to compare the RECS and the CBECS survey samples and designs over the decade as well as response rates associated with each survey year. For a discussion on the individual surveys, see the appendices of previous publications of the RECS and CBECS.[18]

Table B1. RECS Survey Sample and Design, 1980 to 1990

Survey Sample	1980	1981	1982	1984	1987	1990
Sample Size						
Total Units	7,232	7,550	5,808	7,535	8,007	6,607
Eligible Units	6,634	6,841	5,272	6,752	7,183	5,909
Interviews Completed	6,051	6,269	4,724	5,682	6,229	5,095
Response Rates	91.2%	91.6%	89.6%	84.2%	86.7%	86.2%
Data Collection						
Target Population	Housing Units*	Same as 1980	Same as 1980	Same as 1980	Same as 1980	Same as 1980
Collection Instrument	Personal Interview	Same as 1980	Same as 1980	Same as 1980	Same as 1980	Same as 1980

*For the definition of Housing Unit, see Appendix E, "Glossary."

[18]See Appendix E, "Related EIA Energy Consumption Publications."

Table B2. CBECS Survey Sample and Design, 1979 to 1989

Survey Sample and Design	1979	1983	1986	1989
Sample Size				
Total Units	7,322	8,479	9,189	8,791
Eligible Units	6,773	8,018	7,539	6,352
Interviews Completed	6,222	7,140	7,024	5,877
Response Rate	91.8%	89.1%	93.2%	92.5%
Data Collection				
Target Population	Subset of nonresidential buildings, excluding those in which industrial or agricultural activities occupy more of the total floorspace than any other type of activity	Same as 1979	Buildings used primarily for commercial purpose 1,001 square feet or more - buildings 1,000 square feet or less were excluded from the published estimates	Same as in 1986 - interviews were not conducted at buildings 1,000 square feet or less
Collection Instrument	Personal Interview	Computer Assisted Telephone Interview (CATI)	Personal Interview	Same as 1986

Nonsampling and Sampling Errors

Nonsampling errors are the set of all errors in surveys that arise from anything other than the sampling process. Because these errors occur outside the sampling process, they are equally likely to occur in a complete census or a sample survey. Nonsampling errors include: (1) operational errors, including editing, coding, and tabulation errors; (2) errors of measurement, including a lack of precision by the respondent and failure of the respondent to understand instruction; (3) errors of estimation, including the assumptions underlying the derived values; and (4) errors of nonobservation, including nonresponse and noncoverage. Some nonsampling errors are random, some are not. Random nonsampling errors tend to cancel out the set of all possible samples; however, these errors do affect estimates in a given survey. Biased nonsampling error occurs when some systematic error occurs, such as an interviewer consistently re-wording a question and thereby changing the question's meaning and biasing the response. Biased nonsampling error, when present, will affect the estimates regardless of the specific sample chosen. There is no measure for errors that occur outside of the sampling process.

Sampling errors occur because the CBECS and RECS samples represent only one of the possible samples that could be selected under the same survey specifications. The estimated values are developed from one of many possible samples that could be drawn and, therefore, will differ from true population values that would be obtained from a complete enumeration. Each possible sample yields its own estimates of the true population values, with the differences attributable to the particular set of cases selected in each sample.

One measure of the variability caused by the sampling process is the average magnitude between the values for the population of all samples and the true population value. This measure is the difference one would expect to obtain between a given estimate and the true value, based on the mean difference from the true value over all possible samples. In other words, sampling error is a measure of the variability of all samples, one of which was drawn. This measure accounts only for random sampling error. Biased sampling errors occur when the survey sample design itself allows for systematic error. For example, in the early CBECS, buildings under 1,000 square feet were included in the survey sample. It was later discovered that these small buildings could not be accurately represented in a national CBECS survey and were excluded in 1986. This deficient representation could be considered a biased

sampling error. It is believed that there are few large systematic biases in the RECS and CBECS estimates and to a great extent the sampling errors which occur are random.