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THE DEVELOPMENT OF WASTE INDICATORS AT EUROPEAN UNION LEVEL: SOME RECENT EUROSTAT EXPERIENCES

Paper submitted by EUROSTAT*

Summary: If there is one environmental policy field where the need for indicators as tools for monitoring is particularly significant, this is the waste field. Possibly no other environmental issue has such a strong and relevant 'management' side as waste and no other has the same impact on the everyday life of consumers and producers.

Although the relevance of the waste theme is unchallenged, from a statistical perspective there are weaknesses which result in an incomplete information picture, and which prevent the establishment of indicators that could provide powerful and comprehensive signals.

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1. THE CURRENT STATE OF WASTE STATISTICS: MAIN CONSTRAINTS ON AVAILABLE DATA AND NECESSARY DEVELOPMENT

It is widely recognised that obtaining information on waste depends largely on improvements in three main statistics-related problem areas, which are also found in other environmental domains: the use of common definitions and classifications, the level of detail for each variable concerned and the efficiency of the reporting system.

These themes are extensively analysed in the relevant expert and statistical working groups on waste, both within the European Statistical System/Eurostat and within the European Environment Agency's Topic Center on Waste and Material Flows; a summary review is therefore appropriate in this context.

1.1 Definitions and classifications

A preliminary, conceptual issue concerns the overall definition of waste, i.e. what can be considered definitely waste or a 'potential' new material or commodity. In other words, it is difficult to identify exactly the borderline between waste (residuals for recycling) and non-waste (residuals for further processing/'recycling').This problem can be applied in general to all waste streams, starting with municipal and hazardous waste, but it is especially true for several categories of industrial waste. The classification or identification of what is or is not waste is largely dependent on technological innovations achieved and applied; the waste/non-waste borderline varies therefore by country and may be fixed at different stages of the production and consumption processes.

Looking to the sectoral specifications, the need for harmonisation is particularly important for the two primary waste streams, 'municipal' and 'hazardous' waste, for which most information is available at present.

Concerning municipal waste, differences between countries arise for two main reasons: the differences found in specific categories to be included in this stream (the most relevant being 'household' and 'similar' waste, from shops, offices, etc.) and differences found in the collection system applied in each country. For instance, municipal waste, as far as collected by or on behalf of the municipalities, in general does not cover a major part of 'similar' waste.

The mixed nature of the 'municipal' stream, which is partly consumption (household), partly production waste (small enterprises) also complicates the picture.

There are also differences in terminology, such as 'household' versus 'domestic' waste.

In the proposal for the forthcoming EU Waste Statistics Regulation (WSR) – which is the first comprehensive information tool to obtain information on waste and is currently undergoing the approval procedure at EU Parliament and Council level – the category 'municipal waste' as such does not exist anymore. The categories 'households' and 'similar waste' will have to be linked with their respective 'source', i.e. the households and the different economic activities according to NACE nomenclature. In this way, the 'municipal' stream will be 'de-linked' in future reporting from collection practices.

Hazardous waste is currently classified according to different lists based on national legislation defining hazardous waste. Use of the « Basel Convention » classification remains limited, although it has only been applied since 1996. The same can be said of the harmonised EU Hazardous Waste List. As a result, all the categories that should be included in hazardous streams do not have a common identification at present.

Industrial waste figures are influenced by the differences among countries in classifying economic activities, which results in non-comparable data. Most problematic in terms of

definition and coverage are the categories 'Construction and Demolition', and 'Mining and Quarrying'.

Some definition problems arise with agricultural waste, which is not included in the WSR new reporting system.

As a result, these problems of various definitions and classifications severely limit data comparability, which is a basic requirement for producing significant indicators.

The harmonisation of classifications and definitions is a crucial pre-condition for improving the quality of waste data.

1.2 The main data sources and the EU reporting system on waste

The joint biennial OECD/Eurostat Questionnaire on the State of Environment represents the main data source on waste.

It is completed by countries on a voluntary basis or 'gentlemen's agreement' and is structured with six main tables covering the most important aspects of waste generation and waste treatment methods.

The tables on municipal and hazardous waste (according to the Basel Convention) are the most detailed ones and those with the highest response rate. The information on 'waste generation by sector' is focussed mainly on manufacturing industries and presents a limited coverage of waste categories and NACE breakdown. The questionnaire covers also 'waste treatment installations', the 'recycling of selected streams' and, beginning with the 1998 edition, also 'non-hazardous industrial waste', although the level of response for these tables is unsatisfactory.

However, the data collection on waste variables carried out through the Joint OECD/Eurostat Questionnaire is still the most significant.

A second source of information on waste at EU level is related to the compulsory reporting system, a major part of which was implemented during the nineties, with mainly 1995-1997 as the first data reference period**.**

EU legislation on waste and the subsequent reporting obligations form a complex system with some elements of duplication or overlapping.

The new WSR will represent another major component of the EU reporting system and, hopefully, will act as a catalyst to improve waste data.

A third possible source is represented by ad-hoc surveys 'tailored' for a very policy-specific need or for limited coverage (in terms of variables covered or time/country level).

As announced in the 6th EU Environmental Action Programme, a wide-ranging review of the environmental information and reporting system will be carried out. This will also include reporting on waste.

This review will have a direct impact on existing sources on waste and will seek to harmonise the Joint Questionnaire, the WSR, the other reporting obligations, and the ad-hoc data collections, so that the definitions and breakdown of variables are consistent, duplication is avoided and the burden on respondents (Member States) is limited as much as possible.

This is obviously a complex task that will require co-ordinated efforts.

Standardisation and simplification are key issues to improve information flows.

1.3 Level of detail and frequency of data reporting

In most of the reporting obligations implementing the EU waste legislation, the information requested remains at a highly aggregated level, i.e. 'total amounts' generated or disposed at stream level.

In general, the Joint Questionnaire asks for more details than the reporting system based on EU legislation. For some streams, however (industrial waste), even the Joint Questionnaire does not request specific information.

A detailed breakdown by waste category and economic activity is only requested in the context of the forthcoming WSR, so that a complete range of waste generation sources will be provided in the near future.

With regard to information on treatment, the WSR foresees a greater level of detail than what is currently required by the reporting instruments (legislation or questionnaire) for the waste categories in which the method of treatment is requested.

This applies to incineration, recycling and re-use of waste which currently covers a limited amount of specific waste-streams.

Concerning frequency, according to the reporting obligations, information is in general requested on an annual basis (in an aggregated form). The Joint OECD/Eurostat Questionnaire is issued every two years.

In the WSR, the proposed frequency is three years (but with more disaggregated figures). The WSR however will show effects in the long term, assuming that the first reference year will be 2004.

This different timing for reporting waste data by the different sources will have to be synchronised to avoid relevant gaps in the years reported.

What would be the optimal data frequency?

The provision of annual figures would be the best solution, but would probably be feasible only on a long-term basis. Therefore, the focus on yearly updating has to be limited and targeted.

Two key elements should be considered, here: first; the identification of some 'priority variables' on waste generation; secondly, it is evident that annual figures on waste disposal, in particular waste sent to landfill and incinerated waste, are useful so that the implementation of recommended treatment methods could be better monitored.

There is also a spatial dimension to be taken into account.

In principle, waste information is generated and primarily used at local (city or regional) level, where the waste management policies are implemented and often defined. This aspect can have a direct impact on the level of detailed data available (and perhaps not physically collected) as well as on the frequency of the data collection.

Surprisingly, in the context of the current information system review (and also in the WSR) this item is not fully considered as an additional criterion for selection.

Conclusions: the available data at EU 15 level for waste variables still present relevant quantitative gaps and suffer from lack of comparability due to the application of different definitions.

It is evident that the limited detailed breakdown of variables not only hampers the possibility to analyse the whole chain of waste generation but also hampers the analysis of waste management.

Only the main aggregated variables are provided, and even these reflect a limited time series (usually not before the 1990s). Nevertheless, valuable progress has been made in recent years at national level in terms of better time and variable coverage. This is true in particular of the 'municipal waste' stream and to a lesser extent 'hazardous waste'.

2. CONSTRUCTION OF AGGREGATED WASTE INDICATORS AT EU-15 LEVEL: EUROSTAT'S RECENT EXPERIENCES

Given current data availability, the definition and selection of significant indicators for waste is not an easy exercise.

The problem does not directly concern so much the identification of policy and statistical requirements to be met, but more the difficulties of compilation of a meaningful set of indicators.

2.1 Criteria for policy relevance and statistical requirements of a waste indicator

From a policy perspective, there are two main – and important – orientations that can be identified in line with the EU general strategy on waste and the priorities of waste management operations:

- ✓ **The minimisation of environmental impacts of waste generation, with the overall objective of reducing (and finally preventing) waste generation.**

- ✓ **The reduction of resource use and the related task of successful implementation of appropriate waste management policies, with complete or partial recovery or recycling of materials. The objective is to maximise 'recovery, reuse and recycling' operations (RRR) in order to achieve sustainable waste management.**

In other words, the 'pollution approach' and the 'resource use approach' can be considered as the main guidelines to define the policy relevance of a waste indicator (in an analysis at macro-level).

To deepen this macro-level analysis, one should take into account all the derived 'side-effects', both environmental and economic, of waste generation and management e.g. in terms of land- take (use), transportation, energy use, environmental expenditures, etc.

From the statistical side, five essential quality criteria for indicators – also applicable to the waste domain – have to be highlighted:

- ✓ ***Analytical soundness*** **(the correlation between changes in the indicator and changes in environmental pressure and/or use of resources),**

- ✓ ***Responsiveness*** **(the capacity of the indicator to reflect and respond to policy actions),**

- ✓ ***Comparability of data used***

- ✓ ***Consistency with other related indicators (a consistent set) and, last*** **but not least,**

- ✓ ***Clarity, that is the capacity to be easily understood.***

2.2 The waste indicators applied in indicator frameworks: preliminary Eurostat work

Eurostat's recent experiences in compiling waste indicators can provide some indication of the achievements effected, the outstanding problems defined and the development needed.

A specific waste chapter has been developed in the context of three indicator projects, namely:

- ✓ **the UNCSD Sustainable Development Indicators framework, (SDI)**
- ✓ **Eurostat's Environmental Pressure Indicators (EPI),**
- ✓ **EU Environmental Headline Indicators (HI), a Commission/EEA initiative carried out jointly with Member States.**

A major goal has been to assure the overall consistency in compiling the three sets.

Not surprisingly, a high degree of convergence concerning indicator definition and selection can be found between the three waste indicator lists, even if the approaches are partially different: the SDI and EPI are wide-ranging indicators, suitable for a detailed statistical compilation.

The HI requires on the contrary an aggregated and more performance-oriented approach.

2.3 The Waste Indicators in the Sustainable Development Indicators framework (See also Annex 1)

Eurostat's SDI report «Measuring progress towards a more sustainable Europe » published in July 2001, draws upon and extends the UN list of 59 core SDI, which is structured along a policy-oriented classification according to the relevant sustainability dimensions (4), themes (15) and sub-themes (38). This UN list was revised in 2000.

Eurostat has tested the UN methodology in order to verify the application of the selected indicators and their availability in terms of adequate statistical information at European level.

About 50 per cent of the 29 indicators selected by Eurostat are similar to those in the UN core list and 20 per cent of the final Eurostat selection (13 modified) are comparable to their UN counterparts in terms of definitions.

As a result, more than 66 per cent of the selected indicators (i.e. 42 indicators out of 63) are comparable to those in the UNCSD core list.

The verification of the UN waste indicators has been useful for several reasons, not least as a means of considering their methodological aspects and their policy relevance.

From the UN selection of 4 (somehow 'condensed') waste indicators, 6 indicators have been identified, as follows:

Table 1: Comparison of UN and Eurostat waste indicator lists

SD Theme	Eurostat selection		UN 2000Core list	Evaluation status(**)
Waste generation and management	ECON 13	Generation and disposal of municipal waste	Generation of industrial and municipal solid waste	Modified
	ECON 14	Generation of industrial waste	-	Added
	ECON 15	Generation and disposal of hazardous waste	Generation of hazardous waste	Modified
	ECON 16	Generation and disposal of radioactive waste	Generation of radioactive waste	Modified
	ECON 17	Recycling of waste: paper and glass	Waste Recycling and Reuse	Modified
	ECON 18	Waste treatment and disposal facilities	-	Added

(**) Eurostat action regarding UN indicator selection.

The almost exclusive data source is the Joint OECD/Eurostat Questionnaire on the State of the Environment.

The main features of the compiled indicators can be summarised as follows:

✓ **Four main waste streams have been selected**

The most important waste streams – municipal, hazardous, industrial (non-hazardous) and radioactive waste – are covered both in terms of generation and disposal, the only exception being industrial waste for which available figures on disposal methods are too scarce.

Two indicators are focused on treatment, namely regarding recycling and treatment plants.

✓ **'Generation and disposal of municipal waste'**

This is the best indicator in terms of country and time coverage (over the period 1990-1998), both for generation and disposal method figures. Despite the progress registered in last two years on data availability, several gaps still remain, considering that only 7 countries provide almost complete annual figures over the 1990-1998 period and that the 1999 figures are still not available at this time for many countries.

Therefore, it is not possible to provide EU total figures. Nevertheless, some general trends can be extrapolated in terms of growth rate for waste generation (around 3-4% over the past decade), and absolute amounts in per capita values.

Moreover, the prevalence of landfilling practices in southern European countries and of incineration in the northern ones can be detected from the figures.

✓ **'Generation of industrial waste by main sectors'**

A specific indicator on this stream has been added, to separate the otherwise mixed UN indicator for municipal and industrial waste. The non-hazardous component of industrial waste represents an important parameter in the EU context due to significant consequences arising from its generation in terms of recovery/recycling operations.

However, due to data gaps these aspects cannot be analysed at present and thus no clear trend at EU level can be drawn from the figures.

Therefore, at present an indicator focused on industrial waste provides very weak signals.

✓ **'Generation and disposal of hazardous waste'**

Availability and accuracy of the data remain a major concern, but this is to some extent an expected outcome if one considers the different national classifications applied and the lack of a comparative analysis of them (see 1.1).

A breakdown by main categories is not feasible yet.

Interpretation of the generation data is problematic, as is data on treatment.

There are considerable differences between hazardous waste generation and treatment figures (landfill and incineration) which need to be better explained (external flows, recovery operations?).

✓ **'Generation and disposal of radioactive waste'**

Eurostat has compiled this indicator for the first time.

The policy relevance of this indicator can be discussed, considering that the vast majority of all radioactive waste from nuclear industry is low-level and/or short-lived, and safe disposal sites for this type of waste have been in operation in numerous countries for many years.

However, disposal sites for high-level waste (HLW) and other long-lived waste have not yet been built (outside of the USA) and this waste is presently being stored above ground pending the availability of a disposal option.

This indicator does not include the minor part of radioactive waste coming from other sources than nuclear industry, i.e. hospitals, research institutes, etc. Radioactive waste is also included in the OECD core environmental indicator set.

✓ **Recycling of waste – paper and glass (recycling rates)**

Recycling – in terms of recycling rate – can be analysed at present only for these two materials; it is thus a very partial indicator, given that information on other relevant streams (plastics, metal, etc) is still very limited if not missing completely.

In addition, the data are based on 'apparent consumption', a definition that needs to be clarified.

The timeliness could be improved, as 1997 is the last reported year.

At EU level, paper and glass recycling respective markets are well established and the growth trend seems stabilised in recent years. Still a relevant gap on recycling rates which needs to be overcome remains between northern and southern European countries.

✓ **Waste treatment and disposal facilities**

This indicator has been added on the assumption that appropriate information on waste treatment facilities could be relevant to support policy decisions on waste management. It can be used in fact to detect the running and available spare capacity and to determine therefore whether a sort of 'sustainability' level has been approached or not. In addition, a

technical knowledge of installations is useful for analysing trade waste flows, particularly regarding the effect on transport.

The drawback is that the reported data are very few and limited to the number of plants only.

Therefore, the compiled indicator is very weak and does not address the issue as it is outlined above.

However we found it important to show the current data gaps and to bring attention to this – not negligible – issue.

2.3.1 The waste chapter in the UN policy framework

The UN SDI list on waste provides another interesting methodological aspect worth examining, that is the 'place' of the waste issue in a policy framework for sustainable development.

The UN has considered waste in the 'economic dimension', under the 'Consumption and Production patterns' theme together with 'Energy use', 'Transportation' and 'Material Consumption'.

Is this the appropriate framework?

No doubt that the structural links with 'producers' and consumers' behaviour are highlighted, in this way.

The point is that considering waste an economic issue does not fit with the current environmental classification.

In fact, for the same reason one should include also some other environment-related themes such as 'air emissions', or 'agriculture' or 'urbanisation' under the 'consumption and production patterns' cluster.

This is not a 'formal' issue. On the contrary, it highlights the importance of a defined policy context or the analytical framework to be applied for implementing/monitoring sustainability.

The 'adequate' policy cluster for waste depends on the specific model adopted for defining and linking sustainability policies and interpreting the signals concerned.

The decision we made in the SDI compilation was to keep the waste indicator chapter under the economic dimension to adhere to the tested UN framework.

2.4 The waste chapter in the Environmental Pressure Indicators (EPI) project

The EPI aims to create a framework for the regular production of environmental pressure indicators for 10 key environmental policy fields, namely air pollution, climate change, loss of biodiversity, marine environment & coastal zones, ozone layer depletion, resource depletion, dispersion of toxic substances, urban environmental problems, waste, water pollution & water resources.

These represented also the themes of the Fifth EU Environmental Action Plan, adopted first in 1993.

The EPI indicators are intended as tools for environmental policy making at European Union level and as tools for providing information to the general public.

The starting point of the project has been the results of two surveys of environmental experts, carried out by Eurostat in December 1995 and October 1996 which resulted in the

creation of 10 lists of core, or essential environmental pressure indicators broken down by policy field, including *waste*.

The specific Scientific Advisory Groups (SAGs), appointed for each field according to the policy relevance and quality criteria mentioned under 2.1, have ranked the core set of pressure indicators on waste as follows:

Table 2: Core ranked Pressure Indicators on Waste

1.	Waste landfilled
2.	Waste incinerated
3.	Hazardous waste generated
4.	Municipal waste generated
5.	Waste per product during a number of products entire lifetime
6.	Waste recycled/material recovered
7.	Waste from industrial sectors (non hazardous)
8.	Consumption of hazardous materials (in terms of product life-cycle)
9.	Waste from energy production
10.	Waste disposed to sea

The next stage of the project involved a preliminary development (data collection, methodological development and calculation) of the first 60 core indicators (6 per policy field) using available data at EU 15 level. This process resulted in the publication 'Towards Environmental Pressure Indicators for the EU – First edition 1999' (TEPI - June 1999).

A second edition, renamed 'Environmental Pressure Indicators for the EU", has been finalised in 2001.

Some indicators have been reviewed in light of data limitations and constraints. The indicators excluded from the first edition have been further developed in terms of geographical and time coverage and their methodological soundness possibly reinforced/improved.

Development of the EPI indicators on waste — Second edition, 2001

As for the SDI publication, the waste indicators developed for EPI are also based on data from the Eurostat/OECD Joint Questionnaire, which is issued biennally, and OECD in particular for recycling.
Therefore, the main underlying statistical (methodologies and data issues) problems are the same as detailed above (see 2.3).

In compiling the waste indicators for the SDI and EPI, two main criteria have been followed:

- ✓ Ensuring as much as possible the consistency of basic statistics used,

- ✓ Keeping the specificity of each indicator set, i.e., adding or balancing complementary information for each publication, in table or graph format; for instance, for the EPI 2001 edition, an attempt was made to provide a NACE-type sector breakdown.

The main specificity of EPI indicators on waste can be summarised as follows:

WA-1 Waste landfilled:

Coverage improved in comparison to 1999, especially for municipal waste, even if limited to municipal and hazardous waste streams.

WA-2 Waste incinerated:

Stream limitations as above. Additional information on municipal waste with energy recovery and use of flue gas treatment also for municipal waste.

WA-3 Hazardous waste generated:

Datasheet structured with hazardous waste generated and recovered (not distinguishing landfilling and incineration as in SDI). For generation, a NACE-type sector breakdown has been added for some countries.

WA-4 Municipal waste generated

Datasheet structured with a breakdown between total municipal and household waste generated.

WA-5 Industrial waste generated

New indicator, replacing *Waste per product during the lifetime of a number of products* which proved unsatisfactory (no time series are available on the dominant life cycle phases for waste generation per product; data were indicative).

As in the case of SDI, this indicator suffers from poor data availability and comparability due to the use of different definitions of industrial waste. The EPI compilation has focussed on some branches of manufacturing for selected countries (excludes mining, electricity and construction).

WA-6 Waste recycled/material recovered

In spite of the 'wide-ranging' name, the indicator covers only paper and glass, the only available mono-streams, at present.

Conclusions:

Despite the differences in the reference policy framework and the assumptions for identification, the SDI (UN based) and EPI (expert defined) indicators on waste are practically the same. The main difference concerns the separate structure in EPI for 'waste landfilled' and 'waste incinerated', which in the SDI publication are included together with the generation of the respective waste stream.

Therefore, on a general level Eurostat's indicator compilation work provides an outline of a core set of waste indicators which covers the most important waste aggregates – municipal and hazardous waste – both in terms of generation flows and most utilised management practices.

However, detailed important information is missing; for example, the sectoral breakdown in the waste chain generation remains difficult to obtain. As a result, current available information does not provide figures for total amount by stream (generated/collected or treated/recovered).

2.5 Environmental Headline Indicators

The Commission/Member State expert group which has worked on this project (1999-2000) has pointed out two main policy questions in order to define what a headline indicator on waste is meant for:

- ✓ What is the trend at EU level for waste generation?
- ✓ What are the results of the EU waste management policies? How are these policies being implemented?

There was also recognition of the need for:

- ✓ Selecting a few highly aggregated indicators, given that one single indicator cannot be representative, and providing a comprehensive and reliable picture of waste generation and treatment of the waste categories concerned,
- ✓ Highlighting the objectives of the EU strategy for waste management and the specific programmes concerned.

As a result, given the present data availability, the following two Headline Indicators on waste were agreed:

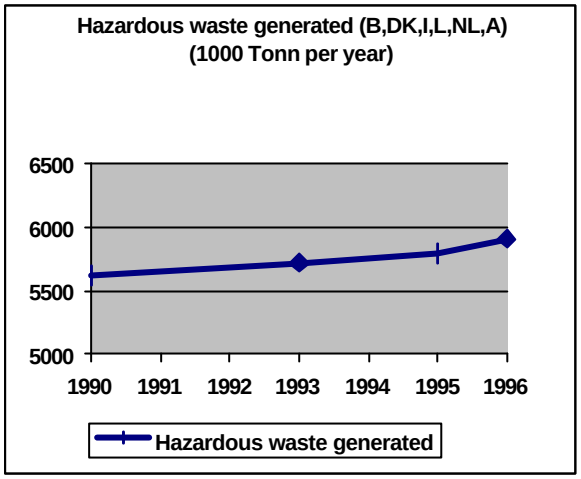
Municipal waste landfilled in relation to municipal waste generated

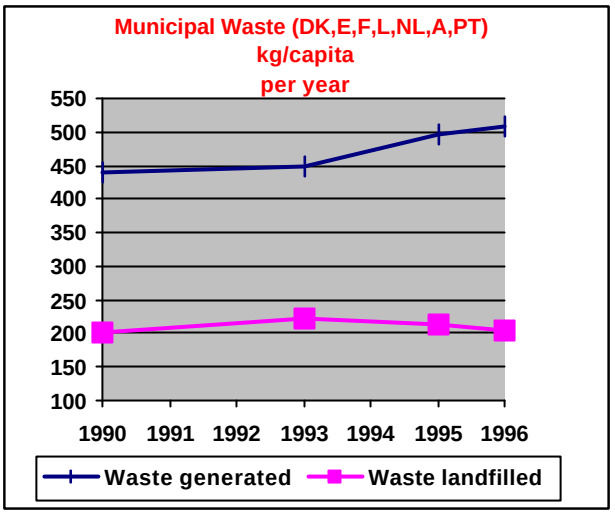
This indicator can provide a general indication for one relevant aspect of waste management practices, since a decrease in landfilling can be considered as a positive development.

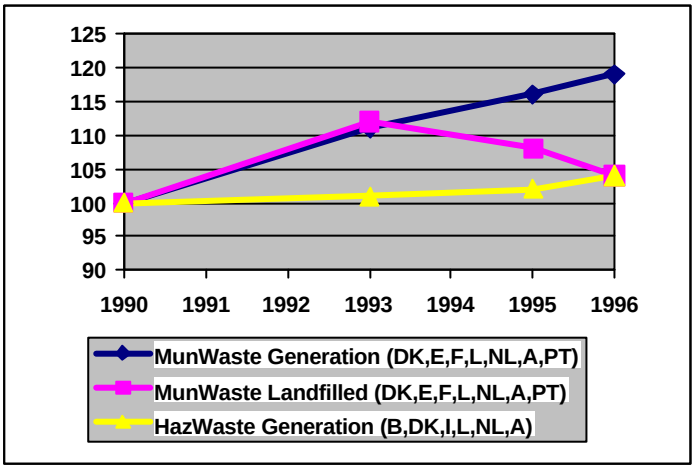
Generation of hazardous waste

This indicator was chosen because generation of hazardous waste rather than landfilling seemed a more appropriate indicator for providing the overall trend of the heavy direct impact on the environment and the related treatment capacity needs.

Graphs 1: Environmental Headline Indicators







These are the actual Headline Indicators on waste (2 versions: one with absolute values, the other as an index), presented in September 2000 for publication; they do not yet include the most recent figures.

The most complete and comparable set of figures from Member States has been used.

The data comparability issue is an important one in order to provide a meaningful picture of waste phenomena.

The Headline project requires quite a different approach than for SDI and EPI for compiling indicators:

Headline figures are presented at EU level only, given that country disaggregation is not in line with the requirements of a headline set; due to the lack of data, EU15 total figures to show a trend over a period are difficult to obtain. EU15 figures were available for one or two years only.

A Headline indicator by its very nature requires a graph format, which reduces drastically the possibility to 'mask' or compensate for the missing information using tables compilation criteria; at the same time, Headline information has to be not only intrinsically rich but condensed, which again reduces the possibility to show several aspects, as one can do with composite/structured tables.

Conclusions: The attempt made to build up a headline indicator on waste is paradigmatic of the present stage of development of an environmental information system.

To combine/synthesise information at a very aggregated level with a limited statistical basis is a real challenge for environment statistics.

Users and producers of environmental indicators should have a clear understanding of the underlying statistical requirements needed to produce clear aggregated information. In addition, an effective monitor of policies via the use a headline indicator is made more difficult by the lack of a set of defined quantitative target(s).

Without an underlying fixed quantitative objective, the signals provided by an indicator are drastically reduced.

3. FUTURE STATISTICAL WORK ON WASTE INDICATORS: THE DEVELOPMENT OF 'THREE BUILDING BLOCKS' AND PRIORITIES ACCORDING TO POLICIES

From recent Eurostat experiences, it is clear that compiling waste indicators is a process in an early stage of development.

The harmonisation of classifications and definitions, the improvement of data availability and the amelioration and streamlining of existing reporting instruments are crucial pre-conditions for a better coverage of complex waste aspects.

In trying to outline a theoretical development path for waste indicators, one can identify an important preliminary step and three main development stages, or 'building blocks' for achieving comprehensive indicators on waste:

- The *overall framework for identification/interpretation of waste indicators* needs to be carefully built-up with a previous *detailed analysis of the main determinants* for the indicator (what is waste, where is it generated, how is it treated and for what reason). To this end, also the pre-definition by policy makers and the subsequent use of targets and quantitative measures is an important tool to provide 'direction' to the indicator work (being aware however that policies change). At present, only an attempt toward a target was quantified at EU level (Kg of municipal waste generated per capita). On these themes, a useful preliminary contribution can be found in a EEA/ETC/WMF draft report, "Development of an indicator Framework on Waste and Material flows", (version September 2001).
- The *first building block refers to the statistical dimension*, that of fundamental indicators which draw on basic statistics; here we are at a mid-development stage, considering that a complete statistical dimension for the whole 'life' of a waste stream is not yet available.
- The *second block has to consider the economic components*, linking the waste variables with consumption and production patterns,
- A *third building block, more environment-oriented*, should place the development of waste indicators in the context of the overall resource use issue and environmental impacts of waste.

In terms of possible indicator sets to be derived by improved basic statistics, the following indicators can be envisaged (the selection is limited to a macro-level policy analysis):

From mid-term perspective (1-2 years):

1. Generation of hazardous waste	(mainly according to Basel Convention)
2. Waste landfilled	(possibly 'Household waste' and also 'Similar waste')
3. Waste incinerated	(specific waste streams incinerated, starting with Hazardous waste and Municipal waste – Household waste)
of which : 3.1 Incineration of waste with energy recovery	(resource use)
4. Recycling of waste	(options : recycling of paper/metal)
5. Radioactive waste	(focussed on disposal of long-lived categories)

From a long-term perspective:

1. Generation of Hazardous Waste	(ideally based on EU classification & legislation)
2. Total waste landfilled	
3. Total waste incinerated	(plus, of which: with energy recovery)
4. Generation of Municipal waste	(harmonised on the categories Household and Similar waste)
4.1 Indicator for Prevention of waste => Consumption trends for selected goods	With improved figures, more detailed and harmonised, different policy themes on waste management could be 'made visible' inside the Municipal waste.stream
4.2 Indicator for Recycling of waste => Landfill and Incineration of municipal waste.	
5. Generation and disposal of industrial (non-hazardous) waste	(by main NACE category)
6. Designed capacity and actual capacity of waste treatment plants	(by main treatment method)

The evaluation and discussions at EEA/ETC/WMF level represent an appropriate forum for developing advanced waste indicators, those of the 2nd and 3rd 'building blocks', variables of the type waste-economic or waste-resource consumption/recovery.
The possibilities to explore here are surely wide-ranging, and the collaboration among all the involved actors, both at policy, Eurostat and EEA level, will help to achieve some useful results.

The following main work areas can be envisaged:

1. Waste flows connected with household incomes or
2. Waste flows connected with consumption level by goods category,
3. Incentives for establishing a market of waste materials,
4. Product life cycle analysis (waste per product)
5. Trade of wastes (export and import)
6. Environmental impacts of waste generation & treatment (emissions to groundwater and air, contaminated soil, etc.)

From a statistical standpoint, what is clear now is that these advanced indicators on waste do not provide a feasible and realistic outcome.

Links with the economic determinants of waste generation and treatment will provide significant trends if they are built on a well-developed statistical basis, i.e. on a detailed and comprehensive quantitative flow of information.

Of course, one could suggest the use of estimations or forecasting methods to overcome the present data limitations for waste.

To some extent this could even be a necessary temporary option, but without a reliable information system, waste indicators which are not based on meaningful figures can provide unhelpful or misleading messages.