



## Review of EUROSTATs reporting method and statistics

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Reducing food waste through social innovation

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# Colophon

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# Summary

The main objective of this survey has been to evaluate how national waste statistics in Europe related to food waste/waste are registered and reported, to assess how they are further used by Eurostat to establish a common European statistical basis for waste statistics, and to give input to how FUSIONS can contribute to the methodological basis for these statistics. Contact with Eurostat and its national representatives has been of great value for the project, both in this short evaluation period and hopefully in further project work where coordination with activities organized through Eurostat is important for FUSIONS.

The present system for how waste statistics are collected and reported by Eurostat is presented in several documents which are reviewed in the report. The Manual for Waste Statistics where the formal bases as well as the methodological framework, definitions, classifications and reporting requirements are described, gives a comprehensive overview of the system.

The main aim of the EU statistics on waste is to monitor the implementation of waste policy throughout EU countries, and especially the compliance with principles of recovery and safe disposal. The European Waste Categories classifications (EWC) is mandatory for reporting of national waste statistics data to Eurostat. The Eurostat Manual for data gathering does describe three main methodologies being surveys administrative data or other sources, statistical estimation procedures, and a combinations of the above methods.

Although there are well described methodologies for waste statistics available in the Manual, all countries are free to choose their own methodological framework which makes it difficult to evaluate waste figures cross-nationally on a detailed level, both in total and per capita. Comparisons of waste statistics between nations must thus be done carefully as differences in methodologies might give biased results. Monitoring development over time *within* nations is however not influenced by this lack of common methodologies, provided the methodology used is persistent over time, and can give valuable information concerning effects of policy measures and regulations.

The waste statistics is based on treatment methods of waste which makes it impossible to follow the waste from the source to the treatment, which also means that it is not possible to follow, for example, waste from a certain sector and how it is treated.

Each set of waste data from the member states has a quality report attached, which is mandatory according to EU Waste Regulation EC 2150/2002. In these reports the member states describe the methodology used, derivations between different years, uncertainties etc. for the total waste statistics. Based on the quality reports the most common up-scaling methodology is to scale up data collected from a sample of companies to a whole sector based on economic factors (turnover), number of employees or a certain number of inhabitants in a municipality. The quality reports also show that most countries are collecting data based on the List of Waste (LoW) categorization and then use a key for transformation to EWC-Stat categories.

This evaluation of the Eurostat system has shown that there are formal and methodological elements that make it difficult to use the statistics for generating reliable food waste statistics to be used for creating reliable time series. Firstly there are no common methodologies prescribed for gathering waste data nationally. Secondly, the waste categories defined in EWC-Stat are on a highly aggregated level and contain various amounts of waste that are not directly related to the food sector which makes it difficult to sort out relevant food waste data. Thirdly, to cover food waste, it is thus necessary to make the categorization more detailed in national statistics, and there should also be distinguished clearly between different subcategories of food waste.

Based on the objectives of the FUSIONS project and especially the reports from Work Package 1, we foresee that the project can make a significant contribution to improving the basis for collecting data on food waste on a voluntary basis alongside with the formal requirements imposed by EU taking its starting point in the present EU statistics.

Three important areas in which FUSIONS should collaborate directly with Eurostat and national representatives in order to contribute are:

- Development of "Best practice methodologies" for collection of data from different parts of the food chain, and for up-scaling to branch statistics or national statistics, based on a comprehensive literature review.

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- Development of indicators for food waste statistics on a national level, to make data as comparable as possible between countries.
  - Gathering of data in member states that are partners in the FUSIONS project and making those available as a basis for national food waste statistics.

As there are well established connections between FUSIONS partners and national waste statistics representatives there should be good potential for such collaboration.



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# 1 List of abbreviations in the report

There are a number of abbreviations used in the report, and to make the reading easier we have given a short list of explanation of those in the table below.

<b>Abbreviation</b>	<b>Short description</b>
LoW	List of Waste Codes to classify waste on a detailed level, based in a sector wise approach (see Chapter 5.2 and Appendix 2)
EWG-Stat	European Waste Categories classifications, according to substance types (see Chapter 5.2 and Appendix 2)
WStatR	European Waste Statistics Regulations established in 2002 and revised in 2010
Eurostat	Eurostat is the statistical office of the European Union situated in Luxembourg. Its task is to provide the European Union with statistics at European level that enable comparisons between countries and regions.
EU27	The present organization of the European Union with 27 member countries (Croatia will become the 28th <b>member</b> of the <b>EU</b> on 1 July <b>2013</b> )
Plug-In	A voluntary project where Eurostat member states can get funding for developing more specific statistics, In this case for, for food waste based on 2012 data
FUSIONS	Project funded by the 7 <sup>th</sup> Framework Research program in EU, to reduce food waste through social innovation
NACE	The Statistical Classification of Economic Activities in the European Community is a European <a href="#">industry standard classification system</a> consisting of a 6 digit code
NACE2	Revision of the original NACE codes in a version 2.0 based in EC Regulation 1893/2006
EEA	European Economic Area, with EU27 member states, Iceland, Switzerland and Norway
EOL waste	End-of-Life Waste, related to waste of products
IPCC	Intergovernmental Panel on Climate Change established by United Nations in collaboration with other international organizations in 1988
GHG-emissions	Green House Gas emissions

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## 2 Background for the survey

Evaluation of the way in which Eurostat covers statistics for food waste nationally as well as on the EU27 level was initially a part of the general state of the art survey of methodologies for food waste quantification in FUSIONS. This was, however, an important issue for the European Commission in the negotiations for the project, and the activity being both relevant and of interest for the project partners, it was to be reported in a special dedicated report as a part of the Work Package 1 review. Contact with Eurostat and its national representatives has been of great value for the project, both in this short evaluation period and hopefully in further project work where coordination with activities organized through Eurostat is important for FUSIONS.

## 3 Scope and objective of the survey

The main objective of this survey has been to evaluate how national waste statistics in Europe related to food waste/waste are registered and reported, to assess how they are further used by Eurostat to establish a common European statistical basis for waste statistics, and to give input to how FUSIONS can contribute to the methodological basis for these statistics.

The main questions to be evaluated and discussed in this survey seek to give an overview of several key issues and to evaluate them in light of FUSIONS experiences:

- What are the connections between the categories of waste used nationally and in Eurostat?
- Which types of sectors are involved in the national statistics and the Eurostat statistics?
- What types of methodologies have been used in the national statistics for the different sectors and waste types, and how much do they differ as a basis for Eurostat statistics?
- How is food waste/waste included in the national statistics and how does it relate to EWC-Stat and List of Waste (LoW)?
- What are the plans for further development of national statistics in relation to food waste/waste?
- How can and should FUSIONS contribute to improved methodologies and categorization of food waste in national statistics/Eurostat statistics in the future?

## 4 Data and methodology

The main information sources for this survey and report have been the following types of documents and information:

- The Manual for Waste Statistics 2010 from Eurostat (Eurostat 2011)
- Documents from external studies of Eurostats working platform and results, e.g. Oekopol, Argus etc.
- Formal documents from the EU Commission presenting the legal basis for Eurostat work
- The national Quality reports 2010 that have been prepared for Eurostat according to EU regulations
- A questionnaire distributed to all national delegates responsible for waste statistics in the Working Group meeting on Waste Statistics in Luxembourg on the 11th April 2013 (31 persons).
- A survey among FUSIONS partners about their contacts with national waste statistics organizations and eventual plans for further national-level collaboration
- Participation in a meeting of the working group for waste statistics in Eurostat (30 May 2012, 10 April 2013).
- Contact with national representatives to Eurostat on waste statistics in Norway and Sweden.

The most important documents regulating and describing the European Waste Statistics system are presented in the following official documents from the EU Commission or from Eurostat:



**Table 1 Overview of the most important documents presenting the Eurostat Waste Statistics system**

<b>Document with links for downloading marked with blue</b>	<b>Subject covered</b>	<b>Section/pages related to food waste</b>
<a href="#">EC 2150/2002</a> of 25 November 2002 on waste statistics	General framework for waste statistics covering categories of waste, definitions, data gathering, reporting	pp 1-5, Annex II and III
<a href="#">EC COM(2008) Final 13.06 2008</a>	Report on the first results of waste statistics collection from the Commission to the European Parliament and the Council	Chapter 3&4 on data quality
<a href="#">EU Comm Reg 849/2010 of 27 September 2010</a>	Changes made in Annexes to Regulation No 2150/2002 on waste statistics	Annex 1 p9 Annex III p17
<a href="#">Eurostat Version 2 (2010)</a>	Guidance on classification of waste according to EWC-Stat categories	pp. 52-57
<a href="#">Eurostat (2011)</a>	Manual on Waste Statistics. A Handbook for data collection of waste generation and treatment	The whole manual gives a good overview of the field.

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# 5 Basis for the Eurostat waste statistics related to food waste

The present system for how waste statistics are collected and reported by Eurostat is presented in several documents, as presented in Table 1. For those who would like a comprehensive but easily available overview of the system, we recommend the Manual for Waste Statistics 2010 (Eurostat 2011), where the formal bases as well as the methodological framework, definitions, classifications and reporting requirements are described.

## 5.1 Aim of the statistics in general and for food waste related categories specifically

The main aim of the EU statistics on waste is to monitor the implementation of waste policy throughout the EU countries, and especially the compliance with principles of recovery and safe disposal (EU COM 2010). Waste statistics will also be important for further changes in the policy and regulations, aimed at increasing resource effectiveness and sustainability in EU. This is the reason behind changes in classification of waste, for example to monitor how biologically safe waste like vegetable parts is treated compared to animal waste, which must be treated differently to prevent problems with spreading of animal diseases. Eurostat has organized a voluntary plug-in test phase based in 2012 data in some countries to get access to more detailed data about wasting of food, both in general and more specifically edible and non-edible food waste.

The EU Commission is, according to Article 8(1) in the EU Regulation EC No 2150/2002 from 25 November 2002, obliged to submit a report to the European Parliament and the Council on statistics every two years, starting with the reference year 2004 (EU COM 2008). Annexes I and II in the Regulation set out the requirements for statistics on waste generation, waste treatment and waste treatment capacities in each country. The report on waste statistics includes coverage of statistics in each country, as well as country-specific quality reports.

The EU Commission has followed up Regulation EC2150/2002 with additional legal acts and guidance documents:

- EC No 574/2004 amending Annexes I and III to the Regulation
- EC No 783/2005 amending Annex II
- EC No 782/2005 defining the format for transmission of national data on waste statistics
- EC NO 1445/2005 defining quality evaluation criteria and the content of national quality reports.

An important note is that the regulations define data to be submitted from the EU Countries, but do not prescribe specific methods for gathering waste statistics. Each country therefore has the freedom to establish statistical data based on national systems, with minimum changes to comply with the EU Regulation (EU COM 2006).

In 2010, the EU Commission made some changes to Regulation 2150/2002 through the Commission Regulation EU No 849/2010 of 27 September 2010 based on experiences from the first two reports on waste statistics from EU27 and new need for information stemming from the revised Waste Framework Directive (2008/98/EC). The main aims were to increase usability of waste statistics, to simplify provisions and to align Regulation 2150/2002 with other reporting obligations in the EU (EU COM 2010).

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## 5.2 Definitions and categories of waste related to food waste in the present system/proposed revision

The EU Commission and Eurostat published a new "Guidance on classification of waste according to EWC-Stat categories" in 2010 (EU Comm 2010). This was a supplement to the Manual for implementation of EC Regulation 2150/2002 on Waste Statistics, to which the Member States were obliged to report statistical data for 2010 on waste generation and waste treatment according to the waste nomenclature EWC-Stat (Eurostat 2011). The EWC-Stat is a substance-oriented aggregation of waste types defined in the European List of Wastes (LoW) which is a sector-wise classification of waste. There is thus a 1:n relationship (see Appendix 2) between the EWC-Stat classification and the LoW, allowing for the conversion and aggregation of waste types classified according to LoW to EWC-Stat (EU Comm 2010).

The EWC-Stat categories that shall be reported to Eurostat are shown in Appendix 2, with the relevant connections to the LoW categories. With 2010 as reference year, all Member States must report data on waste generation and waste treatment for the 51 EWC-Stat categories (which were 48 up to 2008). The LoW is used in the EU mainly for administrative purposes, for permitting and supervision in the field of waste generation and management. The LoW defines a total of 839 waste types which are structured into 20 chapters, mainly according to the source of the waste, e.g. economic sector or process of origin (EU Comm 2010).

The EWC-Stat classification is mandatory for reporting of national waste statistics data to Eurostat, but does not prescribe a given method for data gathering nationally. Member States are thus free to use any method for gathering of primary data, and can use any classification of statistical data nationally, as long as they can be re-classified into the right EWC-Stat categories. In practice, it seems that most countries gather data according to LoW categories and transform them into EWC-Stat categories for reporting to Eurostat (EU Comm 2010), see section 6.4.

The relevant EWC-Stat categories for non-hazardous food waste are the following three categories (see further connections to LoW categories in Appendix 2):

- 09.1 Animal and mixed food waste (from agriculture, forestry and fishery, food preparation and products, biodegradable kitchen and canteen waste, edible oils and fat)
  - 09.11 Animal waste of food preparation and products (Non-hazardous)
  - 09.12 Mixed waste of food preparation and products (Non-hazardous)
- 09.2 Vegetal waste (from agriculture, forestry, food preparation and products, biodegradable kitchen and canteen waste, edible oils and fat)
  - 09.21 Green waste
  - 09.22 Vegetal waste of food preparation and products
- 10.1 Household and similar waste (mixed municipal waste, bulky waste, street cleaning waste, kitchen waste, household equipments, where the main amount comes from private households, but also similar wastes from commerce). Not including separated collected biodegradable waste (09 category).
  - 10.11 Household wastes
  - 10.21 Street cleaning wastes

The categories are further defined in the Manual for Waste Statistics (Eurostat 2011):

Animal and mixed food wastes (09.1): item 31. These wastes are animal and mixed wastes from food preparation and products, including sludges from washing and cleaning; separately collected biodegradable kitchen and canteen waste, and edible oils and fats. They originate from food preparation and production (agriculture and manufacture of food and food products) and from separate collection. Animal and mixed waste of food preparation and products are non-hazardous.

Vegetal wastes (09.2): item 32. These wastes are vegetal wastes from food preparation and products, including sludge from washing and cleaning, materials unsuitable for consumption and green waste. They originate from food and beverage companies.

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Household and similar wastes (10.1): item 34. These wastes are mixed municipal waste, bulky waste, street-cleaning waste like packaging, kitchen waste, garden waste and household equipment except separately collected fractions. They originate mainly from households but can also be generated by all sectors in canteens and offices as consumption residues. Household and similar wastes are non-hazardous.

This means that food waste is reported in any of the three categories to Eurostat, where the two 09-categories are directly related to residuals from food production and food products, but without separating different subcategories of waste. For waste from households, food waste is combined both with a number of other waste fractions in category 10, as well as being mixed with wastes originating from commercial sectors.

EU Comm (2010) prescribes a given procedure to secure reliable and comparable data when applying the LoW correctly. Classification should be done by

1. Identifying the field of activity to which the waste producer belongs (Chapters 1-12 or 17-20).
2. Identifying the sub-chapter and waste category which best characterize the source of waste, and where the specific always should be identified over the general
3. If no appropriate waste category is found, chapters 13-15 should be examined before resorting to categories XX YY 99.

With a growing interest for food waste and based on a request from the EU Commission, Eurostat has launched an opportunity in spring 2013 for the member states to carry out a food waste plug-in, see Chapter 6.3.

## 5.3 Methodology for national data gathering in Eurostat

The Eurostat Manual for data gathering (Eurostat 2011) does not prescribe one common methodology to be used in the national collection of data on waste statistics, nor on the upscaling from smaller samples to national data. The three main methodologies that are described in detail in the Manual are:

- Surveys;
- Administrative data or other sources;
- Statistical estimation procedures;
- Combinations of the above methods.

Although there are well described methodologies for waste statistics available in the Manual, there has not been any advice given or any prescription of which methods to use, which means that all countries are free to choose their own methodological framework.

Surveys are used in order to collect information from units, i.e. response units. Information on waste generation will generally be collected using a questionnaire on waste and the units will be enterprises (or parts of enterprises) or private households. As a method of data collection, surveys include both census (comprehensive) surveys and sample- surveys which are carried out regularly in order to collect statistical data on waste generation directly. The survey methodology is described in detail in the Eurostat Manual, without giving directions for which approach to follow.

An administrative information source is established by an institution which regularly collects and puts together information from enterprises or institutions, e.g. environmental authorities, branch organizations, statistical offices etc.. If any information which is collected and put together by the administration for purposes other than for waste statistics can also be used directly or with some additional effort to generate some of the information required for waste statistics, then this data set serves as an administrative source for waste statistics.

Statistical estimation procedures can be:

- the estimation of waste generation by waste factors to be applied to waste-related activities;
- the estimation of waste generation via (causal) models based on 'visible' variables;
- the indirect determination of waste generation via waste treatment or waste collection.

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The data collection method 'combination of the foregoing methods' is a method which is not only based on several of the foregoing methods but which can also include small additional tools to close data gaps. Data collection methods which are (mainly) based on one of the foregoing methods and use only small tools to cover residual data gaps are not considered to be a combination method. Methods of this kind should be attached to their primary data collection method. More detailed descriptions of the methods are given in the Manual (Eurostat 2011).

Examples of combination methods:

- Combination of indirect determination of waste generation via waste treatment for specific waste types with business survey of waste generation for the distribution of the remaining waste type;
- Combination of business survey of selected economic sectors with administrative sources for remaining sectors or specific waste types;
- Combination of business survey of the economy (production statistics) with household survey of private households.

The complete work flow for the process of data gathering, processing and analyses up to reporting of statistics is shown in Figure 1.

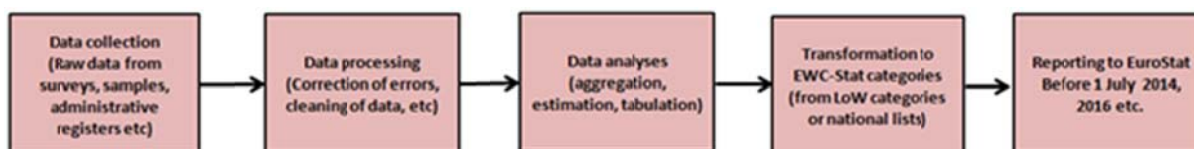


Figure 1 Flow diagram for the process of data gathering, processing and reporting of statistics to Eurostat (based in Eurostat (2011))

## 5.4 Sectors covered by food waste, relevant categories in present statistics/proposed revisions

One important reason for making the updated Guidance on waste statistics was the new version of the economic sector classification to the NACE Rev 2 from reference year 2008 and the connections to the WStatR system with reference year 2010 (EU Comm 2010). According to NACE Rev 2 the following NACE categories are relevant for food waste statistics reported from Member States:

- Agriculture and fishery (farm and fishing) (NACE 01-03)
- Food manufacturing (NACE 10, 11, 12)
- Retail and wholesale (NACE 46 and 47)
- Food and beverage service sector (NACE 56)
- Households

## 5.5 Treatment methods covered in present statistics/proposed revisions

Waste statistics are set up in such a way that you can't follow the waste from the source to the treatment, which also means that it is not possible to follow, for example, waste from a certain sector and how it is treated. The treatment is instead reported for EWC-Stat codes (wastes) treated with the following treatment methods (EU COM 2008):

- Incineration, (divided in with and without energy recovery)
- Recovery excluding energy recovery, (material recycling and biological treatment reported as one and backfilling as one)
- Disposal other than incineration, (land filling and discharges).

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In addition, member states have to report on indicators reflecting waste infrastructure (number of and capacity for facilities covering the 6 different treatment methods), and coverage of the different collection schemes for waste (percentage of population covered by collection systems). Statistics for export and import of waste between countries are dealt with in Article 5 in the EC Regulation EC No 2150/2002, but it was said in the regulation that the Commission shall draw up a program for pilot studies on the import and export of waste to be carried out by Member States. This program has not been established and carried out, as it was not approved by the member states (Hartmut Schroer pers comm. 17.05 2013). Data on export and import of waste will be important when comparing amount of waste originating in each member state, as well as waste per capita. Regarding food waste, it is also important to discuss how waste that is generated in manufacturing in one country shall be reported when the product is exported and used in another country. This makes it difficult to compare mass of total waste and waste per capita between different countries (similarity with the Scope 1 and Scope 2/3 discussions for GHG-emissions and the focus on direct and indirect emissions in a value chain perspective).

## 5.6 Indicators used in present reports for EU27 statistics of relevance for food waste

The data that are reported nationally are gathered into a number of indicators, which are partly reported on a per-country basis and partly as aggregated data for EU27 and a few other countries in the European Economic Area (EEA), including Switzerland, Iceland, and Norway.

The following indicators are reported (not necessarily by all member states) in the latest version of Eurostat's Pocketbook for Energy, transport and environmental indicators (Eurostat 2012).

- Total tons of waste per year for hazardous and non-hazardous waste
- Tons of waste and percentage of hazardous and non-hazardous waste per sector (households, manufacturing, electricity/gas/steam, construction, mining and quarrying, others). Primary production is not specified among the sectors from which data should be specified.
- Total tons, tons per capita and percentage of non-mineral waste per country and economic sector (manufacturing, households, others)
- Total tons of waste per country and treatment method (recovery, energy recovery, incineration and disposal)
- Waste recovery in percentage of total (animal waste from manufacturing, animal and vegetable waste 2 of 13 categories)
- Municipal waste per country in kg/capita
- Treatment of municipal waste in kg/capita and the four treatment methods
  - Energy production from municipal waste per country in tons of oil equiv.
  - GHG emissions from waste treatment per country in tons of CO<sub>2</sub>-equiv.
  - Special statistics for packaging waste, EOL waste from vehicles, export of hazardous waste

As can be seen from this list of indicators that are reported, there are very few that are directly relevant to food waste in general or to prevention-related solutions.

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# 6 Methodological basis for Eurostat food waste statistics

## 6.1 Methodological basis for data gathering for the EU27 waste statistics

As presented in section 5.2, no harmonized methodology has been developed or prescribed for gathering or analyzing neither national waste statistics in Europe in general, nor food waste statistics specifically. It is thus up to each country in Europe to develop the best national methodologies, in accordance with the resource basis and other important factors. This means that it is difficult to evaluate waste figures cross-nationally on a detailed level, both in total and per capita. Comparisons of waste statistics between nations must thus be done carefully as differences in methodologies might give biased results. Monitoring development over time *within* nations is however not influenced by this lack of common methodologies, provided the methodology used is persistent over time, and can give valuable information concerning effects of policy measures and regulations.

## 6.2 Data gathering from the National Quality reports

Each set of waste data from the member states has a quality report attached, which is mandatory according to EU Waste Regulation EC 2150/2002. In these reports the member states describe the methodology used, derivations between different years, uncertainties etc. for the total waste statistics. For example, one member state has done a so-called sample survey from all sectors, meaning that they have collected data (in various ways) from companies and have then used for example, the number of employees to calculate the total amount of waste. The information in the report does not however describe how the companies themselves have measured their data that are presented in the survey. The data therefore does not give much input as to the methodology used “behind” the sample survey – which is the methodology of importance in the scope of FUSIONS.

Going through the quality reports show that some common methodologies for collection of waste data are:

- For industry and enterprises: sample surveys (in which data is collected from a sample of companies, and waste data are estimated for the others via economic up-scaling), administrative sources (including national databases, registers for declarations etc.), full scale surveys (common for large companies or companies generating certain amounts of waste), personal interviews for collection of data and waste factors.
- For households: administrative data, surveys sent to municipalities, data on collected / treated waste (data on collected / treated waste is also often collected via surveys sent, for example, to waste collectors. Additional data may be estimated for households which are not served by sanitation services.).

The quality reports also give information about the scaling methods used in order to upscale the collected data to national data. The most common up-scaling methodology uses data collected from a sample of companies to a whole sector based on economic factors (turnover), number of employees or a certain number of inhabitants in a municipality.

The quality reports also show that most countries are collecting data based on the LoW categorization and then use the key available for transformation to EWC-Stat categories. The quality reports are expected to give more detailed information about approaches for data gathering regarding both waste in general as well as food waste. As this study focus on the Eurostat system for waste statistics at the European level, those country-wise reports have not been evaluated and discussed in this report. The

FUSIONS project will include those reports related to food waste in the general review of methodologies for food waste quantification and characterization to be presented later in 2013 (see Chapter 8.3).

## 6.3 The Food Waste plug-in approach

In the food-waste plug-in member states are asked to fill in data on the LoW level. The LoW codes requested are the ones which belong to EWC-codes 09-1, 09.2 and 10.1 – these being the EWC-Stat codes that are supposed to include any kind of food waste (see chapter 5.2). The sectors that are included in the reporting have also been further divided into subsectors. The manufacturing industry is divided into a number of subsectors, while the service sector is divided into retail, wholesale, large scale kitchens and restaurants). The plug-in will be reported in parallel with other waste statistics by participating member states, in June 2014.

In the plug-in approach, a single methodology for collecting national data has still not been defined. The problems with different methodologies used in different member states will thus remain, and it is still not clear if the plug-in approach in its present form will provide better data on food waste from member states. Member states can apply for extra funding to carry out this activity for 2012 data.

## 6.4 Data gathering from Questionnaires

A questionnaire was developed in close cooperation between the FUSIONS project and Eurostat, and was distributed to all participants in the Working Group meeting on Waste Statistics in Luxembourg on 11<sup>th</sup> April 2013. A copy of the questionnaire is enclosed in Appendix 3. The questionnaire was returned with answers from 19 of the 31 possible countries, with the best response rate from national representatives from Eastern and South-Eastern Europe.

Regarding the question about what type of waste classification system is used nationally, 11 countries reported using the LoW classification, whereas 8 countries reported using EWC-stat and 3 countries food waste combined with other systems (Figure 2). 4 countries reported to use other systems, with two countries using "organic" or "wet-organic" waste as national categories and one country differentiating between "edible and non-edible" for the household sector. The fact that most countries report using LoW classifications for national statistics as well is in line with what was reported by EU Comm (2010).

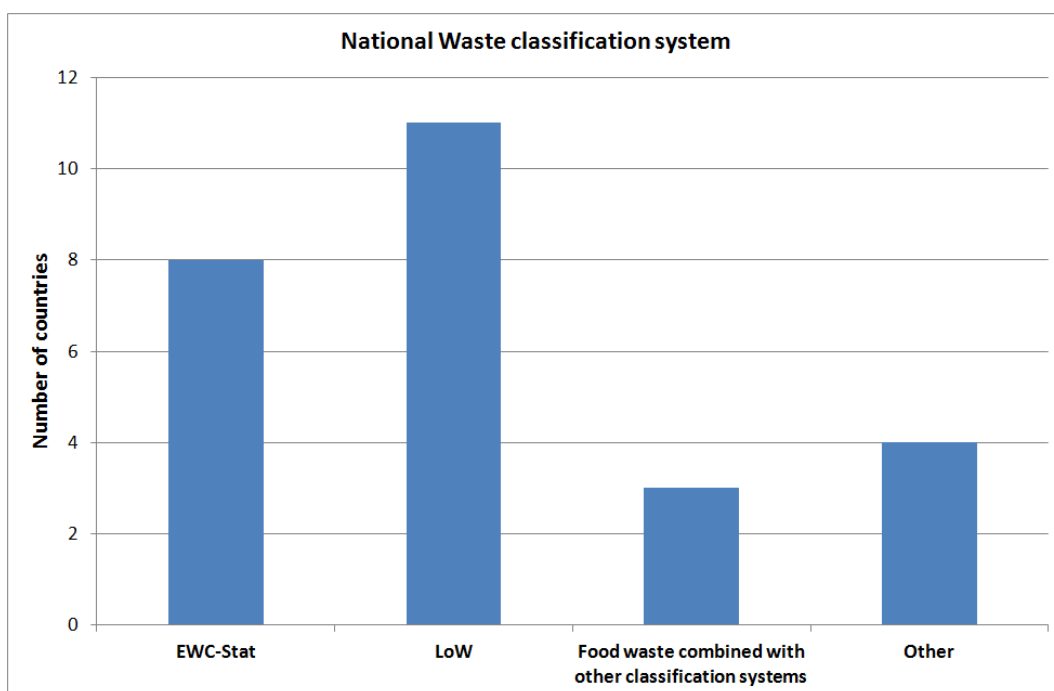


Figure 2 Overview of which waste classification systems that are used for national waste statistics (the sum of countries is higher than 19 because several countries reported to use more than one classification system)



The legal basis for gathering national waste statistics differs between countries, as shown in Figure 3. In most countries there are special regulations which make leverage of statistical data mandatory for companies and municipalities (about 50%), whereas in other countries this is voluntary or done without any specific regulations. In some countries statistical data are collected by environmental authorities whereas in other countries this is done by statistical offices (often according to special regulations).

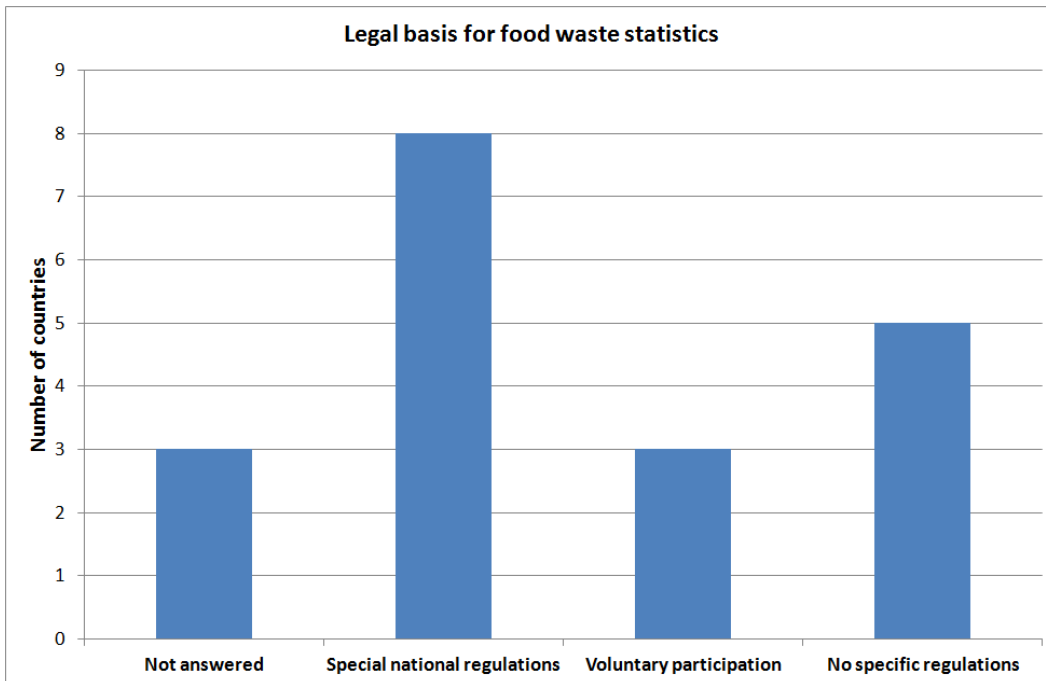


Figure 3 Legal basis for national waste statistics in addition to WStatR regulations

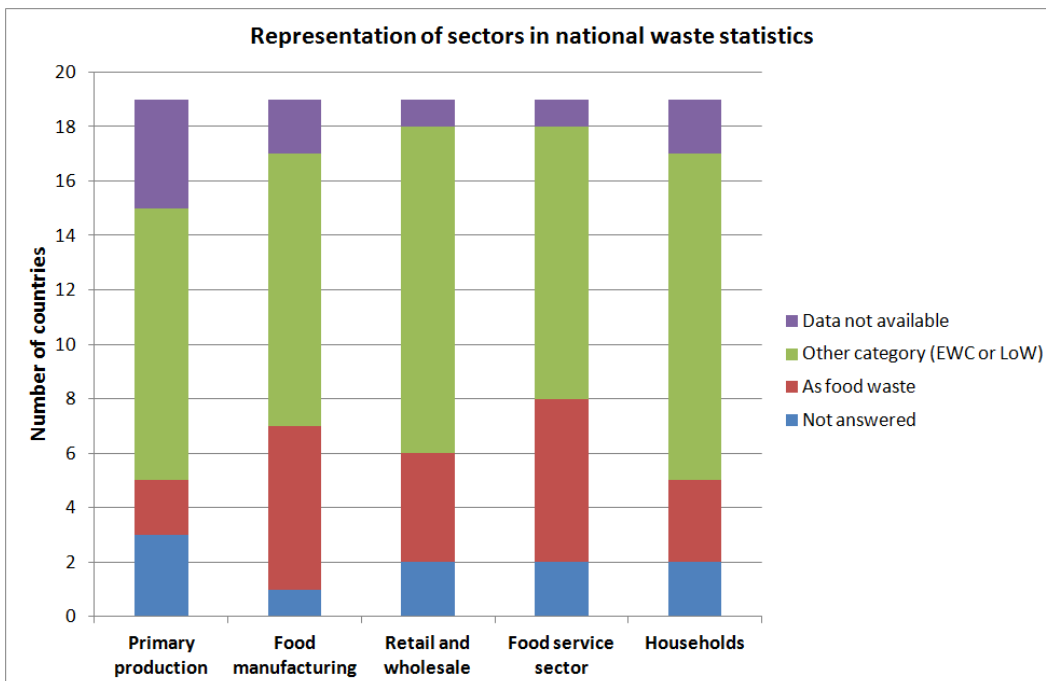


Figure 4 shows the representation of different parts of the food chain in relation to the types of data that are gathered nationally. Most countries use data related to the EWC-Stat or LoW classification systems, probably in accordance with the reporting classification shown in Figure 2. There are generally fewer data available for primary production, whereas

retail/wholesale and the food service sector are covered by most countries (

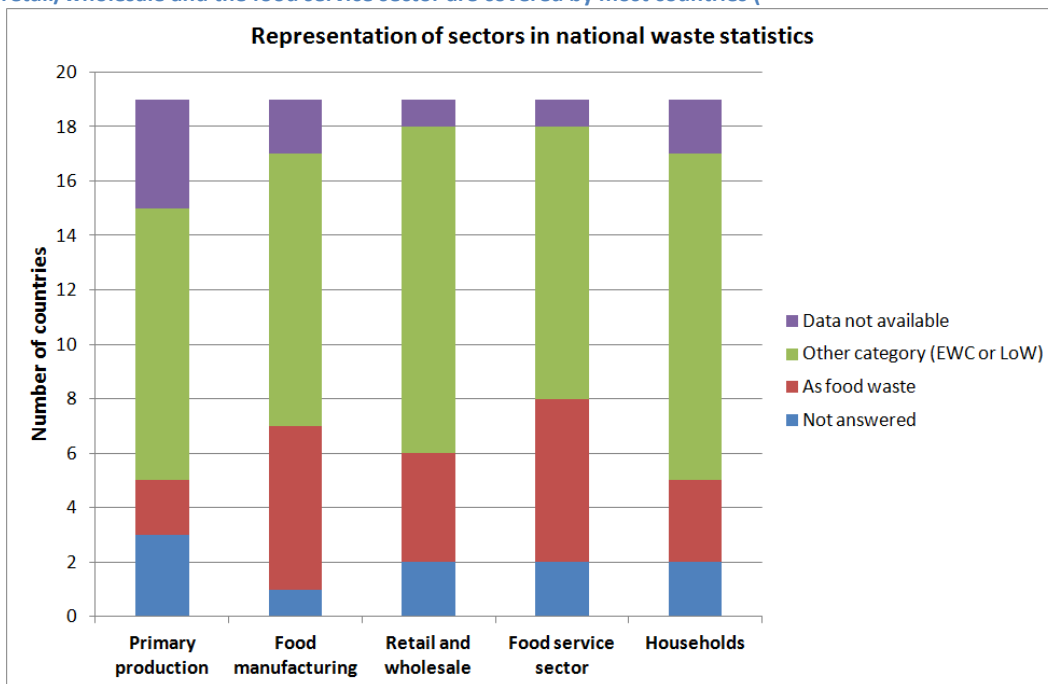


Figure 4).

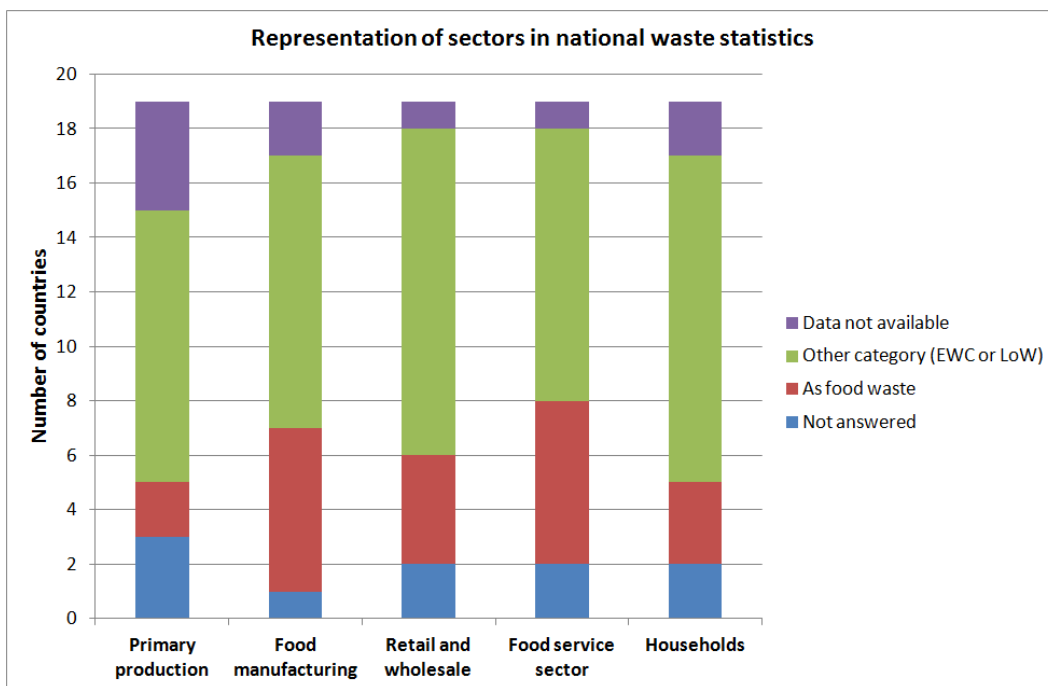


Figure 4 Representation of different sectors of the food chain in national waste statistics

As there are few nations that have started to collect specific data about food waste nationally, there are also few nations that have used specific methods for such data gathering. Only 3 nations (Sweden, Norway, UK) have developed their own specific methods for food waste statistics, whereas one nation used internationally developed methodologies (Figure 5).

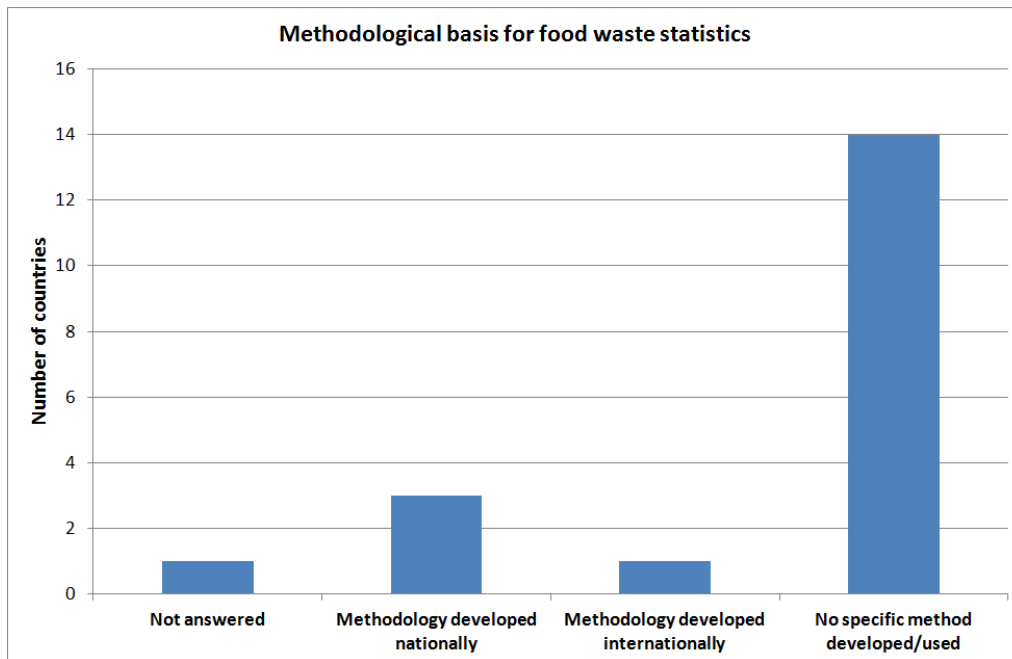


Figure 5 Methodological frameworks for national food waste statistics

There are just a few nations that plan to or are discussing making changes in their present system for national food waste statistics. 6 nations have already carried out studies to estimate the edible part of food waste nationally, whereas 3 nations are discussing launching such studies (Figure 6). Only one nation will definitely ask for funding for a food waste plug-in to participate in the development and testing of methods for food waste statistics, whereas 2 other nations are in the discussion phase (Figure 6).

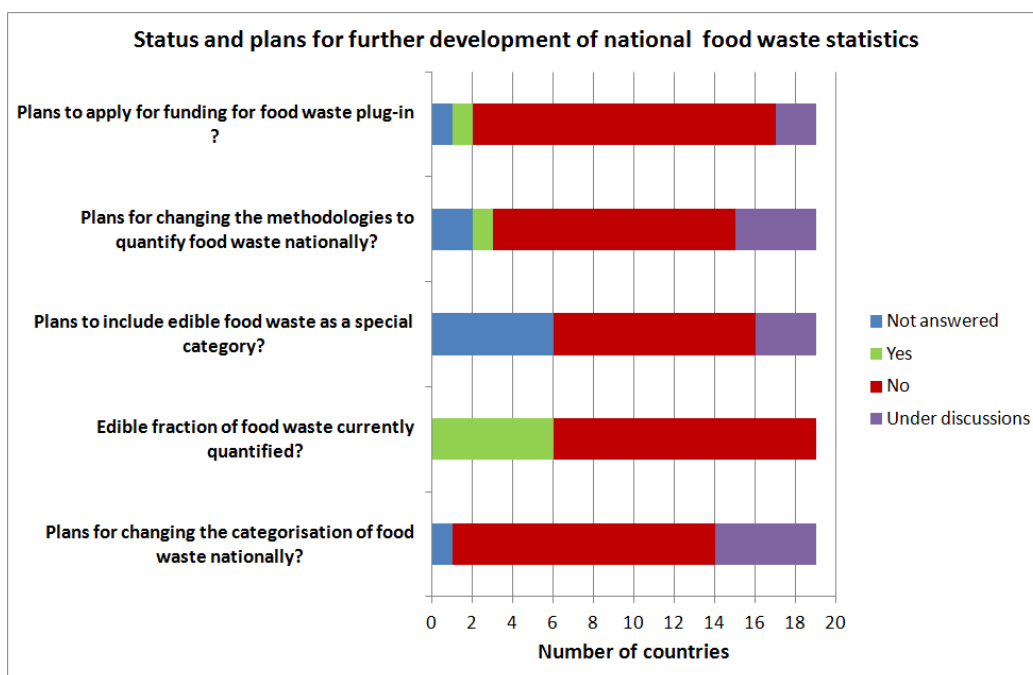


Figure 6 Status and plans for national food waste statistics

## 6.5 Collaboration nationally between FUSIONS partners and Waste Statistical Organizations

To evaluate opportunities for collaborations between FUSIONS partners and organizations in charge of national waste statistics, we have also conducted a survey among our FUSIONS partners to find out whether they are in contact with and collaborate with those organizations nationally. As shown in Figure

7 there are established national contacts between 6 of 11 FUSIONS partners who have responded to the survey, and for 5 of those this collaboration was established before the FUSIONS project started. Three partners have plans for collaboration to produce national food waste statistics (Figure 7). 8 of 11 partners have plans for collaboration about national methodologies for food waste statistics, whereas 5 of 11 have plans to collaborate in data gathering and generating national statistics for food waste (Figure 8).

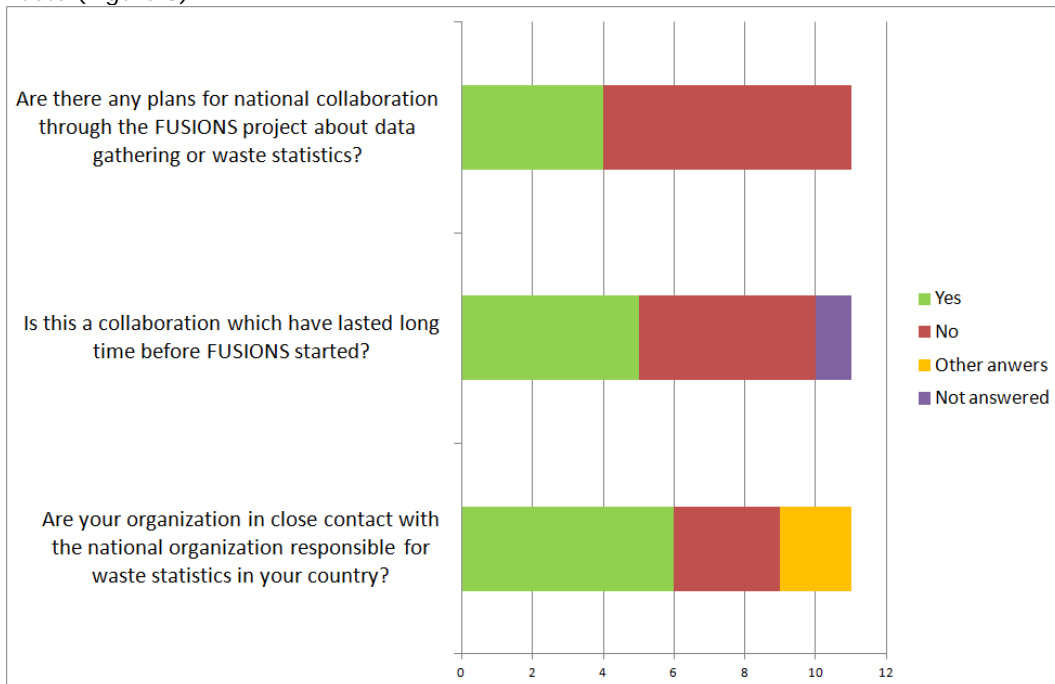


Figure 7 Status and plans for national collaborations between FUSIONS partners and national waste statistics organisations

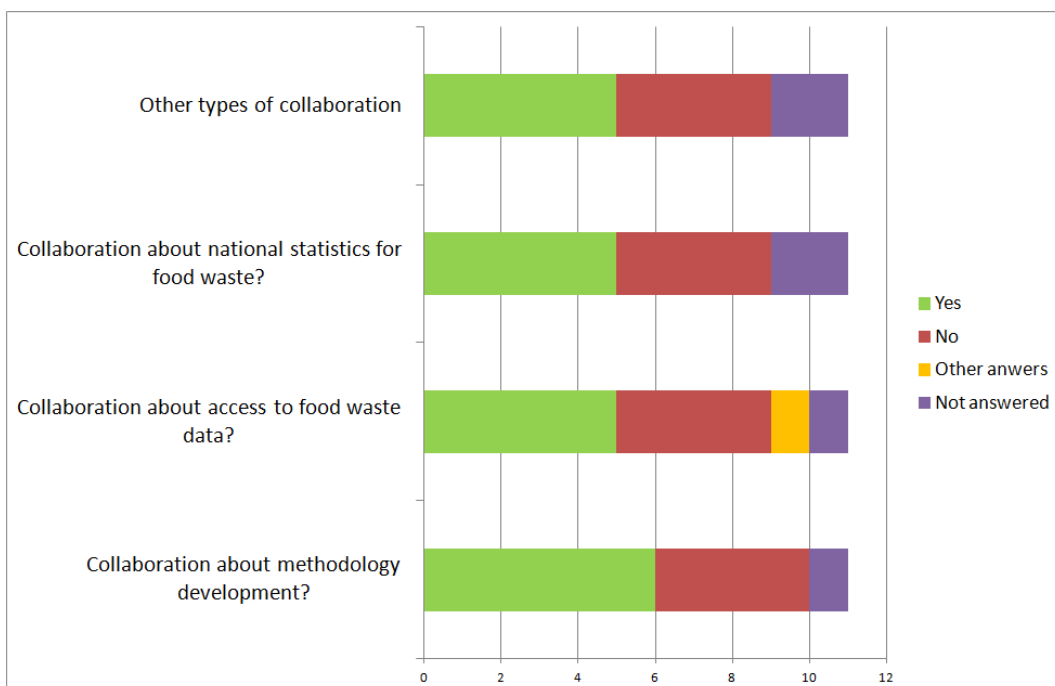


Figure 8 Subjects for plans for collaborations between FUSIONS partners and national waste statistics organisations

## 6.6 Evaluations of the present Eurostat system based in available documents and own considerations

One important aim of the FUSIONS project is to contribute to better methodologies and data for food waste, both on a national level and in the EU27 area. A good understanding of the present system and

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methodologies for waste statistics, as well as for food waste specifically is thus important as a basis for Work Package 1 in the project.

This evaluation of the Eurostat system has shown that there are some formal and methodological elements that make it difficult to use for generating food waste statistics. First, there are no common methodologies prescribed for gathering waste data nationally, and Eurostat does not have the authority to define one common methodology for gathering data or for up-scaling data from a sample of waste generating units to national statistics. The consequence is that each country chooses its own methods and that national waste figures (total and per capita) should be compared with a bit of caution, keeping in mind that differences in methods will cause differences in final data. FUSIONS cannot do anything with this lack of authority to define “best practice methodologies” to be used in all European countries, but we can hopefully make such methods available to be chosen by as many countries as possible (see chapter 8.1).

Second, the waste categories defined in EWC-Stat and used at present to report national and EU27 statistics are on an aggregated level, making it difficult to sort out relevant food waste as such as well as different categories of food waste. This is very clearly presented by Gonser (2012) in a presentation for the Eurostat Working Group meeting on Waste in March 2012. Both the EWC-Stat categories and the LoW categories serve as the basis for reporting from all types of economic sectors, in addition to household wastes for all types of waste generated at households:

- Animal waste of food preparation and products (Non-hazardous)
- Mixed waste of food preparation and products (Non-hazardous)
- Green waste
- Vegetal waste of food preparation and products.

Those categories contain various amounts of waste that are not directly related to the food sector and food waste (see Gonser 2012). To cover food waste, it is thus necessary to make the categorization more detailed in national statistics, and to distinguish clearly between different subcategories of food waste. It should be possible to differentiate between finished food products and waste from food preparation, like resources and raw materials that have the potential to be eaten by humans. As most food waste seems to be generated in households, as shown by many studies (WRAP, BIOIS, Gonser 2012, Hanssen & Schakenda 2011, Jensen et al. 2012), it should also be possible to separate data for food waste from waste that is generally categorized as “household waste” in EWC-Stat 10.1. As household waste is a mix of all types of waste, it is impossible to know how much of that category is actually food waste.

National data gathering and reporting of waste statistics must be connected to different economic sectors in accordance with the NACE2 classification, as described in chapter 5.4. The categories for primary production, manufacturing, food service and retail are easy to connect to the food chain, which is the basis for the FUSIONS project. For primary production, the NACE categories that are used also contain large economic sectors that are not related to the food sector, especially the forestry sector. In up-scaling from smaller samples of units to economic sectors, it is thus important to exclude those subsectors that are not producing food, and which thus should not be part of the up-scaling.

Thomas & Jordan (2002) described the problems with waste from households, which was earlier classified as “Municipal waste” in the EWC-Stat system, as this consists of waste from many other sources than households. Changing from “municipal waste” to “household waste” is thus a good approach to distinguish more clearly between waste from households and from economic sectors with similar waste types. However, in many countries this might still be difficult, because waste from households and waste from small retail and food service companies, markets etc. are collected by the municipalities, and not reported in the right NACE-categories.

Import and export of waste is at present not taken into consideration in waste statistics, and this is also the case for food products that are exported or imported. If food waste statistics from primary production and the manufacturing sector shall be directly comparable between countries, it might be necessary to correct for waste from production for export and waste from production of food used nationally. Member states with large food exports (vegetables from Spain, cheese from France, meat from Denmark, fish

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from Norway) will otherwise show very high amounts of food waste from primary production and manufacturing, both in total and per capita. Another solution is to develop indicators for food waste per ton of production of food in each country. Those questions should be further addressed in the development of methodologies and indicators for food waste statistics in the FUSIONS project.

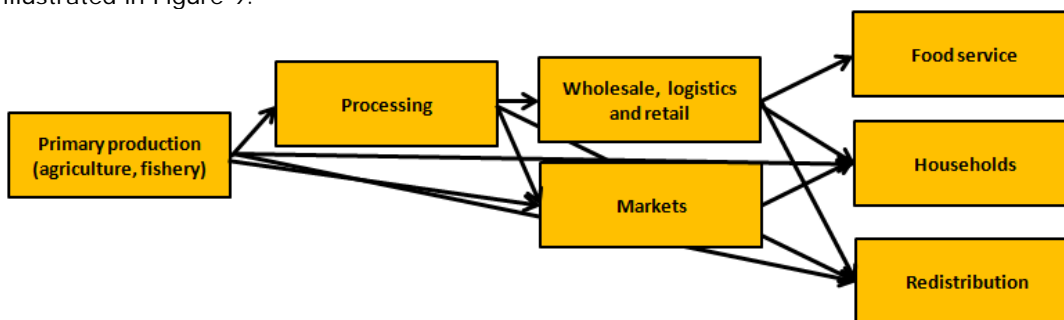
Access to better data for food waste is the main aim of the plug-in studies that will be carried out in some member states in 2013-14, to be reported in parallel with the general statistics in June 2014. The system that is described so far seem not to remove all problems with the existing system to get more detailed data on food waste. A common methodology has still not been developed for use by participating member states in data gathering, and there is not either a detailed classification system for food waste categories within EWC-Stat and LoW available (especially important for household waste). Few countries seem so far to have decided to participate in the plug-in, which probably also reflects that they have no plans to change their national systems for waste statistics to make food waste more visible in the statistics (see Chapter 6.3).

*To summarize, there is still a way to go to improve the methodological basis for collection of data and up-scaling of data from smaller samples to national figures, to have sufficiently detailed and relevant waste categories for reporting waste data, and to use NACE categories that do not include economic sectors that have nothing to do with the food chain.*

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# 7 Basic elements in the FUSIONS approach

Through the FUSIONS project, both definitions of food waste and waste as well as system boundaries are under development. An internal report has been developed (D1.1 Main definitional choices for the food and drink waste produced within Europe) as input to external consultations, and will be an important basis for further collaboration between FUSIONS and Eurostat in the next years. Based on a literature review a systematic concept on how to address food waste has been suggested as well as a definition to be further discussed and decided upon. The suggested definition is framed in the context of a mass balance approach. This document also describes the system boundaries of the food system with clear starting points and end points. Principal starting points for grown crops and bred animals occur when crops are mature for harvest and animals ready for slaughter and for wild crops and animals by the point where crops are harvested and animals are caught/killed. The end point of the food supply chain is defined by when food is consumed or removed from the food supply chain before consumption as illustrated in Figure 9.



**Figure 9 Principle structure of the food chain as it is defined in relation to the FUSIONS system boundaries and methodological review**

Based on the structure above, it should be quite possible to find relationships between the activities as defined in the FUSIONS project and the NACE categories as defined in the Eurostat methodology (Chapter 5.4).

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# 8 Relationship between the FUSIONS project and Eurostat waste statistics development

## 8.1 How the FUSIONS project can contribute to improved statistics for food waste in EU27

Based on the objectives of the FUSIONS project and especially the reports from Work Package 1, we foresee that the project can make a significant contribution to improving the basis for collecting data on food waste on a voluntary basis, alongside the formal requirements imposed by the EU taking its starting point in the present EU statistics in the food waste area. Three important areas in which FUSIONS should collaborate directly with Eurostat and national representatives in order to contribute are:

- Development of “Best practice methodologies” for collection of data from different parts of the food chain, and for up-scaling to branch statistics or national statistics, based on a comprehensive literature review.
- Development of indicators for food waste statistics on a national level, to make data as comparable as possible between countries.
- Gathering of data in member states that are partners in the FUSIONS project and making those available as a basis for national food waste statistics.

As there are well established connections between FUSIONS partners and national waste statistics representatives in 6 of 11 cases, there should be good potential for such collaboration, although there are only plans for data gathering in 4 of 11 cases (Chapter 6.3).

Some ideas for how the work can be organized and focused are presented in the next three chapters.

## 8.2 Methodological basis

WP1 in FUSIONS is in the middle of its work to review available methodologies for data gathering and up-scaling of data to sector figures and national figures, with a deadline for delivery of the Review Report on 30 September 2013. Based on this report, the WP1 partners will develop “Best practice” guidelines for methodologies to be used further in the project for data gathering and up-scaling. National offices reporting to Eurostat can have access to the Review Report as a basis for their national work with development of food waste statistics.

Methodologies for data gathering will focus on how to collect data from different parts of the food chain, which will be quite different when moving from primary production and food manufacturing for which it is normally quite easy to focus on specific product groups, to retail and warehouses where all types of products are mixed together, to the hospitality sector with its large kitchens and households, where all types of products and large amounts of left-overs from the kitchen are mixed together, and where food waste is also mixed with other types of waste. Methodologies thus have to focus on how to develop mass fractions of food waste in relation to the mass of total waste from a sample of units, which can give representative average values for each sector and part of the food chain. Those figures should be possible to further break down into subcategories of food waste on level 2 and 3, for use by the industry, branch organizations, environmental authorities and research organizations. In many cases, the food waste is also broken down by a number of food products, like fresh bakery, fruits and vegetables, meat, fish, dairy products etc. (e.g. Lee & Willis 2010, Hanssen & Schakenda 2011, Stenmarck et al. 2011, Gustavsson et al. 2011, Silvennoinen et al. 2012). To relate such food waste figures to the EWC-Stat and LoW categories for Eurostat reporting, it is also necessary to develop representative fractions for the



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different NACE categories in relation to the categories that are relevant for food waste (9.11, 9.12, 9.21, 9.22 and 10.1). Such mass fraction figures will have to be updated within certain time periods, to catch up changes in compositions and mass of food waste. This will be discussed further in development of the best practice methodology report to be delivered in January 2014.

In developing a system for collecting national data on a more detailed level it could be a good approach to develop a system similar to the IPCC GHG emission factors for waste treatment, with three Tier levels:

- Tier 1: To estimate the total amount of national food waste based on average European food waste fractions. In this approach, each country would use its own national statistics for total waste within each EWC Stat/LoW category, in combination with average European data for fractions of food waste.
- Tier 2: To estimate the amount of national food waste on a more detailed level, where each country has specific national food waste fraction data combined with total waste data within each EWC Stat/LoW category. In this approach, each member state can also separate statistics into different subcategories of food waste.
- Tier 3: In this case, specific data on amounts of food waste are available from each different sector nationally, and can be aggregated to national figures from sector-specific data on food waste (primary production, manufacturing, retail and wholesale, food service, households). This approach should also distinguish between the different subcategories mentioned under Tier 2.

As discussed in Chapter 6.5, the FUSIONS project should be able to develop national figures for food waste fractions for countries that participate in FUSIONS, and with this as a basis, European average fractions.

## 8.3 Basis for national and European statistics for food waste

Based on the methodological framework described in Chapter 8.2, the FUSIONS project shall develop overview of status and trends in food waste amounts in the partner countries represented in the project, as well as estimates for the amounts in EU27 (FUSIONS Project plan 02.08 2012). Data collection will be supported by all FUSIONS partners through Work Packages T1.6 and T1.7. The collected data will be used to present an estimate of amounts and trends in food waste produced in EU27, using the framework developed in Work Packages T1.1 and T1.4. To assess current EU27 food waste amounts and to achieve a pan-European approach, the whole FUSIONS consortium will participate in collecting national and regional data on food waste.

## 8.4 Indicators for food waste – methodological basis and cases

Relevant indicators to be used in food waste surveys nationally as well as internationally will be reviewed and evaluated through FUSIONS WP1 – Tasks 1.2. This work will be based in available literature on food waste indicators as well as more general literature on the subject. Indicators used by Eurostat and member countries on food waste will be one important element in this work, as well as input from other important stakeholders.

Indicators can be used for at least three main purposes in relation to food waste studies, with quite different requirements to methodological basis for the indicators:

- I. Surveys to identify where in the food chain, from which types of activities and product groups, most food waste is generated.
- II. Time series studies, to identify trends in food waste over time and to study potential effects of policies and regulations from governments or programs developed by business organizations and companies to reduce food waste.

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- III. Benchmarking studies between nations or sectors within a nation or between nations, to compare status and trends in food waste.

The importance of a common methodological framework for quantification and characterization of food waste, including well-defined categories for classification of waste and economic sectors, increases from level I to III. This will be an important area for the work in FUSIONS in developing and testing of methodologies, which also should be of great value for the Eurostat plug-in project. It is thus important to maintain close collaboration between Eurostat and FUSIONS partners, both on a European level as well as at a national level, in the months and years to come.

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## Review of EUROSTATs reporting method and statistics

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