

INSTITUTO NACIONAL DE ESTADISTICA



**Survey on the
environment in
industry.**

**Waste generation
2010**

Methodology

Index

1- Introduction	2
2- Objectives	2
3- Survey unit	3
4- Survey scope	3
5- Sample design	4
6- Variables and definitions	6
7- Information collection	12
8- Information processing	12
9- Tables of results	13

1 Introduction

One of the most important objectives of the Spanish Sustainable Development Strategy (SSDS) passed at the end of 2007 is to *encourage sustainable consumption and production, considering social and economic development, respecting the load capacity of the ecosystems and dissociating the economic growth of environmental degradation.*

Waste constitutes a crucial aspect within the area of environmental policy, and in particular, for very industrialised countries, and also for those with urban settlements in large population nuclei. In response to this kind of problem, the relationship between the efficient use of resources and waste generation and management has been indicated as one of the keys, both in the EU Sustainable Development Strategy and in the 6th Environmental Action Programme 2002-2012, establishing the main objective of uncoupling the use of resources and waste generation from economic growth, and of consumption not exceeding environmental capacity. To do this, one of the main tasks during the coming years is waste management according to the following basic principles: reduction of the volume of waste, optimisation of recycling and reuse, and safe elimination.

The INE performs this study every two years to measure the waste generated in Spain by industrial activities, by means of a specific module integrated into the survey on the environment in industry. The design of the survey follows the guidelines set out in European Parliament and Council Regulation (EC) 2150/2002, of 25 November, on waste statistics. The annexes of this regulation - where variables researched and breakdowns considered are stipulated - have been subjected to amendment by virtue of Commission Regulation (EU) 849/2010, of 27 September.

2 Objectives

The main objective of the survey is to quantify, in physical units, the waste generated by the set of industrial establishments, classified by type of waste, degree of hazard thereof, and activity generating it.

Other additional objectives of the survey worth highlighting are:

To meet the needs of European Parliament and Council Regulation (EC) 2150/2002, of 25 November, regarding waste statistics, which also entails being able to establish comparisons on an international scale.

To complete the waste section in the joint questionnaire of OECD/Eurostat.

To have entry information available for compiling the waste satellite accounts.

3 Survey units

The basic survey unit is the industrial establishment, understanding this to be "any productive unit located in a topographically marked place (workshop, mine, factory, etc.), from which economic activities are carried out through the work of one or several persons from the same legal entity and whose main activity is included in sections B, C and D of the National Classification of Economic Activities (CNAE-2009)".

Even if the company takes on the role of respondent unit, for the purposes of the survey, the observation unit, or that to which the data requested in the questionnaire refers, is the industrial establishment. This selection of the information unit provides the regional estimates.

4 Survey scope

4.1 POPULATION SCOPE

The target population of study is the set of industrial establishments with more than 10 paid employees whose main activity is included in sections B, C, or D of the National Classification of Economic Activities (CNAE-2009).

The main activity of the establishment is understood to be that which generates the greatest added value. If this information is not available, the survey will use the activity that generates the greatest production value, or, in its absence, that which requires the greatest number of employees.

4.2 TERRITORIAL OR GEOGRAPHICAL SCOPE

From the geographical point of view, the survey covers the whole of the national territory.

For the purposes of statistical use, using regionalisation techniques, the survey enables offering, in a limited way, results aggregated by Autonomous Community, this aspect being of special interest for the study and regional economic analysis.

4.3 TIME SCOPE

Starting with reference year 2010 inclusive, this survey is conducted every two years, and refers to even years, alternating with the survey on waste generation in the services sector, which is also conducted every two years, but refers to odd years. Regarding the reference period of the information, the data requested refers to the target calendar year of the survey.

5 Sample design

5.1 TYPE OF SAMPLING

The reference framework used is the Central Companies Directory (CCD) for the activities from 05 to 09, and the Annual Industrial Products Survey (AIPS) for the activities from 10 to 35. The CCD is a register that assigns and classifies statistical units by their main economic activity, according to the National Classification of Economic Activities (CNAE-2009), and their size defined by the number of wage earners (employed persons or employees).

It has been necessary to design independent samples for the different divisions and groupings of Autonomous Communities. A stratified sampling has been used, drawing up the strata according to the number of employees, as the following chart shows:

Size	Employed persons
14	10-19
15	20-49
16	50-99
17	100-199
18+	200 and more

The two groupings of Autonomous Communities considered are as follows:

- Region 1: Andalucía, Castilla y León, Cataluña, Comunitat Valenciana, Galicia, Comunidad de Madrid and País Vasco.
- Region 2: the remaining Autonomous Communities.

5.2 SIZE OF THE SAMPLE

Regarding the divisions into which a stratified sampling has been divided, the sample units have been selected in each one of the strata using the application of a systematic sampling with random start, in such a way that the units obtained are representative, on a national level, by economic activity and size, with an allocation that is approximately proportional by Autonomous Community, for the purpose of

enabling, as possible, the assisted estimation by model to regionalise a limited number of aggregates, given the scant sample size at this geographical level.

The chart below relates the number of units selected in reference year 2010, within

Secciones	Tamaño	Forma de recogida	Nº unidades agrupación 1	Nº unidades agrupación 2	Total unidades
B	Todos	Exhaustiva(*)	178	94	272
C	14	Muestral	1285	780	2065
	15	Muestral	1640	882	2522
	16	Muestral	960	459	1419
	17	Muestral(*)	981	362	1343
	18+	Exhaustiva	823	237	1060
D	Todos	Exhaustiva(*)	59	40	99
Total			5926	2854	8780

each of the strata, for the sections considered:

(*) Except for some strata

5.3 ESTIMATORS

Unbiased expansion estimators have been used in the stratified sampling.

"Y" estimators are as follows

$$\hat{Y} = \sum_h \hat{y}_h = \sum_h \left(\sum_{i,}^{n_h^*} y_{ih} w_h + \sum_{k \neq h} \sum_j^{n_k^h} y_{jk} w_k' \right); \text{ with } w_h = \frac{\hat{N}_h^*}{n_h^*}; w_k' = \frac{N_k}{n_k}; (1)$$

where the first sum encompasses units i (establishments, operation, etc.) of the real sample n_h^* in stratum h , which has not changed stratum, and the second sum extends to all units n_k^h that have changed from stratum k to stratum h .

\hat{N}_h^* refers to the total estimator of the stratum provided by the design, corrected from the proportion of units of the theoretical sample from stratum h that change to another stratum and of inactive time units (in) and duplicates (d) estimated by the proportion of the theoretical sample in the stratum that each incidence presents. That is,

$$\hat{N}_h^* = N_h \left(1 - \frac{d + in}{n_h} - \sum_{k \neq h} \frac{n_h^k}{n_h} \right) (2)$$

n_h^* represents the real sample in stratum h .

These values without (*) refer to the theoretical design factors.

6 Variables and definitions

The definitions on waste, according to European Parliament and Council Directive 2008/98/EC, of 19 November 2008, are as follows:

Waste: any substance or object that its owner discards or has the intention or obligation to discard.

Hazardous waste: any waste that presents one or more of the hazardous characteristics listed in Annex III of Directive 2008/98/EC.

Non-hazardous waste: waste not included in the previous section.

Other definitions:

European Waste Catalogue (EWC): This is a waste listing standardised to a European level. This waste is classified using six-digit codes for the waste, and four and two figures for subchapters and chapters, respectively. The chapters and subchapters define the types of activity that generate the waste.

Statistical Waste Classification (SWC): This is a waste nomenclature for statistical purposes, targeting substances, with categories encoded to 1-4 digits - from greater to lesser aggregation level - and with an additional distinction according to whether dealing with non-hazardous or hazardous waste.

Commission Regulation (EU) no. 849/2010, of 27 September, establishes the SWC currently in force, *CER-Stat version 4*, and the equivalence table with the European Waste Catalogue.

The following briefly describes the different types of waste:

Code CER-Stat		Non-hazardous	Hazardous
01.1	Solvents used		Chlorofluorocarbons, HCFC, HFC Solvents, cleaning liquids and organic and halogenated mother liquors Sludge or solid waste containing organic and halogenated solvents Mixtures of solvents
01.2	Acidic, alkaline or saline waste	Lime mud waste Saline waste that does not contain hazardous substances.	Acid waste: hydrochloric, nitric and nitrous, phosphoric and phosphorous, sulphuric and sulphurous, hydrofluoric, etc. Waste etching solutions, pickling acids, bleach solutions and bleach fixer solutions Alkaline waste: Ammonia, sodium, calcium hydroxide. Waste from the cleaning of fuel with bases Saline waste: Solid salts and solutions containing cyanides, heavy metals, arsenic. Phosphatising sludge Salt slag from the secondary production of aluminium
01.3	Used oils		Engine, gear and lubricating oils (chlorinated, unchlorinated, synthetic, biodegradable, etc.) Hydraulic oils (containing mineral oil, synthetic oil, etc.) Oil from oil/water separators Insulating and heat transmission oils Tank bottom sludge and sludge from desalinisation of petroleum refining Spent waxes and fats
01.4	Spent chemical catalysts	Spent catalysts containing precious metals (gold, silver, rhenium, rhodium, platinum, etc.)	Spent catalysts containing transition metals or dangerous transition metal compounds Spent catalysts containing phosphoric acid Spent catalysts contaminated with dangerous substances
02	Waste of chemical preparations. (except 2.3)	Agrochemical product waste Unused medicines Paints, varnishes, inks and adhesive waste not containing dangerous substances Aqueous sludge containing inks, paints, varnishes, adhesives and sealants not considered to be dangerous substances Waste printing toner not containing dangerous substances Gases in pressure containers	Agrochemical product waste containing dangerous substances Unused medicines (cytotoxic and cytostatic) Paints, varnishes, inks and adhesive waste containing dangerous substances Wood preservatives Waste printing toner containing dangerous substances Unused explosives Gases in pressure containers
02.3	Mixed chemical waste	Mixed chemical waste not containing dangerous substances.	Packaging containing residues of or contaminated by dangerous substances

Code CER-Stat		Non-hazardous	Hazardous
03.1	Chemical deposits and waste	<p>Absorbents, filter materials, wiping cloths and protective clothing contaminated by non-dangerous substances</p> <p>Green liquor sludge (from recovery of cooking liquor)</p> <p>Tars and non-hazardous carbonaceous waste, such as asphalt and bitumens</p>	<p>Absorbents, filter materials, wiping cloths and protective clothing contaminated by dangerous substances</p> <p>Waste from liquid fuels: gasoline, fuel, oil, gasoil and other fuels (including mixtures)</p> <p>Oil and water emulsion sludge (bilge oils and oil/water separator contents)</p> <p>Chemical reaction waste(for example: aqueous washing liquids and mother liquors in organic chemical processes, etc.)</p> <p>Filter cakes and absorbents used in halogenated organic chemical processes</p> <p>Tars and hazardous carbonaceous waste, such as acidic tars, soot, etc.</p>
03.2	Industrial effluent sludge	<p>Sludge from on-site effluent treatment that do not contain dangerous substances</p> <p>Waste from cooling columns and from cooling water treatment</p> <p>Aqueous sludge from boiler cleansing</p>	<p>Sludge from on-site industrial effluents that contain dangerous substances</p> <p>Waste from cooling water treatment containing oils</p> <p>Aqueous sludge from boiler cleansing containing dangerous substances</p> <p>Sludge or waste containing hydrocarbons</p>
03.3	Sludge and liquid waste from waste treatment	<p>Liquors and digestate from the treatment of animal and vegetable waste</p> <p>Liquors and digestate from the treatment of municipal waste</p> <p>Landfill leachate not containing dangerous substances</p>	<p>Landfill leachate containing dangerous substances</p> <p>Liquors and digestate from the treatment of municipal waste containing dangerous substances</p> <p>Waste from liquid fuels containing dangerous substances, from waste incineration</p>
05	Medical and biological waste	<p>Sharps</p> <p>Human or animal medical waste whose collection and disposal are not subject to special requirements in order to prevent infection</p>	<p>Waste whose collection and disposal are subject to special requirements in order to prevent infection</p> <p>(for example: infectious animal corpses)</p>
06.1	Ferrous metal waste	<p>Ferrous metal waste and scrap (iron and steel)</p> <p>Mill scales</p> <p>Ferrous metal dust, particles, scales and chips</p> <p>Ferrous metal cables not containing dangerous substances</p>	
06.2	Non-ferrous metal waste	<p>Non-ferrous metal waste and scrap (aluminium, copper, bronze, lead, brass, zinc, tin, etc.)</p> <p>Ferrous metal dust, particles, scales and chips</p> <p>Non-ferrous metal cables not containing dangerous substances</p>	
06.3	Mixed ferrous and non-ferrous metal waste (including packaging)	<p>Metallic packaging</p> <p>Mixed ferrous and non-ferrous metal waste and scrap</p> <p>Mixed ferrous and non-ferrous metal dust, particles, scales and chips</p>	
07.1	Glass waste	<p>Glass</p> <p>Glass dust and fine particles from the production of glass products</p> <p>Glass containers (for example: glass bottles)</p>	<p>Waste from small particles of glass and glass dust containing heavy metals (for example: cathode tubes)</p>
07.2	Paper and cardboard waste	<p>Paper and cardboard waste</p> <p>Paper and cardboard packaging</p>	
07.3	Rubber waste	<p>Used tyres</p>	

Code CER-Stat		Non-hazardous	Hazardous
07.4	Plastic waste	Plastic waste Uncontaminated plastic containers	
07.5	Wooden waste	Sawdust, shavings, cuttings, wood, particle board and veneer not containing dangerous substances Wooden containers or packaging	Sawdust, shavings, cuttings, wood, particle board and veneer containing dangerous substances
07.6	Textile waste	Worn clothing Textile packaging Textile fibre waste Waste from tanned leather (blue sheetings, shavings, cuttings, buffing dust) containing chromium	
07.7	Waste containing PCBs		Hydraulic oils containing PCBs Components, transformers, condensers and other discarded equipment containing PCBs Construction and demolition waste containing PCBs
08	Discarded equipment (except 08.1 and 08.41)	Electric and electronic equipment not containing dangerous components Brake pads Non-dangerous components removed from discarded equipment	Oil filters Fluorescent tubes and other mercury-containing waste Large household appliances containing chlorofluorocarbons, HCFC, HFC (for example: washing machines, refrigerators) Discarded electric and electronic equipment containing dangerous components Dangerous components removed from discarded equipment
08.1	Discarded vehicles	Discarded vehicles not containing liquids or other dangerous components	End-of-life vehicles
08.41	Battery and accumulator waste	Alkaline batteries without mercury Batteries and accumulators not containing dangerous substances	Lead batteries Mercury-containing batteries Ni-Cd batteries/accumulators
09.1	Animal waste and waste from mixed food products	Animal-tissue waste Materials for the preparation of meat, fish and other foods of animal origin that are not adequate for consumption. Also the sludge from washing and cleaning in these processes Mixed waste from food preparation and products (for example: Waste from preservatives, biodegradable kitchen and canteen waste) Edible oils and fats and mixtures of fats and oils from oily/water separation	
09.2	Green waste	Biodegradable green waste Plant-tissue waste Sludge from washing, cleaning, peeling, centrifuging and separation in preparing fruit, vegetables, grains, cocoa, tobacco, etc., production of preserves and yeast Waste from washing, cleaning and mechanical reduction of raw materials in the production of beverages Materials unsuitable for consumption or processing of all the above activities, and of the bread and pastry bakery industry Waste from alcohol distillation	
09.3	Animal faeces, urine and manure	Animal faeces, urine and manure, effluent, collected separately and treated off-site	

Code CER-Stat		Non-hazardous	Hazardous
10.1	Domestic waste and the like	<p>Mixed waste similar to that generated in households (not separated into differentiated fractions for selective collection - paper, packaging, organic material-)</p> <p>Mixed waste from canteens and markets.</p>	
10.2	Mixed and undifferentiated materials	<p>Compound/mixed containers and packaging (for example: those placed in containers for the municipal selective collection of packaging)</p> <p>Mechanically separated rejects from the pulping of waste paper and cardboard</p> <p>Waste from the sorting of paper and cardboard destined for recycling</p> <p>Other mixed and undifferentiated materials that do not contain hazardous waste (not including the waste from section 10.3)</p>	<p>Inorganic and organic waste containing hazardous waste</p> <p>Metal waste contaminated by dangerous substances</p> <p>Cables containing oil, coal tar and other dangerous substances</p>
10.3	Waste from separation	<p>Reject fraction and combustible waste (not hazardous) generated in the physical-chemical waste treatment</p> <p>Reject fraction of municipal, animal or green waste generated in the aerobic treatment of solid waste</p> <p>Waste for fuel or other waste (mixtures of materials) from mechanical waste treatment</p> <p>Light fragmentation fractions (<i>fluff-light</i>) and dust</p>	<p>Reject fraction and combustible waste (hazardous) generated in physical-chemical waste treatment</p> <p>Waste for fuel or other waste (mixtures of materials) that contain dangerous substances from mechanical waste treatment</p> <p>Light fragmentation fractions (<i>fluff-light</i>) and dust</p>
11	Common sludge	<p>Biodegradable sludge from the treatment of wastewater generated in the preparation and elaboration of animal and vegetable products and beverages.</p> <p>Sludge from the purification of drinking and process water</p> <p>Sludge from the treatment of urban wastewater</p> <p>Waste from sewer cleaning</p>	
12.1	Construction and demolition waste	<p>Waste from concrete, bricks, plasters generated in construction and demolition activities</p> <p>Waste from mixed construction</p> <p>Waste from hydrocarbonised road-surfacing material (for example: non-dangerous bituminous mixtures)</p>	<p>Waste from concrete, bricks, plasters generated in construction and demolition activities containing dangerous substances</p> <p>Waste from hydrocarbonised road-surfacing material (for example: dangerous bituminous mixtures, cal tar pitch and tar products)</p> <p>Glass, plastic, wood or other waste from construction and demolition that contain dangerous substances or are contaminated by them</p>
12.2	Asbestos waste		<p>Metallic packaging containing a dangerous solid porous matrix (for example asbestos), including empty pressure containers</p> <p>Waste containing asbestos from electrolysis</p> <p>Brake pads containing asbestos</p> <p>Waste from fiber cement siding manufacture containing asbestos</p> <p>Discarded equipment containing free asbestos</p> <p>Construction or isolation materials containing asbestos</p>

Code CER-Stat		Non-hazardous	Hazardous
12.3	Waste from naturally occurring minerals	<p>Waste from the extraction of metallic and non-metallic ores</p> <p>Mineral waste generated in the physical and chemical transformation of metallic ores (for example: Sterile, dust, powdery waste, red sludge from alumina production)</p> <p>Mineral waste generated in the physical and chemical transformation of non-metallic ores (for example: Sterile and other waste from the washing and cleaning of minerals; gravel and crushed rocks; sand, clays, dust; waste from stone cutting and sawing)</p> <p>Drilling sludge and other drilling waste (without hydrocarbons).</p> <p>Soil from cleaning and washing beets.</p> <p>Aqueous sludge containing ceramic materials</p> <p>Waste from the preparation of mixtures prior to thermal processing in glass manufacturing.</p> <p>(All of them not containing dangerous substances)</p>	<p>Acid-generating tailings from the processing of sulphide ores</p> <p>Waste and sterile containing dangerous substances from the physical and chemical transformation of metallic and non-metallic ores.</p> <p>Drilling muds and other drilling waste containing dangerous substances</p>
12.4	Waste from combustion	<p>Waste from flue gas purification generated in electrical or combustion plants (not including those from waste treatment plants)</p> <p>Sludge and filter cakes from gas treatment</p> <p>Solid waste from gas treatment</p> <p>Slag, ashes and boiler dust from thermal treatment and combustion</p> <p>Particles and dust</p>	<p>Solid waste from gas treatment; sludge and filter cakes from gas treatment; flue-gas dust containing dangerous substances</p> <p>Slag, ashes and boiler dust from thermal treatment and combustion containing dangerous substances</p>
12.5	Different mineral waste	<p>Artificial mineral waste (for example: Off-specification calcium carbonate in sugar preparation, glass-polishing and -grinding sludge, waste from ceramics, bricks, roof tiles - after the cooking process-)</p> <p>Waste from refractory materials (casting moulds and cores not containing dangerous substances)</p>	<p>Artificial mineral waste containing hazardous waste (for example, glass-polishing and -grinding sludge, sludge from zinc hydrometallurgy, mills and spent grinding materials, etc.)</p> <p>Waste from refractory materials (casting moulds and cores containing dangerous substances)</p>
12.6	Soil	<p>Soil and stones (including excavated) from construction and demolition activities</p> <p>Soil and stones from parks and gardens</p>	<p>Oil spills from oil refining activity</p> <p>Contaminated soil (soil and stones)</p>
12.7	Dredging spoils	Unpolluted dredging spoils	Dredging spoils containing dangerous substances
12.8	Waste from waste treatment	<p>Waste from the incineration or pyrolysis of waste (for example: ash, slag and sand from fluidised beds) generated in waste treatment installations</p> <p>Mineral waste (sand and stone) generated from sorting, crushing, compacting or pelletising in waste treatment installations</p>	<p>Hazardous waste from the incineration or pyrolysis of waste (for example: slag) generated in waste treatment installations</p> <p>Waste from flue-gas cleaning in oil regeneration</p>
13	Solidified, stabilised or vitrified waste	<p>Non-hazardous vitrified waste</p> <p>Non-hazardous stabilised and solidified waste.</p>	<p>Waste marked as hazardous, partly stabilised</p> <p>Waste marked as hazardous, solidified</p>

7 Collection of the information

7.1 QUESTIONNAIRE

There is a single questionnaire, and the informant unit must complete the different sections with the amount of waste, whether hazardous or not, generated during the reference year.

7.2 ORGANISATION OF THE FIELDWORK

The information was collected via the postal questionnaire and telephone support procedure. Informants were also informed of the possibility of completion via the Internet and fax.

The questionnaire was sent to all companies in the sample. Together with the questionnaire, the informant units receive, in each mailing, the regulations for completing the questionnaire, including the equivalence table of the EWC and CER codes, in order to enable the completion thereof.

The collection tasks are completed by calling those companies that have not returned the questionnaire by post by the deadline set out, for the purpose of requesting information of them, advising them as necessary and obtaining the completed questionnaire. Measures such as the updating of the directory, and the control and revision of the questionnaires, are also carried out.

7.3 COMPUTER MANAGEMENT OF THE SAMPLE FILE

A special computer program for managing the sample data file was used both for monitoring the collection and for updating the data on the informant companies, guaranteeing the control and organisation of the whole process. This system allows the data from the informant units to be supervised and updated, while simultaneously collecting and filtering the information. This guarantees an effective control of the process, from the beginning of the survey onwards, as systematic errors in completing the questionnaire may be detected in the initial phases of the survey, thus enabling their rapid correction.

8 Information processing

The initial stage for processing the information from the survey coincides, in time, with the fieldwork itself, and is carried out in parallel with the collection, for the entire duration thereof.

The main purpose is to establish appropriate quality levels that enable a correct and adequate recording of the questionnaires, and significantly simplify the subsequent processing of the information. The recording of questionnaires is carried out establishing the control measures required to guarantee an adequate quality level throughout the whole process. By doing so, the process attempts to limit errors that appear in this stage that could affect the quality of the information given by the informant units.

Once the questionnaire have been recorded and the information is available electronically, a coverage control of the information is carried out, in order to detect duplicities and coverage errors, while being able to make the first assessment of the quality of the variables collected in the questionnaires. This stage is performed for each economic sector, and its implementation is previous to the creation of the survey file and thus, to the whole treatment of information.

Once the survey file is created, inconsistencies and errors are detected and corrected for every identification variable in each register. Subsequently, several stages of filtering and imputation of content errors are carried out. When all filtering phases are completed, analysis tables are obtained in order to detect and eliminate errors or inconsistencies, and to compare the results obtained with other sources of information.

9 Results tables

The objective of the results tables is to offer basic and relevant information on the main results of the survey, which will enable meeting the demand for information by different users.

The detailed results are published on a national level, grouped by Autonomous Community, while those of the Autonomous Cities of Ceuta and Melilla are not published, as the sample sizes thereof produce inefficient estimates, or estimates with an impact on confidentiality.