



"WASTE FROM ECONOMIC ACTIVITY" STATISTICAL SURVEY METHODOLOGY

The statistical survey is conducted annually by the Environmental and Energy Accounts Department, Macroeconomic Statistics Directorate, of the National Statistical Institute, on the basis of mandatory participation, according to the National Statistical Program.

According to Art. 20 of the Statistics Act, respondents are obliged to provide the National Statistical Institute with reliable data on surveys included in the National Statistical Program, which are intended to be conducted on the basis of mandatory participation.

According to Art. 25, para. 1 of the Statistics Act, individual data obtained and collected during statistical surveys are confidential and can only be used for statistical purposes.

GENERAL INFORMATION

OBJECTIVE

The main objective of the statistical survey is to provide information to all stakeholders and the public about the generation, recovery and disposal of waste from economic activity in accordance with the requirements of the Regulation (EC) No. 2150/2002 on waste statistics.

ESSENCE

In order to monitor the implementation of the waste policy, the European Community requires regular community statistics on the production and management of waste from businesses and households. This creates the basis for the control of compliance with the principles of maximizing the recovery and safe disposal. Statistical tools are needed to assess compliance with the principle of waste prevention and to establish a link between waste generation data and world, national and regional resource use catalogues.

The statistical survey 'Waste from economic activity' was created and is conducted with the aim of satisfying the needs of statistical data on waste at the European and national level. The statistics collected allow the implementation of EU waste policy to be monitored and evaluated.

PURPOSE

The statistical data on generated and treated waste, obtained as a result of the statistical survey, are used in the reporting under the Regulation (EC) No. 2150/2002 on waste statistics to the EC - DG Eurostat.

The data are published annually, according to the Release Calendar, on the NSI website for public information. They are also provided to various institutions or organizations in the country for evaluations and analyses.

STATISTICAL SURVEY

SCOPE, STATISTICAL UNIT AND GENERAL POPULATION

The statistical survey covers enterprises from all economic activities.

The statistical unit is an enterprise.

The general population is made up of active enterprises from all industry groups with more than 10 employees, for which data are reported under the Regulation (EC) No. 2150/2002 on waste statistics.

The statistical survey is a combination of comprehensive and sample survey.

DATA SOURCES

- Statistical survey 'Waste from economic activity';
- Administrative sources (ExEA).

Directorate 'Monitoring and Assessment of Environment', Executive Environment Agency (ExEA, statistics body) provides data, collected through the National Waste Information System for the reference year by the end of October of the year following the reference year.

Information from other statistical studies (business statistics) is also used to define the population, verify the data and perform estimations.

FREQUENCY OF DATA COLLECTION AND PUBLICATION

Annually.

STATISTICAL STUDY

DEFINING THE STATISTICAL POPULATION FOR THE STUDY

The statistical population is made up of statistical units (enterprises) included in the Statistical Business Register (SBR).

The selection of the statistical units from SBR complies with the requirements of the Regulation (EC) No. 2150/2002 on waste statistics, according to which enterprises with fewer than 10 employees are excluded from the surveys, unless they generate large quantities of waste, in order to reduce the burden of the respondents. An estimate is made for enterprises with less than 10 employees.

The list of statistical units, included in the statistical population for the study, is prepared as:

- For the economic activities other than services, a comprehensive list for enterprises with more than 10 employees is drawn up;
- For services: NACE Rev.2 sections: G_U (45-99) except class 4677, G, I, N, O, P, Q, R, S - Service provision activities; 'G' - Wholesale and retail trade; repair of motor vehicles and motorcycles; and 'I, N, O, P, Q, R, S' - Accommodation and food service activities. Administrative and support service activities. Public administration and defence; compulsory social security. Education. Human health and social work activities. Arts, entertainment and recreation. Other service activities, simple random samples are selected due to the large number of business enterprises.

To calculate the sample size the following is defined:

- The guarantee probability, with which the survey results and the associated guarantee multiplier will be guaranteed;
- The maximum size of the stochastic error;
- The standard deviation of employed persons.

The sample size is calculated by the formula:

$$n = \frac{t^2 \cdot (V\%)^2}{(\Delta\%)^2 + \frac{t^2 \cdot (V\%)^2}{N}}$$

where:

- $\Delta\%$ - the maximum error;
- t - guarantee multiplier (1.96 for an interval in which the actual value of the average is found with a 95% probability, and 2.58 for a 99% probability, respectively)
- $v\%$ - coefficient of variation in % ($V\% = 100 \cdot \text{standard deviation} / \text{average value} - \text{arithmetic average}$)
- n - number of cases in the sample;
- N - number of cases in the studied population.

Once the population has been determined, all population units have been listed, and the simple random sample size has been calculated, a simple random sample is generated using the SPSS software.

The population is updated annually before the start of the Campaign.

DATA COLLECTION

Primary data are collected from respondents for the previous reporting year. The data are collected via Environmental Statistics Information System (ESIS), which includes automatic checks for completeness, valid values, and logical data control, according to the specifics of the survey. The nomenclatures used for its needs and instructions for the respondents are available in the system.

PRIMARY DATA PROCESSING, DATABASE PREPARATION

PRIMARY DATA PROCESSING

After the respondents have reported their data in ESIS, their processing begins. It is carried out in the system according to the survey program schedule and goes through several stages.

Data validation is carried out on the basis of clearly defined criteria regarding their completeness, correct classification, units of measure, comparability with previous years, logical control, etc.

All checks are done at the respondent level.

DATABASE PREPARATION

After finalising the process of removing all identified errors and discrepancies in the data, actions on classifying and coding the data related to the statistical units or collected variables are also taken. The purpose of these encoding procedures is to obtain derived variables, numerical values, or aggregate values during the next processing stages. The coding process is carried out using code tables. When new versions of the used classifications and nomenclatures appear, recoding and reclassification of statistical units and variables is carried out.

After completing these actions, the methodologists prepare the primary database for further processing and calculation the statistical data.

CALCULATION AND ANALYSIS OF STATISTICAL INDICATORS

DATA PREPARATION

Data preparation is a set of processes through which the primary data are brought into a form suitable for the statistical data calculation, analysis and assessment of their quality and the subsequent presentation to users, incl. fulfillment of reporting obligations to Eurostat, according to the specified table formats.

ASSESSMENT OF PRIMARY DATA RESPONSE RATE

Reports from all survey respondents should be collected within the Campaign. In case a 100% response rate is not achieved, the need for an estimates of the missing data is assessed and, if necessary, carried out.

STATISTICAL DATA CALCULATION

Waste generated

The quantity of generated waste of the population is estimated based on the sample data.

In the industry groups in which a sample was selected, an estimate is calculated by multiplying the average quantity of waste of an enterprise in the sample by the number of enterprises in the industry with more than 10 employees from the population. Thus, the estimated total value of the quantity of waste generated is obtained, for which the population is surveyed by sampling. The estimation is done only for the sample data. The estimation of the sample is burdened with an error – i.e. the evaluated total value of the quantity of waste generated is in the middle of the confidence interval, which is calculated as follows: the estimated total value of the quantity of waste generated from the sample data \pm the maximum error (the stochastic error multiplied by the guarantee multiplier).

The maximum error is calculated using the following formula:

$$\Delta\% = \sqrt{\frac{t^2 V\%^2}{n} - \frac{t^2 V\%^2}{N}}$$

where:

- $\Delta\%$ - the maximum error;
- t - guarantee multiplier (1.96 for an interval in which the actual value of the mean lies with a probability of 95%,)
- $v\%$ - coefficient of variation in % ($V\% = 100 \times \text{sample standard deviation} / \text{sample mean}$, respectively Stdev and Average in Excel)
- n - number of cases in the sample;
- N - number of cases in the study population.

In order to obtain data on the waste generated for all enterprises in the population, the data estimate of the sampled population is added to the data of the enterprises of the comprehensively surveyed population, where available for the relevant industry group.

An estimation of the data of non-respondents is also done. As an estimator, the employed persons in the enterprise is used. The indicator 'employees' has the highest correlation with the observed indicator 'quantity of waste generated'. The average quantity of waste generated per employee is calculated. The quantity of generated waste in the industry group (calculated from the sample) is divided by the number of employees in the enterprises that responded. The average quantity of waste generated per employee, calculated from the sample, is multiplied by the number of employees in the surveyed population minus the number of employees in the

enterprises from the population surveyed comprehensively. This is the estimated total value of the quantity of waste generated in enterprises with more than 10 employees, for which the aggregate is surveyed by sampling (formula 1).

Formula 1:

$$Q_{\text{estimate}} = \frac{Q_{\text{sample}}}{\sum V_{16110\text{sample}}} * \sum V_{16110 \geq 10}$$

where:

- | | | |
|-------------------------------|---|--|
| Q_{estimate} | - | Assessment of the amount of waste generated; |
| Q_{sample} | - | Amount of generated waste (calculated from the sample) |
| $\sum V_{16110\text{sample}}$ | - | Number of employees in the responding enterprises |
| is | | |
| $\sum V_{16110 \geq 10}$ | - | Number of employed people in the studied population |

In order to estimate the quantity of waste in enterprises with less than 10 employees, the share of employees in enterprises with 10 or more employees from the employees in all enterprises from the population in the relevant industry group is calculated (formula 2).

Formula 2:

$$D_{\geq 10} = \frac{\sum V_{16110 \geq 10}}{\sum V_{16110}} * 100 ,$$

where:

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|--------------------------|---|--|
| $D_{\geq 10}$ | - | share of employees in enterprises with 10 or more employees of those employed in all enterprises of the general population in the relevant industry group; |
| $\sum V_{16110 \geq 10}$ | - | number of employees in enterprises with 10 or more employees in the relevant industry group; |
| $\sum V_{16110}$ | - | number of employees in all enterprises from the general population in the relevant industry group. |

The quantity of waste generated in enterprises with less than 10 employees is calculated according to formula 3.

Formula 3:

$$P_{<9} = \frac{\sum P_{\geq 10}}{D_{\geq 10}} * (100 - D_{\geq 10})$$

where:

- | | | |
|--------------------|---|--|
| $P_{<9}$ | - | quantity estimate generated waste of enterprises with less than 10 employees; |
| $\sum P_{\geq 10}$ | - | the amount of waste generated by enterprises with 10 or more employees; |
| $D_{\geq 10}$ | - | share of employees in enterprises with 10 or more employees of those employed in all enterprises from the general population in the relevant industry group. |

The estimate of the quantity of waste generated in enterprises with less than 10 employees is added to the estimated total value of the quantity of waste generated in enterprises with more than 10 employees, for which the population is surveyed by sampling.

The estimation does not include the administrative data received by the ExEA.

Estimates apply only to waste generated. Treated waste is calculated without an estimate.

Food waste

For the calculation of the quantity of generated food waste, data from the surveys 'Waste from economic activity', 'Municipal waste' and administrative data from the ExEA are used. In accordance with Commission Delegated Decision (EU) 2019/1597 of 3 May 2019 supplementing Directive 2008/98/EC of the European Parliament and of the Council as regards a common methodology and minimum quality requirements for the uniform measurement of levels of food waste, data is estimated for 5 stages of the food chain:

- Primary production;
- Processing and manufacturing;
- Retail trade and other distribution of food;
- Restaurants and catering services;
- Households.

The estimate is of the relevant waste codes for the stages of the food chain from Annex II to the Delegated Decision.

In order to estimate the quantity of food waste generated, it is necessary to code the data for the specified waste codes from the survey 'Waste from economic activity' according to the five stages of the food chain. Coding is done according to a code table with the software product SPSS.

Then, for the estimation of the quantity of food waste, analogous actions are applied, as for the estimation of the quantity of waste generated from the activity.

Data from the survey 'Municipal waste' are used to estimate the data on the quantity of food waste generated by households. The share of food waste from the quantity of generated household waste is calculated, according to the National Morphology for the composition of waste. This is done at the municipality level.

Through multiple linear regression, the generated food waste is distributed into the following sectors: Households, Retail trade and other distribution of food, and Restaurants and catering services. The quantity of food waste generated is the dependent variable in the regression analysis. This variable is the analysis target and depends on the other independent variables:

- Average annual population for the reporting year by municipality;
- Employed persons in the sector of Retail trade and other distribution of food;
- Employed persons in the sector of Restaurants and catering services.

Specialised software – Excel, SPSS and/or R – is used to calculate the data.

CONFIDENTIALITY

According to Regulation (EC) No. 223/2009 on European statistics and Statistics Act, the individual (primary) data of enterprises are confidential. In order to ensure their protection and the impossibility of being identified, the aggregated indicators are defined as confidential also when:

- Criterion A - the indicator is formed by one or two enterprises;
- Criterion B - one enterprise dominates the value of the indicator with a share equal to or greater than 85%.

QUALITY ASSURANCE

The statistical survey follows the General model of the statistical production process in NSI. The quality assurance is carried out in order to guarantee compliance with the requirements of

the Statistics Act. Data quality is ensured by the application of the European Statistics Code of Practice principles and NSS Common Framework for Quality Management.

To ensure the high quality of data, their consistency with the data of the annual activity reports of the enterprises (net sales revenue, production revenue, tangible fixed assets, employed persons). For the needs of the additional statistical estimate, the statistical indicator "employed" is used.

Efforts are being made to continuously improve the quality of the data, by improving the primary data collection system through the online-based ESIS, ensuring strict arithmetic and logical control of the input data, and by performing additional analyzes and verifications.

With the preparation of the statistical data, a quality report is also prepared, which is filled in the Eurostat system for metadata and quality reports.

Quality report and metadata are also published on the NSI website together with the statistical data. They are updated annually and contain additional information related to the survey.

STATISTICAL PRESENTATION

Data on waste from economic activity are presented by:

- Economic activities and sectors grouped in accordance with the requirements of the Regulation (EC) No. 2150/2002 on waste statistics;
- Waste type in accordance with the requirements of the Regulation (EC) No. 2150/2002 on waste statistics.

Data are reported to Eurostat in a standardized Excel format (WST Questionnaires) via EDAMIS. They are published on the NSI website in the 'Statistical data – Environment' section, as well as in the Infostat system. The data are used for the preparation of NSI publications: Statistical Yearbook, Statistical Reference Book, brochure 'Bulgaria', specialised electronic publication 'Environment', as well as for providing information upon users' request.