Waste Prevention
Overview on Indicators

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In association with
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INTRODUCTION

THE PROJECT

Following the revision of the Waste Framework Directive, the European Commission is preparing guidelines for Member States to assist them in the creation of their waste prevention programmes. DG Environment commissioned BIO Intelligence Service and its partners, Copenhagen Resource Institute and the Regional Environmental Center for this study, consisting of the selection of best practices, the preparation of waste prevention guidelines and the development of waste prevention indicators.

The study calls for the selection and assessment of the most commonly used indicators and the proposal of core elements for three waste prevention indicators on household, construction and demolition (C&D) and biodegradable waste.

- Benefits and drawbacks will be discussed thoroughly
- Estimation of costs of data collection and reporting
- Assessment of need for additional substantial research
- Reasonable estimate of time and effort necessary needed to solve research problems

A stakeholder consultation was integral to the study, and phase one of the consultation called for proposals on best practices in waste prevention. Phase two of the consultation was directed at experts in waste prevention and indicator development and involved the environment ministries of the EU Member States.

APPROACH

After a more general introduction on waste prevention indicators, the individual chapters on indicators on household waste, biodegradable waste and construction and demolition waste prevention will follow the same structure. For each waste stream there is an evaluation against the RACER criteria of the three most commonly used indicators in Member States. At each waste stream a short narrative is provided further to allocated numerical scores to each of the subcriterion within each of the five main RACER criteria.

In general the most commonly used indicators can be characterized as the best available indicators: this means that although sometimes these are not directly related to waste prevention, but due to lack of data or resources to conduct surveys these indicators are used.
This evaluation is followed by a suggestion of a basket of core elements that can be used to create best needed indicators: these are indicators based on a more academic approach that better suited to answer policy questions on waste prevention.

Three core elements are selected from the previous basket with the intention of combining characteristics of best needed and best available data and indicators. The aim was to the extent possible to select those core elements that can be supported by data that is already subject to European and national reporting in order to minimize initial resource demand for creating new waste prevention indicators that also better fit scientific requirements.

An important element of our approach is to put emphasis on the importance of resource use and resource intensity. Waste is an output from activities that first imply use of resources. Thus, sometimes measuring inputs and outputs together provide a more clear picture.
1. BACKGROUND ON INDICATORS

A widely recognised rule in environmental policy is that “what does not get measured does not get managed”. Developing indicators is therefore essential in tracking progress on objectives and targets and to evaluate the efficacy of waste prevention policies.

However, past experience in EU countries has shown that difficulties in measuring waste prevention using reliable indicators have limited the efficacy of waste prevention measures. This is often the result of the inherent difficulty in measuring ‘prevented’ waste, as opposed to measuring waste recycled or waste sent to landfill. Addressing the different environmental impacts associated with the quantity of waste (e.g. tonnage) in certain waste streams presents another problem.

1.1 MAIN GOALS OF WASTE PREVENTION INDICATORS

Indicators for waste prevention allow public authorities and businesses to:

- identify the priority waste streams to be tackled
- monitor the degree to which policy objectives are achieved

A waste prevention indicator should demonstrate whether certain activities (e.g. food consumption, housing construction activities) are improving over a period of time in terms of material and waste intensity throughout their lifecycle. More than one indicator is often necessary to monitor an objective.

Waste prevention indicators should support national waste prevention benchmarking processes according to the requirements of the Waste Framework Directive allowing to measure performance in a systematic process compared to a desired reference or target.

1.2 CURRENT SITUATION

Waste prevention indicators are in demand but widely accepted models do not yet exist on an international scale. There are however increasing initiatives on a local and sometimes national level, targeting different waste streams and using a variety of methodologies. Usually tonnage of waste generated, waste recycled and waste sent to landfill per person or household per year, as well as GDP, provide an initial base for analysis.

If quantitative targets are included in the policy objective, the indicator is often defined at the same time. If quantitative targets cannot be defined or if they need to be made more precise, indicators,
showing whether the qualitative and quantitative objectives are met, are important to monitor progress in the adopted waste plan.

Note that changes in the annual generation of waste can be caused by a wide range of factors, including changes in population size and GDP and therefore reductions cannot be automatically attributed to waste prevention activities.

1.3 PRINCIPLES FOR EFFECTIVE INDICATORS

Effective indicators should focus on clearly defined waste streams and will use an accepted protocol for waste measurement. The indicators designed for monitoring progress should, to the extent possible fulfil the RACER criteria. It is an evaluation framework applied to assess scientific tools for policymaking. It stands for:

- Relevant (when considering the objective which is to measure waste prevention results);
- Accepted (in particular by targeted stakeholders such as academia and policy-makers);
- Credible (transparency and the confidence that the users and stakeholders place in the indicator);
- Easy (in terms of quantification and follow-up over time with regard to data availability issues and in terms of communication towards the targeted group);
- Robust (data quality, scope and representativeness).

This evaluation framework is applied to assess the most common indicators on household waste, biodegradable waste, construction and demolition waste.

1.4 TYPOLOGY FOR WASTE PREVENTION INDICATORS

The Organisation for Economic Co-operation and Development (OECD) has been addressing the issue since 2000 and delineates three types of indicators constituting the ‘Pressure-State-Response’ model:

- **Pressure indicators**, including MFA indicators ‘total waste generation’ and ‘direct material input’ and relative pressures revealed by plotting GDP or population against waste generation
- **State indicators**, measuring the change in the impact of waste on environmental factors such as air, water or soil quality
- **Response indicators**, measuring the impact of introduced programmes or policies on waste generation

Furthermore, indicators by nature can be:
• **Descriptive indicators**, describing the development of a variable over time if presented on an absolute scale. These are typically state pressure or impact indicators.

• **Performance indicators**, often demonstrating the distance to the target. These are typically state, pressure or impact indicators clearly linked to policy responses; for example, an indicator measuring the amount of bio waste landfilled compared to a base year or a diversion target.

• **Efficiency indicators**, relating drivers to pressures. These provide insight into the efficiency of products and processes in terms of resources, emissions and waste per unit output.

• **Policy effectiveness indicators**, relating the actual change of environmental variables to policy efforts; as such, they are a link between response indicators on one hand, and state, pressure or impact indicators on the other.

Indicators can be defined with **different geographical scope** (i.e. local, regional or national level). Although the main scope of this paper is to present indicators for the national level that can be applied for EU level comparison of Member States, many of the suggested indicators are applicable at the local or regional levels as well.
2 INDICATORS USED IN EU MEMBER STATES

2.1 SYNTHESIS OF CURRENTLY USED INDICATORS

At present, the most commonly used waste prevention indicators are descriptive pressure indicators or efficiency indicators. There are widely applied policy effectiveness response indicators as well, but the most common indicators are from the previous type.

To assess which indicators are currently being employed in the EU, a targeted questionnaire on was sent to experts in waste prevention and indicator development and to the environment ministries of the EU Member States. The inputs given by these experts show that some of the indicators are direct indicators on pressures, since the indicators are related to amount of (preferably less) generated waste. Other indicators are more indirect combining pressures and drivers, in that the waste is related to the consumption of certain types of products, which are assumed to generate less waste or less hazardous waste. Other indirect indicators are related to how the wastes are treated, especially, how much waste is landfilled, which means that the resources in the waste are not used.

Indicators for waste prevention currently in use in the EU are substantially different in nature, but the most common indicators share some common characteristics. Most of the indicators are defined at or related to the national level and address household waste and similar waste from other sources, such as municipal solid waste (MSW).

Furthermore, waste generation from households or municipal waste is related to economic development, demonstrated by factors such as household consumption. It seems that this relation to the economic level is taken into account on an aggregated level.

Many indicators are response or policy effectiveness indicators that are related to the actual behaviour of people, for example, the use of home composting, buying of specific products, the use of ‘no junk mail’ stickers etc.

Some of the used indicators are linked to the actual treatment of waste, for example, how much construction and demolition waste is landfilled. Most indicators are related to waste intensity, but a few indicators are related to material intensity in the production or consumption of materials and goods.

It must be emphasized, that the most commonly used indicators address the quantity and not the quality (hazardousness) and the environmental impacts of waste arisings and impacts of prevention.
2.2 LIST OF CURRENTLY USED INDICATORS

Based on these inputs from the authorities in Austria, Finland, Flanders, Scotland and DEFRA (UK), Slovenia, and Angers Loire Metropol in France and desktop research for other waste prevention indicators, the following indicators have been identified (the order of this list does not represent any priority or preference of application):

1. The arising of all waste streams disaggregated to 17 major waste streams are followed every fifth year.

2. Direct material input (DMI), which is the amount of materials extracted domestically from nature plus the amount of material imported. It shows the amount of material required for domestic consumption and for export products. This indicator is shown for 4 material classes: metals, biomaterials, minerals (other than ore) and fossils.

3. Raw material extraction avoided. Users of business resource efficiency services provided by the Government are asked to estimate the annual tonnage of raw material saved as a result of the waste minimisation measures they have undertaken with Government support.

4. Different waste indicators on households such as:
   - Amount of waste produced per head (kg/head/year)
   - Growth/falls in household waste arisings
   - Municipal waste generation
   - Household waste generation
   - Household waste generation per household
   - Household waste generation per capita
   - Household waste generation versus consumption
   - Residual household waste per household (local) or per head (national). The amount of household waste that is not sent for reuse, recycling or composting.

5. The amount of press copies.

6. The number of households/people who compost at home and the quality of the compost.

7. The amount (%) of reusable household packaging compared to the total amount of household packaging.

8. Total amount (euro) of assets bought with the purpose to re-use them per capita.

9. The monitoring of the following categories of ecological products (for citizen-consumers):
   - Products with a European Ecolabel;
   - Water-based paints and varnishes;
   - Other ecological cleaning products (other than those with an Ecolabel);
   - Low-energy lamps (energy-saving lamps, TL lamps, LEDs);
   - Low-energy white goods (low-energy refrigerators, freezers, dishwashers, washers and dryers).

7. The number of stickers against free publicity that are used.
8. The amount of re-used goods sold.
9. The number of one way beverages calculated per litre.
10. The amount of packages per consumed unit.
11. The number of free publicity folders, printed in one year.
12. Benchmarking compares the amounts of waste generated by an individual company with the average of the companies in the same line of business or with similar types of property.
13. Habits, attitudes and awareness of the citizens concerning waste prevention including number of sensitized pupils / students on waste reduction and number of events (animations, actions of sensitization on waste reduction), responses from teachers and heads of educational institutions and the employees of the public health care sector. The utilisation and the impact of the teaching materials were monitored by opinion polls via a postal questionnaire to the teachers and students of educational institutions. Surveys regarding the use and knowledge of certain Smart Ways of Action –models were made among grocery shops, construction firms, educational institutions and day-care centres.
14. The impacts of the household campaigns on the inhabitants studied by an annual Gallup poll. 1000 randomly chosen inhabitants are being contacted yearly.
18. Stop of growth in the amount of municipal waste produced by, for example, 2010
20. Estimated tonnage reductions resulting from 20 action such as sustainable design; product lifespans; food waste; packaging; purchasing decisions; plastic/paper bags; unwanted mail; home composting; nappies; reuse; community composting; increase waste prevention projects; guidance on bin sizes/frequency;
21. Measures with tonnage reduction targets articulated:
   - home composting XXXX tonnes by 2010/11
   - unwanted mail YYYY tonnes by 2010/11
   - food ZZZZ tonnes by 2010/11
   - packaging waste absolute reduction by 2010 amongst companies signed up to a voluntary scheme for retailers
   - construction and demolition waste target to halve tonnage to landfill by 2012. This will be achieved through a combination of prevention and recycling
22. Other measures where a tonnage prevention target is not specified but which could generate indicators if adopted:
   - encouraging the use of site waste management plans by developers
   - using the pollution licensing system to promote waste prevention
   - encouraging waste prevention through the Eco Schools programme
   - encouraging tertiary education institutions to develop waste prevention plans
• setting targets for re-use and repair
• establishing a network of accredited centres for re-use and repair
• training people in standards for re-use and repair

23. Construction and demolition disposed at landfills
24. Organic kitchen waste or biodegradable waste disposed at landfills
3 INDICATORS ON HOUSEHOLD WASTE

3.1 CONTEXT

Household waste is generated by the domestic activities of households and is made up of two main components: Waste from daily or routine activities in households, such as paper, food and packaging waste, and waste from intermittent activities, for example, disposal of clothing, furniture, white goods, computers and garden waste.

The wastes from daily activity are collected daily, every week or every two weeks, and they are either collected separately (glass, paper, cardboard, plastic, metal and food waste) or as mixed waste. The wastes from intermittent activities are normally only collected every two weeks, every month or quarter, and are collected separately as garden waste and waste electrical and electronic equipment (WEEE) or as bulky waste including different larger waste items from the households.

The waste types generated by households are often also generated by other sources. In this case the term “municipal waste” is used. This covers waste from households as well as other waste which, because of its nature or composition, is similar to waste from households. It is very important for a waste prevention indicator for household waste to clearly define whether the data include waste from households only, or also similar waste from other sources. Household waste accounts for approximately 7% of all waste generated in the EU, whereas municipal waste is 8% of all waste generated in the EU.

Generation of waste from households includes only the waste that actually leaves the households’ property. Garden waste or food waste composted at home is not collected, which means that in practice this waste generation is not registered and does not contribute to the waste load at landfill. In this way home composting is regarded as waste prevention.

Furthermore, Article 5 of the Waste Framework Directive outlines that a substance may be regarded as by-product if the further use of the substance or object is certain and it can be used directly without further processing other than normal industrial practice. This can be translated to normal household activities, and thus home composting can be understood as further use of a by-product from the household.
3.2 COMMONLY USED INDICATORS

The most commonly used indicators on household waste prevention are usually calculated from the following data:

- Amount of municipal (MSW) or household waste (HW) generated is used as primary data on waste arisings. This is subject to regular national and European reporting obligations
- Population for calculating numbers per capita
- Gross Domestic Product (GDP)

These latter variables – also subject to regular national and European level socio-economic statistical data collection – are applied as references in terms of drivers of waste arisings driven by the size of population and the economy.

Based on these primary data the three most commonly used indicators on household waste prevention applied in several Member States are:

1. Total generation of household waste or municipal solid waste (MSW);
2. Total generation of household waste or municipal solid waste (MSW) per GDP;
3. Total generation of household waste or municipal solid waste (MSW) per capita or per number of households.

All the indicators generated from these elements refer to main drivers and actual aggregated trends, but not to policy responses directly. Apparently, these indicators are based on data which are subject to regular reporting and are the best available indicators. However, their relevance to waste prevention could be more direct, and the acceptance is often lower by academic stakeholders.

In a RACER evaluation framework, the three most common indicators can be characterized as follows. Range of scores was between 0 (criterion is not fulfilled) and 4 (criterion is fully fulfilled).
## Evaluation of the Most Commonly Used Waste Prevention Indicators on Household Waste

<table>
<thead>
<tr>
<th>Indicator</th>
<th>HW or MSW per CAPITA</th>
<th>HW or MSW per GDP</th>
<th>Total HW or MSW generated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relevant</strong></td>
<td>Policy targets are often defined in terms of HW or MSW per CAPITA</td>
<td>Represents waste generation in relation to economic activity of the country</td>
<td>Represents total amount regardless of population and economic activity</td>
</tr>
<tr>
<td></td>
<td>Represents figures at highly aggregated level, but data can be used at regional level as well</td>
<td>Relative decoupling of waste generation from the volume of economy does not necessary correspond to waste reduction</td>
<td>More relevant to direct pressures on the environment</td>
</tr>
<tr>
<td></td>
<td>Does not measure environmental impacts</td>
<td>Represents figures at highly aggregated level, but data can be used at regional level as well</td>
<td>Does not measure environmental impacts</td>
</tr>
<tr>
<td><strong>Accepted</strong></td>
<td>Widely accepted</td>
<td>Widely accepted by policymakers, but often questioned by academia</td>
<td>Widely used and accepted aggregated indicator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Structure of economy (service-intensity) highly influences GDP</td>
<td></td>
</tr>
<tr>
<td><strong>Credible</strong></td>
<td>Both variables of the indicators are based on relatively credible data</td>
<td>GDP does not relate to direct household consumption nor takes into account hidden household consumption (from black and gray markets)</td>
<td>Relatively transparent data collection, but there are differences between Member States in statistical data collection methods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HW does not take into account waste from consumption outside the household (e.g. restaurant waste). This is however covered by MSW</td>
<td></td>
</tr>
<tr>
<td><strong>Easy</strong></td>
<td>Data availability is good, periodic updates are available</td>
<td>Data availability is good, periodic updates are available</td>
<td>Data availability is fairly good Reporting obligation to Eurostat</td>
</tr>
<tr>
<td><strong>Robust</strong></td>
<td>Data on population is robust, but less reliable on MSW</td>
<td>Data on GDP is biased by lack of coverage of gray and black markets, data on MSW is less comparable due to methodological differences between Member States</td>
<td>Amount of garden waste collected highly influences Eurostat provides guidelines</td>
</tr>
</tbody>
</table>

**Average non-weighted score**

- HW or MSW per CAPITA: 3.2
- HW or MSW per GDP: 2.4
- Total HW or MSW generated: 2.6
3.3 CORE ELEMENTS AND PROPOSED WASTE PREVENTION INDICATORS

A household waste prevention indicator should demonstrate whether certain household activities (e.g. consumption of food or durable goods at households) are improving in terms of material/waste intensity.

3.3.1 CONSUMPTION AND WASTE VARIABLES

The higher the consumption of goods per capita, the higher the waste generation or material intensity must be expected. However, household consumption of goods (and other consumption categories) is normally only measured in monetary value and not in value and tonnes. Therefore, the material intensity must be defined as a relation between economic value and generated waste in tonnes.

Furthermore, increase in disposable household income results in a non-linear growth in the consumption different goods and services (EEA, 2007): while there is little difference in spending on food and non-alcoholic beverages, higher income usually leads to increased household spending on clothing and footwear and recreation, culture, restaurants and hotels.

In general, current EU waste data reporting requirements specify only that waste data be reported in tonnes. Therefore, most of the material intensity can only be documented in tonnes and not in pressures or impacts as such.

However, it has to be underlined that, even if the material and waste intensity in tonnes are being reduced according to reported data, this can still result in increasing pressures and impacts on the environment. This can occur if the declining material or waste intensity does not reflect a real decline in consumption, but a shift towards using a lighter material, which has a higher environmental burden, for example measured as CO₂ emission, per kg material used.

In many countries with a high per capita generation of household or municipal waste, an increasing amount of the waste collected is garden waste (ETC/SCP, 2009). It can be argued that generation of garden waste depends less on consumption and more on weather conditions, notably dry or oceanic climate. In addition, the increased amounts collected do not necessarily reflect an increased generation of garden waste, but more that collection schemes have been introduced. Therefore, if possible, it could be relevant to exclude garden waste from the final figures for household waste or municipal waste generation.

Apart from including the total waste generation of households, regardless of how the waste is treated, the material and waste intensity can also be indicated by relating the consumption of goods
to the amount of generated household waste, where the resources in waste are not used. Even if it is not a direct waste prevention indicator, that is to say:

- The amount of household waste landfilled; this expresses a loss of the resources in the waste, since the waste undergoes neither material recovery nor energy recovery.
- A special variant of this indicator could be to relate the consumption of household goods to the amount of household waste that is not direct material recycled. That is to say, to relate the household consumption to the amount of mixed waste sent to disposal or incineration or mechanical biological treatment. Mechanical Biological treatment seldom results in significant recycling, but does provide high caloric products for power stations or cement kilns, residual waste for dedicated incinerators, while the residual is landfilled.

### 3.3.2 SOCIO-ECONOMIC VARIABLES

The material/waste intensity must also be assumed to be dependent on certain socio-economic variables. Number of population (per capita) is normally used, but since the indicator is related to generation of waste of households, the number of households is probably a better variable to include. The larger size of households, the less waste is generated per capita.

However, recent studies have been made of the relationship between municipal waste generation over the last the 10 years and different household-related variables. These studies conclude that at EU level household-related variables like size, age, population density or share of urban population provide some useful hints for waste management, but they do not seem to have a great influence (Mazzanti and Zoboli, 2008). The study underlines that in the old EU Member States there is a more positive correlation with the hypotheses that the larger size of households, the less waste is generated per capita.

It is also important to bear in mind that the study focuses on municipal waste and not on waste from households. The same study, but in agreement with other studies, have underlined that the number of single households is a very strong driver of the amount household waste generation. The greater percentage of single households, the stronger the waste generation is per capita of household waste.

### 3.3.3 PROPOSALS ON CORE ELEMENTS

Based on the above discussed considerations the following basket of core elements can be included:

- The household consumption or relevant parts of this consumption measured in Euros. The daily and intermittent activities of households can be related to private household consumption.
- The amount in tonnes of total waste generated by the households or certain parts of the waste generated by the households, or alternatively the amount of generated municipal waste.
- The number of total households and the number of single households.
- The behaviour and action of households regarding certain waste prevention activities.
Even if it is not related to waste prevention directly, the amount in tonnes of landfilled waste from households or the amount of waste from households not direct recycled can be relevant to include since it provides information on resources that are taken out of the economy.

A selection of three suggested core elements is presented under Section 3.3.5.

A more detailed assessment of data availability for different elements including the proposed core elements is presented under Section 3.4.

### 3.3.4 POTENTIAL INDICATORS BASED ON THE ABOVE PRESENTED CORE ELEMENTS

The previous basket of core elements can be used to create the following indicators, or combinations of those can be suggested:

#### POTENTIAL WASTE PREVENTION INDICATORS ON HOUSEHOLD WASTE

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<tbody>
<tr>
<td>Household expenditure type 1 (HE₁) in Euros/PPP (gr. 01-00,05,12)</td>
<td>WG/HE₁</td>
<td>WG-g/HE₁</td>
<td>TR/HE₁</td>
<td>WL/HE₁</td>
<td>noWR/HE₁</td>
</tr>
<tr>
<td>Household expenditure type 2 (HE₂) in Euros/PPP (gr. 01-00,05,9-12)</td>
<td>WG/HE₂</td>
<td>WG-g/HE₂</td>
<td>TR/HE₂</td>
<td>WL/HE₂</td>
<td>noWR/HE₂</td>
</tr>
<tr>
<td>Total Household expenditure HE₇</td>
<td>WG/HE₇</td>
<td>WG-g/HE₇</td>
<td>TR/HE₇</td>
<td>WL/HE₇</td>
<td>noWR/HE₇</td>
</tr>
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</thead>
<tbody>
<tr>
<td>Number of households(NH)</td>
<td>WG/NH</td>
<td>WG-g/ NH</td>
<td>TR/NH</td>
<td>WL/NH</td>
<td>noWR/NH</td>
</tr>
<tr>
<td>Percentage of single households (PSH)</td>
<td>WG/(100+PSH)</td>
<td>WG-g/100+PSH</td>
<td>TR/HE₃/NH</td>
<td>WL/HE₂/NH</td>
<td>noWR/HE₂/NH(100+PSH)</td>
</tr>
<tr>
<td>Proposed combinations</td>
<td>WG/HE₁/NH or WG/HE₁/(100+PSH)</td>
<td>WG/HE₂/NH or WG/HE₂/(100+PSH)</td>
<td>TR/HE₃/NH</td>
<td>WL/HE₂/NH or WL/HE₂/(100+PSH)</td>
<td>noWR/HE₂/NH or noWR/HE₂/(100+PSH)</td>
</tr>
</tbody>
</table>

**Notes**

More information on Household expenditure types and data sources is presented in the following sections. Yellow cells represent parameters that are not directly related to waste prevention but relevant and often measured. Green borders highlight indicators that are derived from the suggested 3 core elements (see below).
3.3.5 **Concrete Proposal for Three Core Elements**

As a first step, taking data availability and considerations combining *best available* and *best wanted* indicators, it is suggested to apply a combination of the following core elements in order to cover pressures in relation to drivers and measuring effects of policy responses as appropriate:

1. **The amount in tonnes of total waste generated (preferably without garden waste);**
2. **Household expenditures on selected consumption categories;**
3. **Number of total households and the number of single households.**

By using these three core elements it is possible to create several different indicators (marked with green borders in the table above) in order to monitor progress and make comparisons between different Member States.

These indicators will provide information on the **waste intensity of daily household activities** expressing whether the typical functions in a household are achieved with less waste generated and **if citizens (households) respond to different policy measures.**

Comparing the three most common indicators presented in Section 3.2 with the suggested basket of indicators, it is apparent that the currently used indicators represent the best available (most close-at-hand) relatively easy to produce indicators but only partially cover the scope of the suggested set of indicators.

### 3.4 Data Availability and Need for Further Research

Even though the quality of reported waste data has improved during the last decade, the rate of details is still limited. This implies that it can be difficult to document household waste prevention because the baseline for the calculation has yet to be well defined.

**Household expenditure for selected goods**

Eurostat divides private consumption into the following categories listed below. Not all of these activities generate waste, however, while some of the waste generated is not registered under households but under other sectors, for example, waste from restaurants and culture. Consumption is stated in value, for example, in Euros in 2000 prices.

- **CP01** Food and non-alcoholic beverages
- **CP02** Alcoholic beverages, tobacco and narcotics
- **CP03** Clothing and footwear
- **CP04** Housing, water, electricity, gas and other fuels
- **CP05** Furnishings, household equipment and routine maintenance of the house
- **CP06** Health
- **CP07** Transport
The following consumption categories will generate waste and that waste will be registered as waste from households:

- CP01 consumption of food and non-alcoholic beverages;
- CP02 alcoholic beverages, tobacco and narcotics;
- CP03 clothing and footwear;
- CP05 furnishings, household equipment and routine maintenance of the house;
- CP12 miscellaneous goods and services.

If household consumption is to be related to municipal waste rather than waste from households, it is reasonable to extend the consumption categories to include:

- CP09 Recreation and culture;
- CP10 Education Restaurants;
- CP11 hotels.

**The amount in tonnes of total waste generated**

The total amount of waste generated by households is reported to Eurostat every second year. Data exist from the years 2004 and 2006. The next series will cover 2008. The data that include all wastes generated by households can be found at:


If the amount of garden waste separately collected shall not be included, cf. the discussion above, this amount has to be provided by national statistics. The amount can not be extracted from Eurostat data, since the relevant waste category (Animal and vegetal wastes (excluding animal waste of food preparation and products; and animal faeces, urine and manure)) includes both garden waste and green kitchen waste.

If municipal waste is used in place of household waste, Eurostat’s, municipal waste data, reported every year as a structural indicator, can be used. Although reporting this data is voluntarily, all countries have done it for 2007. The reporting schedule is published at the websites of Eurostat:

http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/reporting
Number of total households and the number of single households

Number of households is reported to Eurostat annually and available at:

Number of single households is also reported to the Commission and available at:

Behaviour and action of households regarding certain waste prevention activities

Information on waste prevention behaviour and the actions of households is normally only available at national level or municipal level; the information is not reported to Eurostat. Therefore, behaviour indicators on waste prevention must be harmonised and agreed about on EU level before they can be used as a common indicator. The following behaviour indicators have been identified and could be relevant to include:

- How many households are using no-advertising stickers;
- How many have home composting;
- How many carry plastic bags have been sold by retailers;
- How many tonnes or units of electrical or electronic equipments have been re-used or repaired;
- How many tonnes of products or units have been exchanged through re-use stations/websites.

The WEEE Directive contains provisions for the optional reporting of the amount of re-used WEEE. There is not an obligation to provide this information, and only 7 Member States did report this information in 2006:

An alternative core element that might be relevant to include in waste prevention indicators is household behaviour. For example: how many households use no-advertising stickers; how many practice home composting; how many plastic bags have been sold by retailers; how many tonnes or units of electrical or electronic equipments have been re-used or repaired; how many tonnes of products or units have been exchanged through re-use stations/websites. All these elements show active participation from households and they imply reduced waste generation. However, some of these elements are difficult to account in national statistics or they are not equally plausible across EU countries. For example, home composting of organic kitchen waste is not possible or difficult for hygienic reasons in countries with either very low or very high temperatures. Still, it might be relevant to include these behaviour indicators.
Amount of landfilled waste from households/municipal waste or amount of waste not recycled

The data reported to Eurostat do not include information about how much waste from households is landfilled or how much waste is not recycled. If this amount is to be included in an indicator, it must be developed by each Member States. Some countries have already published information about the amount of household waste landfilled and the amount incinerated. If the amount that is not recycled shall also include mechanical biological treated waste, this amount must be registered separately by Member States.

It is important to emphasise that documenting the new recycling target set in Article 11 of the Waste Framework Directive 2008/98/EC (recycling of waste materials from households such as at least paper, metal, plastic and glass shall be a minimum overall 50% by weigh in 2020) will require either Member States reporting new data to Eurostat or very rough calculations based on the existing reported data. This can imply that information about recycling of waste from household will be available in the future.

The amount of municipal waste going to landfill can be found in the municipal waste indicator reported voluntarily to Eurostat each year. The amount of waste incinerated, including waste undergoing mechanical and biological treatment (MBT), is also reported to Eurostat. The data are available at [http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/wastemanagement/treatment](http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/wastemanagement/treatment).

Estimated time and costs of data collection

As presented in the previous sections, data needed for the core elements are already available in European statistics (except for garden waste) and are subject to regular reporting and thus no additional costs are required for data collection only for calculations based on the data reported.
4.1 CONTEXT

Biodegradable waste is defined in the Landfill Directive 1999/31/EC and means according to the Directive “any waste that is capable of undergoing anaerobic or aerobic decomposition such as food and garden waste, and paper and paperboard”. The definition comprises many types of wastes, for example, also the biogenic part of textile waste. The term bio-waste is defined in the Waste Framework Directive 2008/98/EC and the definition is more restrictive, since it only includes: “Biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants”. The quantity of biodegradable waste (excl. animal faeces, urine and manure) is at least 350 million tonnes based on a rough estimation of the data reported to Eurostat. Looking only at biodegradable municipal waste the amount is estimated to be between 130 to 155 million tones.

As discussed in the previous chapter in the context of household waste, the garden waste or food waste composted at home is not collected, which means that in practice this waste generation is not registered. In that way home composting is regarded as waste prevention or the use of by-products of from the household.

4.2 COMMONLY USED INDICATORS

The three most common indicators on biodegradable waste prevention are usually calculated from the following basic data as core elements:

1. **BMW landfilled per capita or per amount landfilled in 1995** (as defined in the Landfill Directive);

2. **Amount of biowaste composted at households or number of registered home composters**: in order to reduce waste going to landfill or incineration composting can be understood as a mean of waste prevention;

3. **Amount of food waste generated from households**: although this is part of the previous fraction, many countries monitor this waste stream independently.

In a RACER evaluation framework, the most common indicators can be characterized as follows. Range of scores was between 0 (criterion is not fulfilled) and 4 (criterion is fully fulfilled).
EVALUATION OF THE MOST COMMONLY USED WASTE PREVENTION INDICATORS ON BIODEGRADABLE WASTE

<table>
<thead>
<tr>
<th>Relevant</th>
<th>Home compost capacity</th>
<th>Food waste</th>
<th>BMW landfilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepted</td>
<td>Accepted in general, but widely debated if it is a “strict” waste prevention mean</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Credible</td>
<td>Difficult to ensure repeatability and continuous registration of home composters</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Easy</td>
<td>Data availability is currently poor in most countries</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Robust</td>
<td>Number of unregistered home composting (self-made composters) is very difficult to estimate</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Average score

2 | 2.8 | 2.8

The current situation with the most common indicators on biodegradable waste prevention is controversial. While the more accepted indicators on food waste and composting are short of reliable and credible data and indicators, the most robust indicator in terms of data quality has questionable acceptance by stakeholders and relevance to waste prevention.

A biodegradable waste prevention indicator should demonstrate whether the activities in the society regarding the production and consumption of biodegradable products are improving in terms of material and waste intensity through their life-cycle.

Biodegradable products and waste stemming from all activities in the economy seem very non-homogeneous. It implies it can be meaningless to include biodegradable products and wastes in the same waste prevention indicators. The differences are huge between, for example, 1) animal and vegetable food production, 2) wood industry producing wood and furniture and 3) garden waste. Therefore, it seems reasonable to split up or narrow the scope of the indicators chosen.

The most important performance figures that characterize the resource-efficiency and waste-intensity in a country are as follows.
4.3.1 BIODEGRADABLE AND FOOD PRODUCTS PRODUCED OR CONSUMED

A group of biodegradable goods such as food including (meat, bovine, pork, cheese, butter, milk, vegetables, cereals, bread etc.) can be taken into account as a core element.

The focus can be either or both on production and consumption of biodegradable products, thus taking imports and exports into account as well.

The challenge is first of all to select the relevant product groups, which can be related to waste outputs. If, for example, an indicator shall focus on food waste from private consumption, it is obvious to relate this to the production and consumption of food products. If the focus is on biodegradable furniture waste, the focus should be on production and consumption of furniture.

4.3.2 TOTAL AMOUNT OF BIODEGRADABLE WASTE OR BIOWASTE GENERATED

The total amount of biodegradable waste generated is a measure of material “outputs” from industry and households each year. However, parts of the amount and type of the biodegradable waste reflect the type of consumption that took place in a country a decade or decades before. The consumption of furniture, for example, will only be waste after normally at least 10 years.

The biodegradable part of the mixed ordinary waste or of the mixed household waste has to be defined, if the production and consumption of biodegradable products are to be related to the total amount of generated biodegradable waste. Therefore, each country will have to define how much biodegradable waste is included in the mixed waste.

4.3.3 AMOUNT OF BIODEGRADABLE WASTE LANDFILLED

Landfilling of biodegradable waste is waste of resources, since the waste is not used for generation of new materials like compost, paper or wood etc. or energy. Further, biodegradable waste landfilled generates methane. Therefore, an indicator on the amount of biodegradable landfilled is a useful indirect indicator of waste prevention.

The landfill Directive includes binding targets for how much municipal biodegradable waste is allowed to be landfilled. By 2016 maximum 35 percentage of the municipal biodegradable waste generated in 1995 is allowed to be landfilled.

Since Member States already have to document the fulfilling of the Landfill Directive, it would be easier for the Member States to develop such an indicator. However, if the indicator shall include all biodegradable waste and not only municipal biodegradable waste, it will require new data of Member States.
4.3.4 SOCIO-ECONOMIC PARAMETERS

The material and waste intensity of the biodegradable products and wastes can be related to one or some socio-economic parameters. These can be:

- Population;
- Number of households;
- The number of employees in wood industry enterprises;
- The number of employees in food industry.

In general, it seems most relevant to relate the consumption to the population figure, since the consumption of biodegradable products, apart from furniture made of wood or other biodegradable material, is directly related to the number of consumers (population).

4.3.5 PROPOSALS ON CORE ELEMENTS

Based on the above discussed considerations the following core elements can be included:

- Biodegradable waste generated (total or from selected sources);
- Food waste generated;
- Landfilling of biodegradable waste (total or municipal);
- Number of households and single households;
- Number of registered home composters;
- Number of employees in selected sectors.

A selection of three suggested core elements is presented under Section 4.3.7.

An assessment of data availability for different elements including the proposed core elements is discussed under Section 4.4.

4.3.6 POTENTIAL INDICATORS BASED ON THE ABOVE PRESENTED CORE ELEMENTS

Based on the previous basket of core elements, the following indicators, or combinations of those can be suggested:
### Potential Waste Prevention Indicators on Biodegradable Waste

#### Notes

- Yellow cells represent parameters that are not directly related to waste prevention but relevant and often measured.
- More information on the potential core elements and data sources is presented in the following sections.
- Gray cells left blank are non-suggested combinations.
- Green borders highlight indicators that are derived from the suggested 3 core elements (see below).

#### 4.3.7 Concrete Proposal for Three Core Elements

As a first step, taken data availability and considerations combining best available and best wanted indicators, it is suggested to apply a combination of the following core elements in order to cover pressures in relation to drivers and measuring effects of policy responses as appropriate:

1. Consumption of food products;
2. Generation of food waste (excluding food industry)/or generation of biodegradable waste from household;
3. Number of households and single households.
By using these three core elements it is possible to create several different indicators (marked by green in the table above) in order to monitor progress and make comparisons between different Member States.

These indicators will provide information on the **biowaste intensity of households** expressing whether the amount of food and biowaste from households are avoided by either buying less food that will be thrown out unused or that will be used for composting.

**4.4 DATA AVAILABILITY AND NEED FOR FURTHER RESEARCH**

**Biodegradable products produced or consumed**

If the focus is on the *consumption* of food, the consumption for all European countries in kg/capita/year for total meat, bovine, pork, cheese, butter, milk, vegetables, cereals, bread etc. can be found at FAOSTAT ([http://faostat.fao.org/site/610/default.aspx#ancor](http://faostat.fao.org/site/610/default.aspx#ancor)). However, the newest data currently are from 2003.

If the focus is on *production and consumption* of biodegradable products, Eurostat’s databases on production and import/export can be used to calculate the production and consumption per country related to different products groups. National production is classified according to NACE Rev.2 and can be found at Eurostat (Statistics on the production of manufactured goods (prom)) at:


Import and export data are not at the moment using the same product classification but it can be “translated”. The data can be found at [http://epp.eurostat.ec.europa.eu/newxtweb](http://epp.eurostat.ec.europa.eu/newxtweb).

The data in the two data bases are updated every year. The data are stated in euros in the production statistics and in euros, weight and units in the trade statistics. By using for each product group in the trade statistics the found ratio between euros, weight and units; it might be possible to transfer this value from the trade statistics into the production statistics and in that way calculate the weight. In principle, all biodegradable products will be covered by the above mentioned statistics.

**Total amount of biodegradable waste or biowaste generated**

The amount of total biodegradable waste in a country is in principle reported to Eurostat every second year. However, apart from the “clean” waste fractions such as, for example, wood, paper waste and animal and vegetal wastes (excluding animal waste of food preparation and products; and animal faeces, urine and manure), the reporting also include statistics on mixed ordinary wastes.

Further, the amount of collected garden waste can not be related to the production or the consumption data. Therefore it is useful if the amount of collected garden waste is stated separately. The **biodegradable waste data** reported to Eurostat can be found at [http://epp.eurostat.ec.europa.eu/portal/page/portal/environment/data/database](http://epp.eurostat.ec.europa.eu/portal/page/portal/environment/data/database).
Lately, there has been much focus on food waste, which is disposed. A study published by the UK WRAP shows that roughly one-third of the food bought in Britain each year, or 6.7 million tonnes, is thrown away. Of this waste 4.1 million tonnes are “avoidable”, i.e. it is food that is no longer wanted or it has been allowed to go past its best. It corresponds to 70 kilogram per capita. No reported data to Eurostat can provide information similar to the UK figure. If an indicator on food waste has to be developed, it will require additional surveys.

**Socio-economic parameters**


**Estimated time and costs of data collection**

As presented in the previous sections, most of the data for suggested core elements, including data on consumption of food products or other biodegradable products, number of households and single households are based on data which are already subject to regular reporting and thus no additional costs are required for data collection, but rather the compilation of existing data sets. However data on food waste are subject to local, regional or national data collection and currently are not reported to Eurostat. Many countries already conduct surveys to estimate food waste. Taking local and or national circumstances into account, Member States can estimate their costs by applying the Standard Cost Model. An exact description of the approach applied in Germany can be found in the German Federal Government’s Methodological Manual that was published by the Federal Statistical Office in August 2006 and available for download from [www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/EN/Content/Projekte/SKM/SkmHandbuchPdf,property=file.pdf](http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/EN/Content/Projekte/SKM/SkmHandbuchPdf,property=file.pdf).
5 INDICATORS ON CONSTRUCTION AND DEMOLITION WASTE

5.1 CONTEXT

Construction and demolition waste (C&D waste) is made up of two individual components: construction waste and demolition waste. It arises from activities such as the construction and refurbishment of buildings and civil infrastructure, total or partial demolition of buildings and civil infrastructure, road construction and maintenance. In some countries even materials from land levelling are regarded as construction and demolition waste. Quantity and content Construction and demolition waste makes up approximately 25% of all waste generated in the EU with a large proportion arising from the demolition and renovation of old buildings. It is made up of numerous materials including concrete, bricks, wood, glass, metals, plastic, solvents, asbestos and excavated soil, many of which can be recycled in one way or another.

5.2 COMMONLY USED INDICATORS

The three most common indicators on construction and demolition waste prevention widely used in EU Member States are:

1. Construction and demolition waste landfilled
2. Recycling of construction and demolition waste
3. Total generation of construction and demolition waste

These indicators illustrate the difficulties with measuring the amount of construction and demolition waste prevented. Although that total amount of C&D waste is an indicator of waste arisings of the present, but the quantity and materials of demolition waste is basically a reflection of past building and construction practice.

Currently it is not the amount of material used for creating functions (road surface, inhabitable floor space) is taken into account, but rather the end of life cycle of the materials. With this regard, the widely applied indicators on the amount of recycled and landfilled waste is a result of a traditional waste management and reporting practice.

In a RACER evaluation framework, the most common indicators can be characterized as follows. Range of scores was between 0 (criterion is not fulfilled) and 4 (criterion is fully fulfilled).
EVALUATION OF THE MOST COMMONLY USED WASTE PREVENTION INDICATORS ON CONSTRUCTION AND DEMOLITION WASTE

<table>
<thead>
<tr>
<th></th>
<th>Construction and demolition waste landfill</th>
<th>Recycling of construction and demolition waste</th>
<th>Total generation of construction and demolition waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevant</td>
<td>Not waste prevention itself, but directly linked with resource saving potential (and prevention of mining waste)</td>
<td>2 Not direct waste prevention but contributes to avoid extraction of virgin materials and landfilling of C&amp;D waste</td>
<td>3 Direct measurement of pressures arising from C&amp;D waste</td>
</tr>
<tr>
<td>Accepted</td>
<td>Not accepted as prevention indicator, but accepted measure of unsustainable use of construction materials</td>
<td>2 Accepted as important element and contribution to resource savings and waste prevention indirectly</td>
<td>3 Amount and hazardousness of demolition waste reflects earlier building activities and technology</td>
</tr>
<tr>
<td>Credible</td>
<td>Difficulties with estimations</td>
<td>2 Difficulties with estimations (on-site recycling)</td>
<td>2 Data reporting is to improved in several Member States</td>
</tr>
<tr>
<td>Easy</td>
<td>Data availability is currently poor in most countries</td>
<td>2 Data availability is currently poor in most countries</td>
<td>2 Data availability is currently poor in most countries</td>
</tr>
<tr>
<td>Robust</td>
<td>Accounting of soil excavated distorts numbers</td>
<td>2 Difficulties with measuring on-site recycling</td>
<td>2 Accounting of soil excavated distorts numbers</td>
</tr>
<tr>
<td></td>
<td>Unreliable data quality in several Member States</td>
<td></td>
<td>Unreliable data quality in several Member States</td>
</tr>
<tr>
<td>Average score</td>
<td>2</td>
<td>2.4</td>
<td>2.8</td>
</tr>
</tbody>
</table>

5.3 CORE ELEMENTS AND PROPOSAL FOR INDICATORS

5.3.1 RESOURCE AND WASTE STREAMS

Virgin construction material extracted

Although there are no exact figures, due to the proportionately high costs of transport, most countries cover the overwhelming majority of their need for construction materials from domestic sources. According to data available in Material Flow Accounts, the ratio of used/unused extracted construction material in the EU-27 countries varies between 80-99%. Figures on the domestic extraction of construction materials are therefore a good measure of the material use.

Total amount of C&D waste generated

The total amount of C&D waste generated is a measure of material “outputs” from the industry each year. However, parts of the amount and type of C&D waste reflect the type of constructions that
took place in a country decades before. For example, typically, roads are designed for a service time of 30 years, whereas buildings for about 50 years.

**Amount of C&D waste landfilled**

Since part of the C&D waste is recycled or reused, part of this typically on-site, the major environmental impacts of C&D waste is its landfilling, including the transportation to landfills. Furthermore, landfilled waste implies new virgin material extraction or offsetting of raw materials by recycling.

### 5.3.2 ECONOMIC AND PHYSICAL ACTIVITIES

One or more, a combination of the above listed elements should be **compared to certain economic and physical activities** (general economic performance, performance of the construction industry). These parameters can be the following:

**National economic activity**

Since Gross Domestic Product (GDP) usually correlates with the activity of the construction industry and GDP data and regularly updates are also available it can be used as a reference data on overall economic activities. However, due to great price differences between the EU countries, it should be considered to measure GDP weighted by purchasing power (PPP). Data on output of construction sector can provide information on the economic activity of the construction itself.

**Physical construction activity**

The net area of newly built houses and the length of newly built or upgraded roads would provide a better comparison on the actual resource/waste-intensity of construction activities by measuring resource use and waste arising against the actual new functions provided by the sector.

### 5.3.3 PROPOSALS ON CORE ELEMENTS

Based on the above discussed considerations the following core elements can be included:

- Domestic extraction of construction material;
- Gross Domestic Product;
- Output of construction sector;
- Total area of dwellings covered by new building permits;
- Construction and demolition waste generated;
- Construction and demolition waste recycled;
- Construction and demolition waste landfilled.

A selection of three suggested core elements is presented under Section 5.3.4. An assessment of data availability for different elements including the proposed core elements is discussed under Section 5.4.
5.3.4 POTENTIAL INDICATORS BASED ON THE ABOVE PRESENTED CORE ELEMENTS

Based on the previous basket of core elements, the following indicators, or combinations of those can be suggested:

POTENTIAL WASTE PREVENTION INDICATORS ON CONSTRUCTION AND DEMOLITION WASTE

<table>
<thead>
<tr>
<th></th>
<th>Domestic extraction (DE)</th>
<th>Construction and demolition waste generated (CDWG)</th>
<th>Construction and demolition waste landfilled (CDWL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Domestic Product (GDP)</td>
<td>DE/GDP</td>
<td>CDWG/GDP</td>
<td>CDWL/GDP</td>
</tr>
<tr>
<td>Output of the construction sector (OUT)</td>
<td>DE/OUT</td>
<td>CDWG/OUT</td>
<td>CDWL/OUT</td>
</tr>
<tr>
<td>Area of new constructions (PA)</td>
<td>DE/PA</td>
<td>CDWG/PA</td>
<td>CDWL/PA</td>
</tr>
<tr>
<td>Proposed combinations</td>
<td>{(DE+CDWG)/GDP}</td>
<td>{(DE+CDWG)/PA}</td>
<td>{(DE+CDWL)/GDP}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>{(DE+CDWL)/PA}</td>
</tr>
</tbody>
</table>

Notes
More information on the potential core elements and data sources is presented in the following sections. Yellow cells represent parameters that are not directly related to waste prevention but relevant and often measured. Green borders highlight indicators that are derived from the suggested 3 core elements (see below).

5.3.5 CONCRETE PROPOSAL FOR THREE CORE ELEMENTS

As a first step, taken data availability and considerations combining best available and best wanted indicators, it is suggested to apply a combination of the following core elements in order to cover pressures in relation to drivers and measuring effects of policy responses as appropriate:

1. Domestic extraction of construction materials;
2. Construction and demolition waste generated;
3. Physical activity of the construction sector.

By using these three core elements it is possible to create several different indicators (marked by green in the table above) in order to monitor progress and make comparisons between different Member States.
These indicators will provide information on the waste intensity of the construction industry expressing whether ongoing construction activities are conducted by using less materials and generating less waste in contrast to the economic and/or physical functions provided by the sector.

5.4 DATA AVAILABILITY AND NEED FOR FURTHER RESEARCH

Virgin construction material extracted
Although MFA is not subject to compulsory reporting, there are fairly reliable databases for all EU countries (for example: www.materialflows.net). Furthermore, Eurostat is gradually improving the database on Environmental Accounts including Material Flow Accounts: http://epp.eurostat.ec.europa.eu/portal/page/portal/environmental_accounts/introduction.

Total amount of C&D waste generated and landfilled
The available data for the C&D sector is generally incomparable due to the current lack of any statistical reporting at a European level. Most Member States have only domestic estimations available. However, since the introduction of mandatory waste management plans across many Member States the quality of C&D waste reporting is likely to improve over time. Member States will have to report by 2020 on their recycling performance and total waste arisings (without the amount of soil excavated) according to the new Waste Framework Directive.

Economic and physical activity of the construction industry
European data on Gross Domestic Product (GDP) and regular updates are available at: http://nui.epp.eurostat.ec.europa.eu/nui/show.do?dataset=nama_gdp_c&lang=en
Due to great price differences between the EU countries, it should be considered to measure GDP weighted by purchasing power parity (PPP): http://nui.epp.eurostat.ec.europa.eu/nui/show.do?dataset=prc_ppp_ind&lang=en
Data on the Output of construction sector is subject to regular reporting and are available at Eurostat's website under the data on economic activity of different sectors. The production in construction shows the output and activity of the construction sector. It measures changes in the volume of output on a monthly basis.
Furthermore, annual data are available from the National Accounts under the Economy and Finance statistics of Eurostat:
http://epp.eurostat.ec.europa.eu/portal/page/portal/forestry/data/main_tables

Physical construction activity
In general reliable data on the physical extension of construction activities are more scattered and difficult to access. In some countries it is the number of new permits issued, total area of building permitted, or number of new dwellings is available.
At Eurostat, an index for number of building permits and building permits in 1000 m² is accessible at: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=teiis540&plugin=1
**Estimated time and costs of data collection**

As presented in the previous sections, data on building permits are subject to regular reporting and thus no additional costs are required for data collection, but rather the compilation of existing data sets. Furthermore, data need for domestic extraction of construction materials is also available in national statistics.

However data on construction and demolition waste are currently scattered but reporting to Eurostat is demanded in the future.

Taking local and or national circumstances into account, Member States can estimate their costs by applying the Standard Cost Model. An exact description of the approach applied in Germany can be found in the German Federal Government’s Methodological Manual that was published by the Federal Statistical Office in August 2006 and available for download from [www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/EN/Content/Projekte/SKM/SkmHandbuchPdf,property=file.pdf](http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/EN/Content/Projekte/SKM/SkmHandbuchPdf,property=file.pdf).
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Waste Framework Directive:

WEEE Directive: