

## **B. Collection of Information by Employing Statistical Methods**

### **1. Description of the Survey Plan**

The 2006 MECS survey plan will largely follow the 2002 plan. The 2006 MECS will use the 2002 Economic Census - Manufacturing (ECM) mail file along with updates for births and deaths to identify establishments eligible for MECS. The MECS will present estimates for US manufacturing industries at the National and Census Region levels.

The U.S. Census Bureau will again conduct the fieldwork for the survey, acting as EIA's data collection agent. The target population for the 2006 MECS will be comparable to that of the previous MECS, a restricted universe of manufacturing establishments above a minimum size threshold established for all NAICS industries in the manufacturing sector.

An Internet-based electronic reporting method will be available for the 2006 MECS. For those establishments that have Internet access the Census Bureau will mail a letter with instructions on how to complete the form. However, as in previous survey cycles, the Census Bureau will conduct the MECS by mail for those without Internet access or who choose not to use the Internet data collection method. Nonresponse follow-up procedures, as described in Section 3 below, will be similar to those used in 2002, which are performed to maximize coverage rate. Data processing and editing will be aided by modernized, automated data entry and storage equipment and editing procedures. Economic data from the 2006 ASM, where appropriate, will again be added to the MECS data file to provide extra analytic capability with no added burden on respondents. For non-ASM cases, economic data will have to be imputed or ratio adjusted from the 2002 ECM.

### **2. Sampling Methodology and Estimation Procedures**

The 2006 MECS sample will be approximately 15,500 establishments. The frame for the MECS will be based largely on the NAICS classifications of the 2002 ECM mail file with updates through the 4-year period. The 2002 ECM mail file was approximately 216,000 manufacturing establishments, and accounted for the top 97 to 98 percent of the total payroll in the manufacturing sector.

The 2006 MECS sample design will be stratified for NAICS industry with no provision to sample according to Census Region. However, industry-by-region data will still be published as in previous MECS. The major portion of the MECS sample will be devoted to the strata defined by the 3-digit NAICS subsectors that comprise manufacturing and 30 to 40 4-digit industry groups and 6-digit industries, all at the Census Region level. The industry groups and sub-industries will be chosen based upon their fuel consumption, economic output, feedstock usage, or other programmatic interest. In 2002, the MECS sample had 19 industries that entered with certainty (i.e., all establishments listed for those industries were selected into the MECS sample). Target coefficients of variation (CV) for the industry strata are set between 0 (for certainty industries) to 9 percent, depending on the NAICS level (six, four, or three digit) as well as other factors such as energy intensity.

The measure of size (MOS) is used to assign overall probabilities of MECS selection to each establishment, excluding the MECS certainty strata. The 2006 MECS MOS will be the sum of annual cost of fuel and cost of electricity (CF). This data comes from the Annual Survey of Manufacturers

(ASM), the ECM, or is imputed. The ASM is a sample survey of approximately 50,000 manufacturing establishments and measures many of the same economic variables that the ECM does, including cost of fuels. For those cases in the 2002 ECM mail sample that are ASM cases, the 2004 ASM CF will be used for the MOS. For cases in the 2002 ECM mail file that are not in the 2004 ASM, the 2002 ECM CF will be adjusted to a 2004 value using an adjustment factor consisting of the ratio of the median 2004 ASM CF to the median 2002 ECM CF by 3-digit NAICS. Finally, for cases that are birth establishments since the 2002 ECM, a value will be imputed using 2004 payroll or employment data and ratio-adjusting the payroll by the median 3-digit NAICS 2004 ASM CF to 2004 payroll. Imputation is used when necessary for all establishments that have missing cost of fuels and electricity data. The method is usually a ratio adjustment of the establishment's payroll data. The 2002 ECM mail file with adjustments for births and deaths will be used to determine what establishments would be eligible for MECS sampling.

The MECS uses a probability proportionate to size (PPS) approach to assigning inclusion probabilities to manufacturing establishments in the strata. The MOS is not highly correlated with measured values of energy consumed as a feedstock and certain energy sources used as a fuel. To address this, the 2006 MECS will select with certainty establishments in the frame known to be significant consumers in these areas.

After the inclusion probabilities are assigned, a modified version of a sample selection algorithm presented by Tillé (1996) is employed to obtain the 2006 MECS sample. This procedure, first used for selecting the MECS sample in 1998, ensures that the sample in each stratum will be of a fixed, predetermined size. This benefits the MECS by preventing cost overruns due to the actual sample size being larger than was expected. Additionally, it can be shown that this strategy assumes a property that ensures a lower variance of the MECS estimators, as compared with Poisson sampling, the selection method used in 1994.

Population totals will be estimated from 2006 MECS data by summing the nonresponse-adjusted weighted sample data. For the 2002 MECS, the nonresponse adjustments were done separately for certainty and noncertainty establishments within the cells. That practice will likely be continued for 2006.

### **3. Maximizing the Response Rate**

The response rate for the 1998 MECS was 81 percent. By using the Census Bureau as the data-collection agent, the survey is not only under the data-collection authority of the DOE mandate, but also has the confidentiality protection that Title 13, Section 9, of the U.S. Code confers on surveys conducted by the Census Bureau.

The Census Bureau has developed standard procedures for follow-up and imputation. The Bureau will conduct two mail follow-ups, as well as a telephone follow-up of the largest delinquents. Smaller delinquents will receive only the two mail follow-ups. An enhancement to the telephone nonresponse follow-up instituted for the 2002 MECS will be continued for the 2006 MECS. In that procedure, follow-up was done to maximize response of establishments that have the greatest MOS in the adjustment cells. The procedure established target overage rates (ratio of the total MOS of the responders to the total MOS in the cell) for the follow-up based on the overall importance of the cell.

#### **4. Tests of Procedures**

This will be the seventh time the MECS will be conducted. After consideration of past results and outside consultations (as described in Section A-3), the questionnaire has undergone substantial redesign in the method of collection. The effectiveness of these changes was analyzed during the editing and review of the 2002 MECS data. The respondents actively supported the changes during the post-survey interviews of respondents in 2004. Usability and cognitive interviews will be conducted in 2006 based upon the new collection method.

The sampling procedure was performed successfully for the 2002 MECS. Tests will be run, where possible, to determine the best way to adjust the MOS to a 2004 value when ASM data are not available.

In carrying out the 2006 MECS, the Census Bureau will use fieldwork procedures similar to those routinely used for the ASM and that were used for the 2002 MECS. No further tests of procedures are planned.

#### **5. Statistical Consultations**

The Census Bureau is selecting the MECS sample under the supervision of Stacey Cole. Mr. Cole can be reached at (301) 763-4771. The overall administrative responsibility for MECS at the Census Bureau rests with Mendel Gayle. Mr. Gayle can be reached at (301) 763-4587. The principal EIA official consulted about the sample design is William Gifford, Mathematical Statistician, of the Energy Consumption Division within the Office of Energy Markets and End-Use. Mr. Gifford can be reached at (202) 586-5931. The EIA Agency Clearance Officer is Jay Casselberry, 202-286-8616.