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Energy Consumption Series

# Residential Energy Consumption Survey Quality Profile

March 1996

  
Energy Information  
Administration

**Energy Consumption Series**

**Residential Energy Consumption Survey**  
**Quality Profile**

**March 1996**

**Energy Information Administration**  
Office of Statistical Standards  
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Public-Use Data Diskettes containing RECS data are available through the Office of Scientific and Technical Information (615-576-8401) and the National Technical Information Service (703-487-4650). For questions about RECS publications, call 202-586-8800. Information, reports, and household level data files are also available by accessing EIA's Home Page on the Internet at <http://www.eia.doe.gov>.

## **Tribute**

Dr. Wendel L. Thompson, Residential Energy Consumption Survey (RECS) Manager, is retiring from Federal service on March 29, 1996. He has guided RECS for 17 years and has been instrumental in making it a survey known for its integrity and high quality data.

It is through his untiring efforts that RECS has continued to evolve and improve over the nine survey cycles--since 1979. With unfailing good humor, grace, and patience--under pressure, Wendel has been the friendly and knowledgeable expert answering everyone's questions about residential energy usage. Wendel epitomizes the very finest in customer service, which EIA and the entire Federal government strives to achieve.

"Mr. RECS" will surely be missed by his colleagues and all the RECS users.

We wish Wendel the best in his retirement.

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# 1. Introduction

## Purpose and Scope of This Report

The Residential Energy Consumption Survey (RECS) is a periodic national survey that provides timely information about energy consumption and expenditures of U.S. households and about energy-related characteristics of housing units. The survey was first conducted in 1978 as the National Interim Energy Consumption Survey (NIECS), and the 1979 survey was called the Household Screener Survey. From 1980 through 1982 RECS was conducted annually. The next RECS was fielded in 1984, and since then, the survey has been undertaken at 3-year intervals. The most recent RECS was conducted in 1993.

### Purpose and Audience

The purpose of this *RECS Quality Profile* is to present, in a convenient form, a report on what has been learned about the quality of RECS data since the survey began. In a broad sense, the term "quality" covers the relevance, timeliness, and accuracy of the survey estimates. The emphasis here will be placed on "accuracy." The report provides information about sampling and nonsampling errors, focusing on the latter. It discusses the types and sources of errors that occur and their possible effects on interpretation of RECS data, especially when used for longitudinal analysis. This information should be helpful to users of RECS data, to those responsible for the design and operation of the survey, and to persons with general interest in survey design and data quality. The final section of Chapter 9 provides specific suggestions for data users on how to gain access to RECS data and use them for cross-sectional and longitudinal analyses.

### Scope of the Report

This report includes information about the quality of data from all of the surveys conducted to date, starting with the 1978 NIECS through the 1993 RECS. As background, a summary of the survey design and procedures for the 1993 RECS is provided, as well as a description of quality-related design changes from 1978 through 1993. The report does not cover the Residential Transportation Energy Consumption Survey (RTECS), a separate survey that has been conducted for a subsample of RECS households in the year following each RECS data collection. The final chapter describes some ongoing methodological research and some anticipated design changes for the 1996 RECS.

## Sources of Information About Data Quality

This report draws on both published and unpublished sources of information. Following established practices of the Energy Information Administration (EIA), all RECS publications have included a substantial amount of information about survey procedures and about the quality of the data. Appendices to the reports on *Housing Characteristics* and *Household Energy*

*Consumption and Expenditures* for all survey years have been a primary source of information for this report. It also draws on numerous survey documentation reports, contractor reports, papers presented at conferences, and internal memoranda. These sources are cited in the text of the report and as sources for information presented in tables by showing the author's name and the year of publication. A full list of all references cited follows Chapter 9.

Direct estimates of the sampling error associated with most RECS data are available and form the basis for row and column variance factors that have been included in the data tables found in the basic RECS reports, starting with the 1984 consumption and expenditures report (EIA 1987a). By using these row and column factors, data users can arrive at an estimate of the sampling error associated with the value found in each cell of the table.

Most available information about nonsampling errors is less direct. For example, there is detailed information about household and item nonresponse rates for each survey, but it is seldom possible to determine the resulting level of bias in the survey estimates that are produced after missing values have been imputed and weighting adjustments have been applied in an attempt to minimize the effects of nonresponse. Similarly, estimates for the same variable from two different sources can be compared, but without detailed analysis and reconciliation of differences between individual reporting units, it is generally not possible to be certain which of the estimates is more nearly correct. Nevertheless, the analysis of both direct and indirect indicators of nonsampling error can contribute in significant ways to understanding and interpreting the survey results and to efforts to improve quality.

Information about nonsampling errors comes from several sources:

- Operational or performance data, such as unit and item nonresponse rates, imputation rates, and weighting adjustments
- Methodological experiments and pretests of survey procedures
- Micro-evaluation studies, such as callbacks or reinterviews of respondents who have reported unusual values and energy audits or assessments of sample housing units by specially qualified persons
- Macro-evaluation studies, such as comparisons of RECS data on energy consumption with data from EIA surveys of energy suppliers, and RECS data on household and housing-unit characteristics with data from the Census Bureau's Current Population Survey, American Housing Survey, and Survey of Construction

## **Relation of This Report to Other RECS Publications**

As noted above, the basic publications for each survey have appendices that describe the design and procedures for that survey and provide some information about the quality of the data. More detailed information about survey operations can be found in the operations, procedures, and data user's manuals that have been prepared for each survey, starting with 1982. A recent publication

provides a fuller description of the sample design for each survey through 1993 and changes over time (EIA 1994). A 1987 EIA publication, *Trends in Consumption and Expenditures, 1978-1984* (EIA 1987b) contains longitudinal data and a discussion of how their interpretation may be affected by changes in survey design, content, and procedures.

The particular goal of this *RECS Quality Profile* is to serve both users and survey designers and managers by providing a more systematic and complete presentation of information about data quality for all of the surveys from the 1978 NIECS through the 1993 RECS. To accomplish this, the report follows a structure similar to the one that has been developed in recent years for presenting information about the quality of data from other major household surveys, such as the Survey of Income and Program Participation and the Schools and Staffing Survey (Bureau of the Census 1990, National Center for Education Statistics 1994).

## **Structure of the Report**

Chapter 2 provides an overview of RECS, with a description of the 1993 RECS design and procedures and of the quality-related design changes that have occurred since the first survey in 1978. Chapters 3, 4, and 5 present information about the three major sources of nonsampling error: coverage error, nonresponse, and measurement error, respectively. Chapter 6 discusses the contributions to nonsampling error of data processing and imputation procedures. Chapter 7 looks at the effects of estimation procedures on data quality and reviews the effects of sampling error on interpretation of the data.

Chapter 8 presents the results of studies that have compared RECS data with data from EIA surveys of energy suppliers and with data collected by other organizations, especially the Census Bureau. Chapter 9 summarizes the effects on RECS data of the principal sources of error. It also describes relevant research currently in progress and quality-related design changes planned or being considered for the 1996 RECS. It concludes with suggestions for users about how to take account of data quality in their analyses of RECS data. A list of all references cited follows Chapter 9. Appendix A lists all EIA publications related to RECS.