Topic report 2/2000

Waste
Annual topic update 1999

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1. Introduction

This report outlines the objectives and results of the European Topic Centre on Waste during 1999.

1.1. The European Environment Agency

The European Environment Agency (EEA) was established in 1990 by a Council Regulation of the European Union. The Regulation laid down a number of tasks for the Agency and prime among these is the establishment, development and coordination of a network for collecting, processing and analysis of environmental data – EIONET (European Environmental Information and Observation Network). Consequently the Agency can be seen as a network covering all member countries but also linking countries beyond and regularly delivering comprehensive environmental reports covering pressures, vulnerability and impacts on the environment. The EEA mission is to support sustainable development and to help achieve significant and measurable improvement in Europe's environment through the provision of timely, targeted, relevant and reliable information to policy-making agents and the public.

1.2. The European Topic Centre on Waste (ETC/W)

The European Topic Centre on Waste (ETC/W) was appointed in June 1997 by the Agency to act as a centre of expertise for use by the Agency in support of its mission and, specifically, to undertake part of the its Multi-annual Work programme.

A joint venture between the Danish Environmental Protection Agency and the Environmental Protection Agency of the City of Copenhagen has been appointed the lead organisation of the European Topic Centre on Waste under contract to the Agency. The Centre is led by the ETC Leader:

Kim Michael Christiansen (to January 2000)/ Birgit Munck-Kampmann (from February 2000).

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ETC/W consists of a consortium of several European organisations, each with a representative on its Management Committee. The Management Committee is chaired by the ETC Leader. The following organisations are represented in the ETC/W and the Management Committee:

- Joint Venture Danish Environmental Protection Agency/EPA of the City of Copenhagen
- ABAG-itm, Baden-Württemberg, Germany
- Umweltbundesamt – Federal Environment Agency, Austria
- Environmental Protection Agency, Ireland
- Junta de Residus, Catalonia, Spain
- European Commission, DG Environment (observer)
- European Commission, Eurostat (observer)

The Management Committee agrees the allocation of tasks and budget and partners are accountable to the ETC Leader for the satisfactory execution of the Work programme.

1.3. National reference centres for waste

In order for the ETC/W to execute its tasks, a close co-operation with all EEA member countries is required. This co-operation is being established and developed through EIONET, and in particular the national reference centres for waste. The reference centres are appointed and funded by the member countries and are in charge of collaboration with their National Focal Points and the ETC/W to cover various topics. National reference centres are the regular collectors and suppliers of environmental data and information. A full list of national reference centres and primary contact points for waste is given in Annex 1 and 2 respectively.

2. Work programme

Despite the long legislative tradition within the waste management area, it has often been recognised by policy makers at national as well as international level that only scarce information is available to help address the legal and political initiatives optimally. However, with European Community waste legislation setting targets for various specific waste streams, and a Community Waste Strategy setting up a general hierarchy and principles on how to prioritise waste management objectives, comparable and reliable data related to the waste management areas are of key importance for policy makers at Community level as well as within member countries to help formulate, implement and enforce appropriate legal and political initiatives effectively.

Based on this recognition, the work of the European Topic Centre on Waste primarily focuses on a number of basic tasks related to e.g. waste amounts, waste treatment capacities and waste management practices. Many of these tasks were presented in the 1998 Annual Topic Update report (EEA, 1999). To a wide extent, the tasks have been continued through 1999 with the following headlines and objectives:

Tasks and objectives
First annual indicator-based report **Objective**: Contribution to the Agency's first annual indicator-based report, including consideration and development of the most appropriate indicators for inclusion in the periodic reporting on the state of the environment and progress of key issues related to waste management.
Data availability and compatibility **Objective**: Establishment of a harmonised and comparable set of data on all major waste flows in EEA member countries, giving precise definitions on all issues addressed in order to secure reliable information on waste as a basic requirement for political decision-making.
Projections, scenarios and assessment **Objectives**: Derivation of a method in order to establish a basis for making projections of future waste arising and elaborating waste scenarios depending on the economic development and technological changes.
Dangerous substances in waste **Objective**: Derivation of a method to document the dangerous substances and materials in waste which cause special problems in member countries and how the environmental impact from these substances and materials can be minimised by means of e.g. material substitution, good housekeeping, clean technologies, etc.
Waste management facilities **Objectives**: Development of a database of recovery and safe disposal facilities in member countries, containing data on type, location and capacity of these facilities, giving additional information about permits, environmental management and pollution control systems and allowing an assessment of transfrontier shipment of wastes.
Waste minimisation practices **Objective:** Support the development of waste prevention strategies by documenting waste prevention practices in all member countries, including information about already existing knowledge at national and international centres on waste minimisation and the effectiveness and transferability of the various waste prevention schemes.
Common data model on waste **Objective:** To establish a common data structure for the various input data related to waste management, thus providing a tool for cross-sectoral and cross-country analysis.

The results achieved during 1999 are described for each task on the following pages.

3. First annual indicator-based report

ETC/W contributed to the first EEA indicator-based report *Environmental signals 2000* (to be published in 2000).

3.1. Introduction

Waste represents the loss of both material and energy resources. Since excessive waste generation is a symptom of inefficient production processes, low durability of goods and unsustainable consumption patterns, waste quantities can be considered an indicator of how efficiently society uses raw materials.

The key environmental impacts of waste can be summarised as:

- use of land for landfills, leaching of harmful substances (nutrients and toxic) and greenhouse gases from landfills;
- air pollution and toxic residues from incinerators;
- air and water pollution and generation of secondary waste streams from recycling plants;
- increased road transport.

All data on waste is associated with major uncertainties but it is estimated that the total amount of waste generated in the EU is 1 300 million tonnes per year. Waste policies adopted at EU level are guided by the Community Waste Management Strategy, which has overall aims for waste prevention, waste minimisation and establishing an integrated approach to waste management.

Waste prevention is the most challenging task for effective waste management. In relation to waste generated, the EU waste strategy calls for increased recycling and energy recovery to prevent disposal, e.g. landfill or incineration without energy recovery. In addition, specific Directives impose common rules for the separate collection and treatment of certain waste streams, e.g. packaging, batteries and accumulators, waste oils, sewage sludge and polychlorinated biphenyls (PCBs).

3.2. Municipal waste and packaging waste

The contribution to the report *Environmental signals 2000* focused on municipal waste and packaging waste which are priority waste streams in the EU Waste Strategy and for which policy targets have been set against which progress can be measured. Waste from industries, construction and demolition waste, sewage sludge, transport of waste and hazardous wastes will be covered in future signal reports.

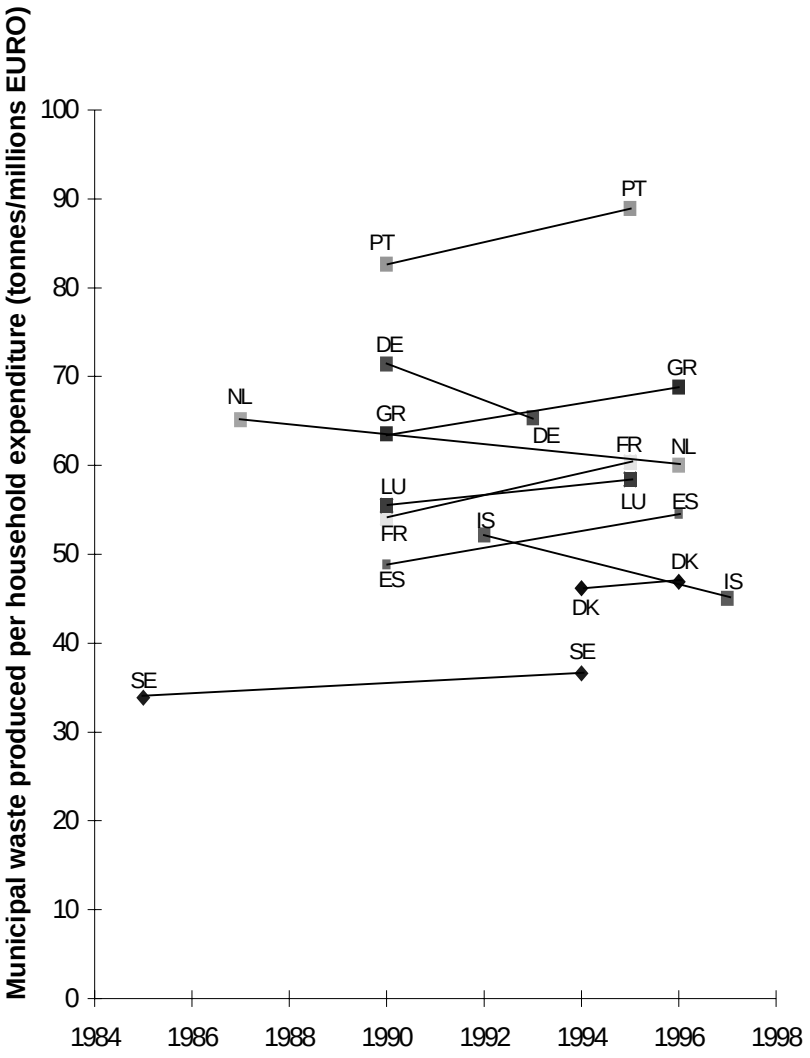
Indicator	Policy issue	DPSIR	Assessment
Waste and economic activity	Is de-linking occurring?	P	😐
Municipal waste generation and disposal	Is 5th EAP target being met?	P	☹
Biodegradable waste landfilled	Is Landfill Directive target being met?	P	☹
Extra costs of incineration compared with landfill tax	Are taxes being used to correct the relatively low price for landfilling?	R	😐
Packaging waste management	Is the treatment of packaging waste developing according to targets?	R	☺

Is de-linking of waste generation from economic activity occurring?

De-linking waste generation from economic activity plays a key role in helping to meet the objective of reduced waste generation. However, waste generation appears to be increasing at a greater rate than economic growth. In European countries of OECD, waste generation increased by an estimated 10 % between 1990 and 1995, while GDP increased by 6.5 %.

At Member State level, de-linking of municipal waste generation from household expenditure is being achieved in a few countries (figure 1). However, household expenditure is not the ideal comparator in this instance since municipal waste also includes commercial waste. The Netherlands, Iceland and Germany in particular, appear to show successful de-coupling of municipal waste generation from economic activity over time, while other states appear not to be making as much progress.

Figure 1. Trend of municipal waste generation by household expenditure



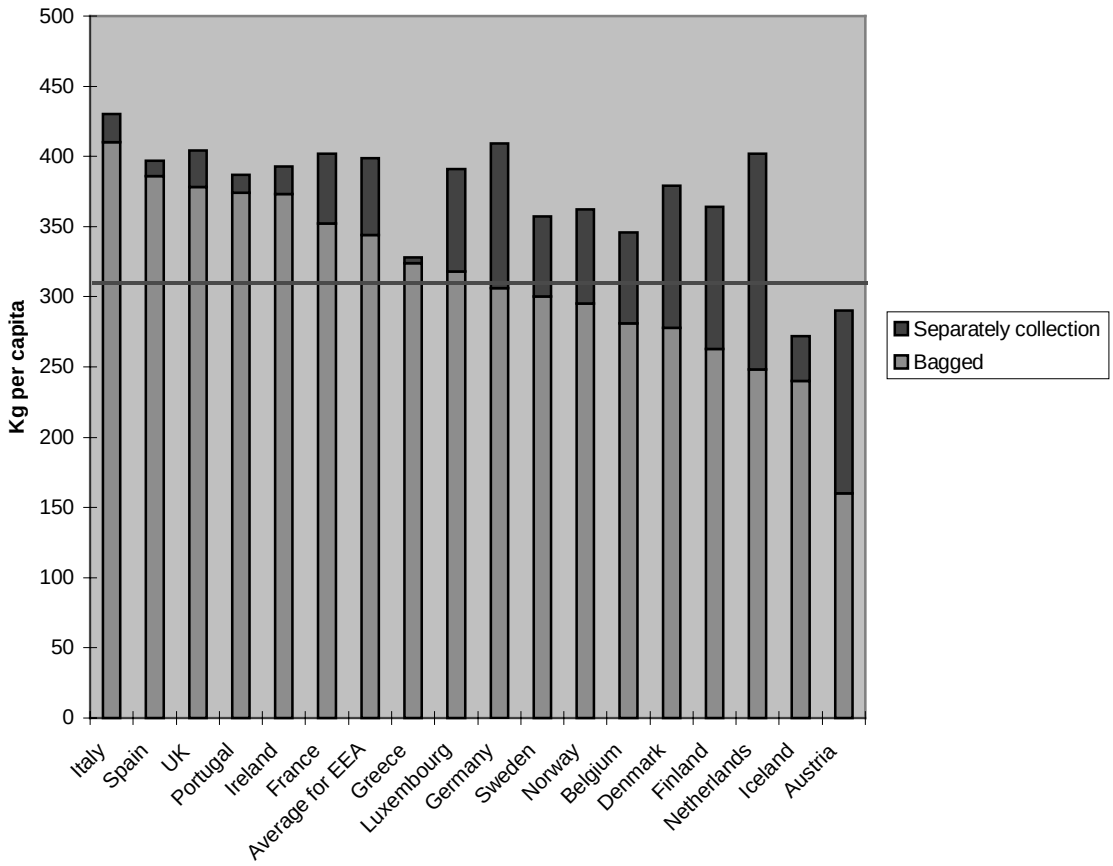
Source: Eurostat and ETC/W

Are we meeting policy targets for municipal waste generation and disposal?

Although some de-linking has occurred in the 1990s for municipal waste in Germany, the Netherlands and Iceland, all EEA countries (except Iceland and Austria) are some distance away from meeting the target of the EU Fifth Environmental Action Programme (5EAP), namely to stabilise municipal waste generation at 300 kg per capita by the year 2000 (figure 2).

Waste from daily household and commercial activities consists of certain well-defined fractions from municipal waste, which can be compared between all EEA member countries. These include bagged wastes (i.e. mixed waste collected from households and other sources) and separately collected wastes such as paper, cardboard, glass, metal packaging and food/organic waste. Bulky waste is not included.

Figure 2. Waste generation from daily household and commercial activities, 1996



Source: ETC/W

Note: 1996 data except for France 1995; Germany 1993; Ireland 1995; and Sweden 1994.

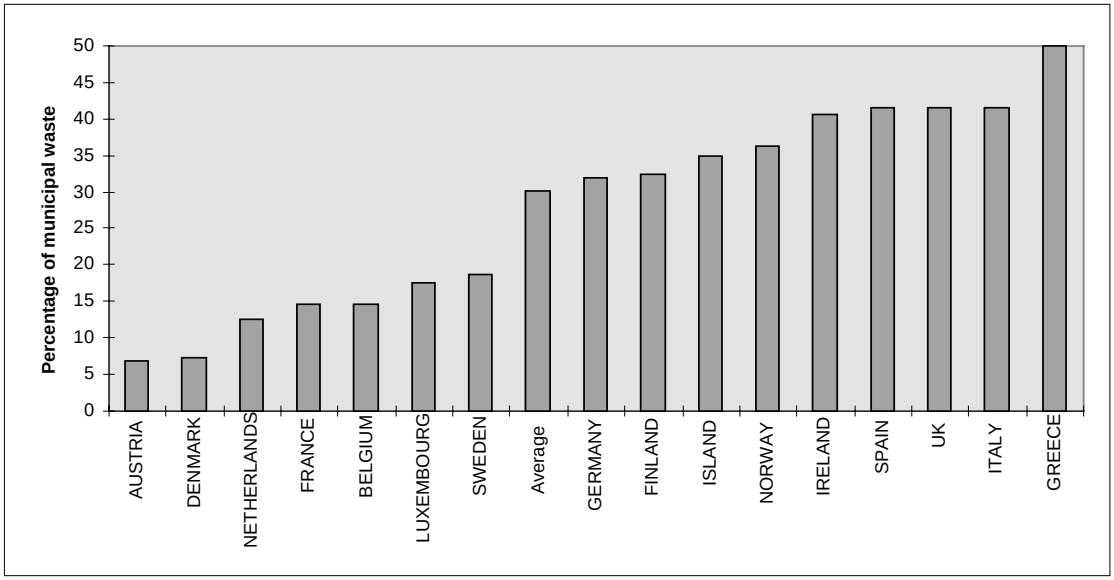
However, on the positive side, all countries have recycling schemes, and on average 13 % of municipal waste is collected separately. Wide variations between both countries and regions exist. In northern European countries on average 20 % of waste is collected separately but large differences exist between countries – the Netherlands leads with 38 % collected separately. In southern European countries on average 5 % of municipal waste is collected separately. Overall, there is a large potential for increasing the total amount of waste recycled.

This potential is further illustrated and reinforced by figure 3, which shows that in 1995 too much biodegradable waste was still 8going to landfill in many countries, despite the fact that such waste could be recovered as compost or incinerated. The landfilling of biodegradable waste results in emissions of greenhouse gases and is a loss of resources. An estimated 55 million tonnes of paper, paperboard, food and organic garden waste was landfilled in 1995 in EEA member countries (excluding Portugal but including Iceland and Norway). If plastics are classed as biodegradable, this statistic rises to 66 million tonnes.

The Landfill Directive sets a target of reducing the amount of biodegradable municipal waste landfilled to 35 % by 2016, i.e. a maximum of 19 million tonnes. Minimising waste to landfill is a central plank of the EU waste management strategy and it will be important to see in future signal reports if progress is being made towards meeting the Landfill Directive target for biodegradable waste.

The variation between countries in amounts of waste going to landfills may be linked to the way the tax system in place favours disposal by incineration rather than landfill. A landfill tax is operational in several Member States. The aim is to improve the competitive position of recycling and energy recovery through incineration as treatment methods.

Figure 3. Biodegradable municipal waste landfilled, 1995

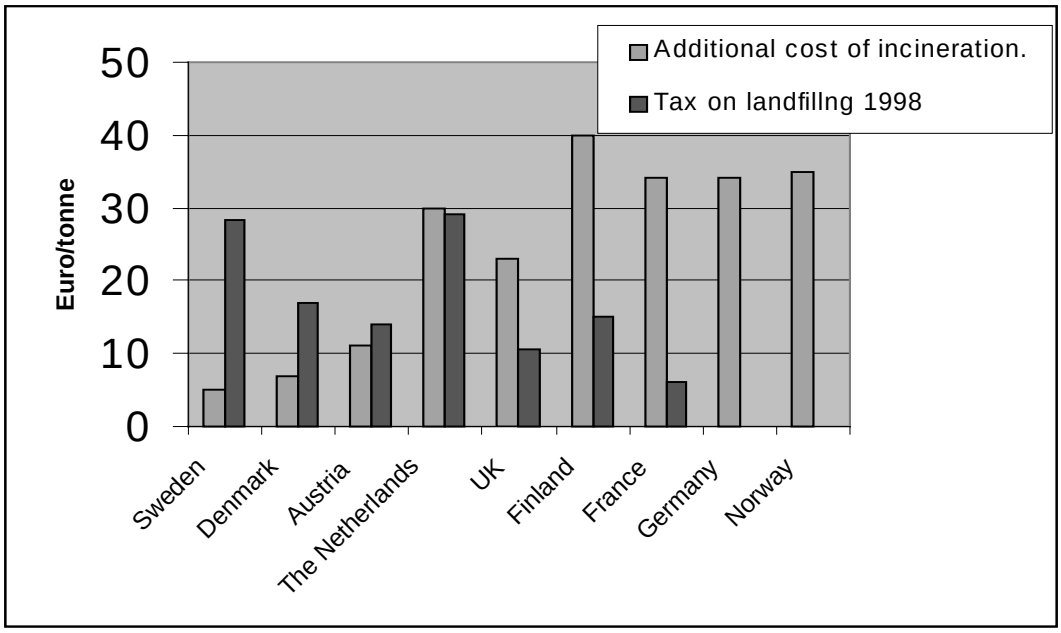


Source: Eurostat and ETC/W

Note: The reference year is 1995. However, data for Belgium refers partly to 1996, Germany 1993, Greece 1990, Italy 1996, the Netherlands 1994 and Sweden 1994. No data available for Liechtenstein and Portugal.

Figure 4 presents a comparison of the relative costs of treatment and disposal of waste to landfill and by incineration for a selection of EEA countries. For those Member States, which have implemented landfill taxes, less biodegradable waste goes to landfill apart from Finland which, despite having the fourth highest landfill tax, still landfills above average amounts of biodegradable waste. This can be partly explained by the fact that Finland has the highest additional cost of incineration of the 11 Member States analysed and so the *relative* costs of incineration compared with landfill are much higher, hence still encouraging disposal to landfill over incineration. The Finnish example emphasises that landfill taxes can only be effective as part of an integrated approach to waste management whereby economic instruments are used synergistically to promote the desired environmental outcome.

Figure 4. Landfill taxes imposed for a subset of EEA countries



Source: EEA-ETC/W

Are the EU's objectives for packaging waste being met?

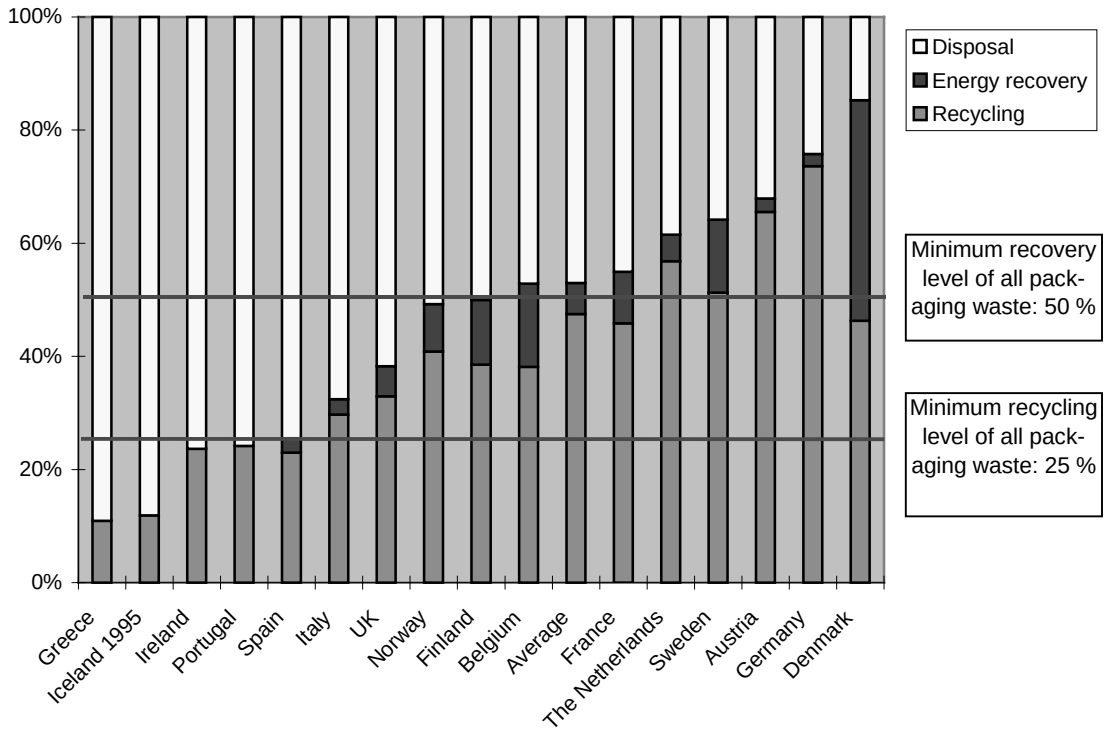
One of the waste streams given special attention by EU policy is packaging, since the Packaging Directive includes measures for the prevention of waste generation and the increased recovery and recycling of packaging waste. In 1997, 136 kg packaging waste was generated per capita, i.e. almost a third of total waste from daily household and commercial activities. Paper and cardboard is by far the largest fraction of packaging waste, with 63 kg generated per capita followed by glass (35 kg/capita) and plastics (29 kg/capita). Metals (9 kg/capita) make up the rest of the four materials included in the Directive.

Several targets have been set under the EU Packaging Directive. Target 1 requires Member States to reach a *recovery* level of between 50 % as a minimum and 65 % as a maximum by weight of *all* packaging wastes. In this case, recovery covers all kinds of recycling, energy recovery and composting. To achieve Target 2, Member States must reach a *recycling* level of between 25 % as a minimum and 45 % as a maximum by weight of *all* packaging wastes. The obligation for Target 3 is to reach a minimum *recycling* level of 15 % on *specific* packaging waste materials.

Good rates of paper and glass recycling have been reached but progress with plastics has been poor. Municipal waste is the largest source of plastic waste, generating over 61 % of the total plastic waste in 1996. Currently, only Austria and Germany have achieved a recycling rate greater than 15 % for plastics.

Paper and plastics recovery is high in countries where energy recovery is the predominant treatment method. The high rates achieved by some member countries indicate the potential for increased recycling and recovery throughout the EEA area. For example, variations between member countries include 6 % plastics recycling in Denmark compared to 45 % in Germany. The variation in recycling of glass is smaller.

Figure 5. Four packaging materials



Source: Member States reporting to DG Environment according to the Packaging Directive and supplement from FEVE and national publications.

Footnote: Recovery includes composting and energy recovery (also biogas for Sweden). Disposal is assumed to account for all remaining waste, which is not recovered or recycled. Waste imported for recycling has been excluded and waste exported for recycling has been included. The aggregated data has been weighted for amount of waste generated for each of glass, plastics, metals and paper.

Indicator development

For existing indicators, improved estimates of generation, treatment and disposal are needed for all waste streams. Consistent and complete trends data are also lacking in many areas, but in particular for base years against which progress towards policy targets is measured. Breakdowns for municipal waste between household and commercial sources would be desirable. Greater methodological consistency is needed between countries for waste data. The adoption of the proposed EU regulation on waste management statistics should facilitate a better collection of waste datasets in the future and hence as a more effective assessment of the whole waste topic. Improved information on the use of economic instruments would also be useful.

For the future, priority should be given by ETC/W to construction and manufacturing waste streams, hazardous waste and waste transport. Analysis of the effectiveness of policies and of economic instruments and the synergies between them, in particular, taxes and voluntary agreements for meeting policy objectives would be highly desirable.

4. Data availability and comparability

4.1. Introduction

Detailed analysis of developments in waste generation, waste management and waste minimisation is hampered by the lack of comparable definitions and statistical information across Europe. National data on waste arisings and flows already exists and is reported through OECD/Eurostat and the EU Standardised Reporting Directive 91/692/EEC, etc. However, for purposes of comparison among the member countries these data have limited value because of inconsistencies in terms of definitions, classifications, terminology and accuracy. ETC/W is assisting OECD/Eurostat and EEA member countries in improving the quality and consistency of waste statistics. During 1999, two surveys on hazardous waste and municipal/household waste concerning data availability and comparability were finalised.

4.2. Hazardous waste

Published statistics on hazardous waste show large variations in the generation per capita from one country to another. National totals reported to the OECD and Eurostat are generally based on national classifications and definitions which makes it very difficult to draw valid comparisons between data from different countries as the classification systems can be quite different.

In order to improve comparability of the reported national data on hazardous waste, ETC/W has reviewed existing data for the time period 1993-1996. As a first step, the review covered the partner countries and regions of the ETC/W consortium, with a full coverage of all EEA member countries to be conducted during 2000. The results have been published in the report *Hazardous waste generation in selected European countries* (EEA Topic Report No 14, 2000).

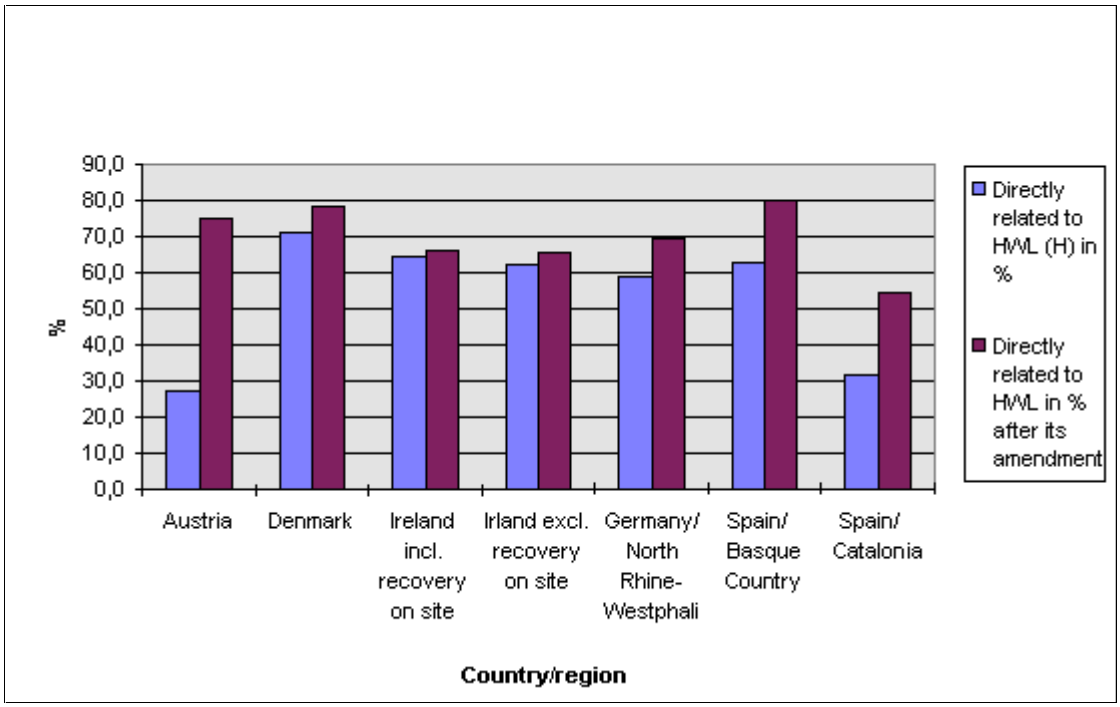
Key findings:

- The survey included Austria, Denmark and Ireland as well as one region in Germany (North Rhine-Westphalia) and two regions in Spain (the Basque Country and Catalonia). All together, these countries and regions produce 6.5 million tonnes hazardous waste per year. This is approximately one-fifth of the total hazardous waste generation in all EEA member countries.
- When comparing the generation of hazardous waste across countries, it is very important that the reported figures are based on the same definitions, i.e. that a common classification is applied. However, in the case of Austria, Denmark, Germany, Ireland and Spain different classification systems were applied when the data originally were registered.
- Even though it is difficult, the study has proved that it is possible to reclassify most of the hazardous waste, which was originally registered according to a national or regional classification system into one common classification system. The system chosen was the Hazardous Waste List (HWL) and the European Waste Catalogue (EWC).
- The variations in hazardous waste generation between Austria, Denmark, Ireland, Germany (North Rhine-Westphalia) and Spain (the Basque Country and Catalonia) can first of all be explained by the fact that, even though the Hazardous Waste List and the European Waste Catalogue have been introduced, they do not sufficiently describe what is regarded and reported as hazardous waste in each country or region. The amount of hazardous waste that

may be related directly to the Hazardous Waste List varies between 27 % and 71 %.

- If the Hazardous Waste List is amended as proposed by the Commission, the amount of hazardous waste that may be related directly to the Hazardous Waste List will increase to between 55 % and 80 % for examined countries and regions. This means that the degree of comparability of hazardous waste generation between countries and regions would increase (figure 6).

Figure 6. Hazardous waste amounts related to HWL before and after amendment of the list. Stated in %



Source: ETC/W

- To compare whether hazardous waste generation is dominated by the same waste types in the participating countries and regions, a top 5 list of waste codes applied for each country or region and based on hazardous waste quantity was set up. From the list it appeared that a total of 29 different codes were used, indicating that different types of hazardous waste dominate in different countries. Thus, in each of the examined countries and regions a relatively small number of waste types represent a large proportion of the total hazardous waste generation. On average, the 20 largest generated waste types represent about 75 % of the total waste generation.

In general, the industrial structure is an important factor in explaining the difference between hazardous waste quantities in the different countries and regions.

4.3. Municipal/household waste

Published statistics on waste from households show large variations in the generation per capita from one country to another without any clear explanation for the variations, (cf. the table below). Furthermore, the terms **household waste** and **municipal waste** are often used as a synonym.

In order to improve comparability of the reported national data on household and municipal waste, ETC/W has reviewed existing data for the time period 1993-1996. The review covered all EEA member countries (EEA Topic Report on generation of household and municipal waste to be published in beginning of 2000).

Key findings:

- Household waste is defined as waste coming from households. Municipal waste is waste collected by or on behalf of the municipalities including waste from households collected by the private sector.
- Total household waste cannot be compared between all member countries due to the fact that some countries do not provide sufficient information on all waste categories produced by households.
- Total municipal waste cannot be compared between all the member countries due to differences in the kind of waste collected by different municipalities.
- However, certain well-defined fractions from the household and municipal waste streams can be compared across all member countries. These are bagged wastes (i.e. mixed waste collected from households and other sources) and separately collected fractions, including packaging, such as paper, cardboard, glass, metal packaging and food/organic waste from households and other sources. Other sources include commercial and institutional activities that generate waste similar to that generated by households. Generally, this waste stream is produced from the daily or routine activity of households and businesses and does not include items such as bulky wastes generated on an intermittent basis. For convenience, this waste stream is called **daily household and commercial waste.**
- Total waste generation per capita per year of this comparable fraction, (daily household and commercial waste), varies to a lesser extent between member countries than previously reported figures for total household waste and total municipal waste. The generation in most countries is normally between 350 to 430 kg per capita per year. The mean production of 'daily household and commercial waste' is 366 kg/capita/annum with a standard deviation of 14 % of the mean compared with 22 % and 21 %, respectively, for household and municipal waste quantities reported by OECD/Eurostat.
- Variations in 'daily household and commercial waste' between member countries are mainly a function of the extent to which household and similar waste from other sources is sorted and separately collected. For instance, member countries with a national, regional or local waste policy that promotes sorting of household and similar waste will tend to have a lower quantity of bagged waste per capita than countries where little sorting activity occurs (figure 2. Waste generation from daily household and commercial activities, 1996 in section 3.2)

Number of countries grouped according to bagged waste, quantity of sorted waste and total waste. Yearly waste generation per capita of 'daily household and commercial waste'.								
Waste categories	< 249 kg	250-299 kg	300-349 kg	350-399 kg	= > 400 kg	Average simple mean	Standard Deviation	Standard deviation as a percentage of mean
Bagged waste	3	4	4	5	1	311	62	20
Total generation of daily household and commercial waste	1	1	2	8	5	369	47	13
	< 25 kg	25-49 kg	50-74 kg	75-99 kg	= >100 kg			
Separately collected	6	1	5	1	4	58	41	71

Source: The ETC/W survey 1998

- There is a need in most member countries for better guidelines for data providers (municipalities, regional governments, treatment plants, etc) on how to obtain reliable data on household and municipal waste. These guidelines do not have to be identical but must be coordinated between EEA member countries to secure the comparability of the data.

5. Projections, scenarios and assessment of dangerous substances in waste

5.1 Introduction

Waste from **E**lectrical and **E**lectronic **E**quipment (WEEE) is the fastest growing waste stream containing a large number of dangerous substances. It will probably become one of the major challenges for waste management in the European Union in the near future: Households, offices and industry are already equipped to a high degree with different types of EEE, including domestic appliances, data processing equipment, telecommunication equipment, etc. Even if some parts of the EEE market show signs of saturation, in total there are clear signs of dynamic growth – e.g. IT-equipment, telecommunication and toys.

It is an objective of the ETC/W Work programme to develop a model for generation and treatment of WEEE:

- to describe and analyse the mass flow;
- to describe and analyse the flow of dangerous substances and the environmental fate of these substances; and
- to make projections on future waste arising.

This computer-based model will cover the phases of production and consumption of EEE, collection of used EEE, and treatment of WEEE (disposal, recovery, re-use) in the five ETC/W partner countries. With use of the computer-based model, preliminary conclusions and recommendations will be made with respect to the needs and demand of the EEA and the Member States for improvement and further development of both European and national waste strategies.

5.2. Waste from electrical and electronic equipment

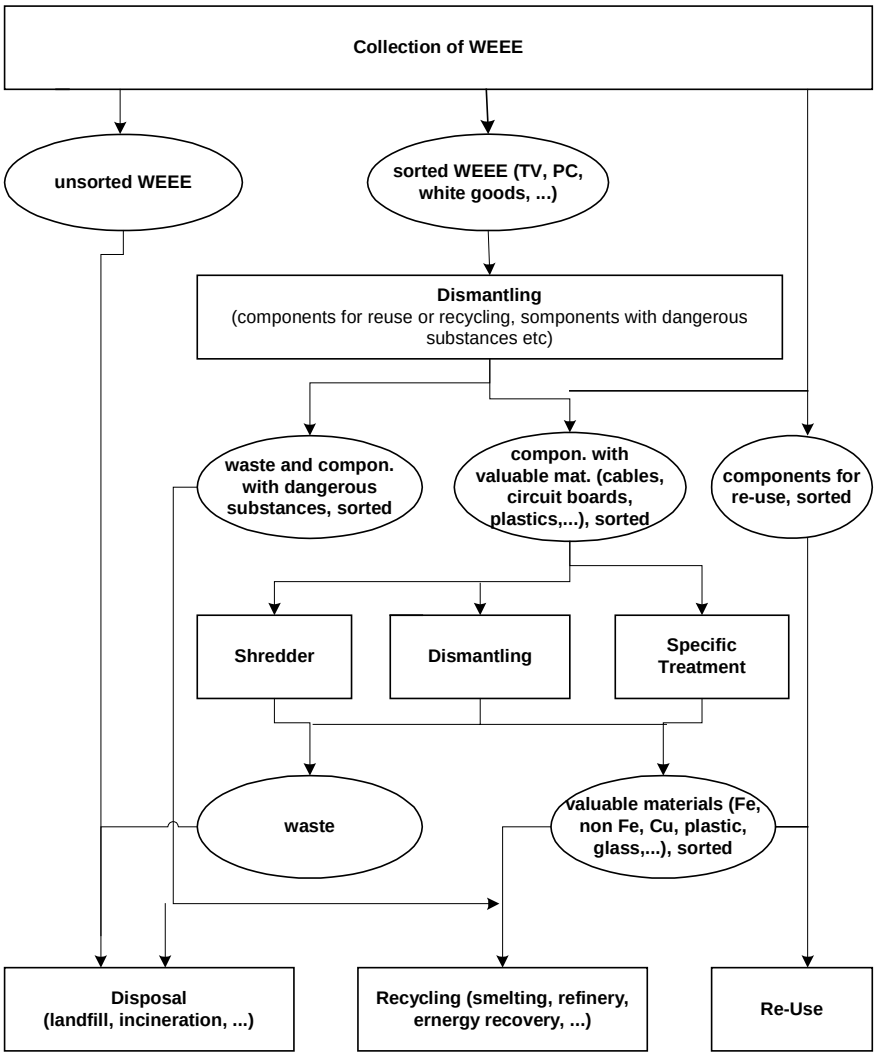
All electrical and electronic equipment ends up as waste. The amount of WEEE generated in EU Member States has been estimated to be about 6.5 to 7.5 million tonnes per year in the late 1990s, with an expected growth rate of 5 to 10 % annually in the next ten years. Waste quantities are increasing in line with consumption, and growth in waste is further fuelled by product innovation cycles, which result in equipment becoming obsolete, before its useful lifetime has expired. In addition, adequate monitoring systems for these waste streams are not available yet.

The potential for negative environmental impacts resulting from the treatment of these wastes is high, due to the presence of hazardous substances within this waste stream. The risks, however, are difficult to quantify because the waste stream is made up of so many different and complex appliances. This is compounded by the absence of reliable recycling and treatment infrastructure in many countries. The absence of dedicated collection and take-back systems for specific products and appliances means that, in many countries, a significant proportion WEEE is disposed of as part of the municipal waste stream.

WEEE is one of the most complex waste streams requiring management. EEE covers a large variety of products ranging from mechanical devices like hair dryers or refrigerators to highly integrated systems like computers. Technological innovation accelerates changes in product composition, for example, the

replacement of CRT-monitors by LCD displays, and the replacement of old products with new products, for example, the replacement of record players by CD-players. Additionally, electronic appliances are increasingly being included as an integral part of other product groups, for instance, electronic systems in vehicles. On the other hand, these products contain significant quantities of valuable substances such as metals, precious metals, high quality plastics and other components, which should be recovered.

Figure 7. General Treatment scheme for WEEE



Source: FTC/W

However, the rapidly changing nature of electrical and electronic equipment mitigates against the establishment of adequate waste treatment facilities. For instance, the general move towards increasing integration makes disassembly and separation more difficult and hinders both recovery and environmentally sound treatment processes. Figure 7 demonstrates a General Treatment Scheme for WEEE, giving an idea of the complexity of this subject.

5.3. Activities in 1999/2000

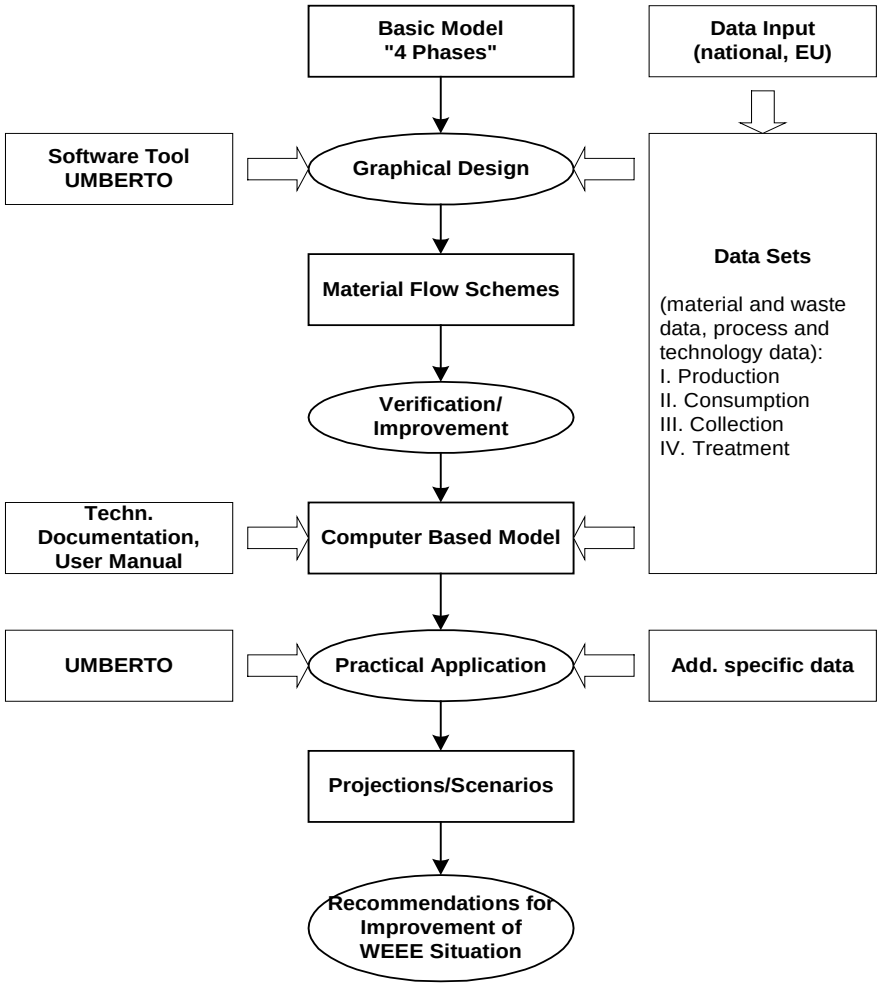
The work is subdivided into the description and analysis of the waste flow as well as the dangerous substances flow, comprising the following activities:

- compilation and analysis of mass flow and composition of EEE and WEEE;
- compilation and analysis of relevant data and information on production, market conditions, trends, consumer habits, etc;
- compilation and analysis of data and information on waste treatment technologies (disposal, recovery, re-use) and their influence on mass flow as well as release of dangerous substances;
- compilation and analysis of data and information about substitution, good housekeeping, clean technologies, better source separation, handling, etc of EEE / WEEE, to reduce both waste arising and emissions;
- modelling of the mass flow and dangerous substance flow with a computer tool;
- application of models to describe mass flow and dangerous substance flow of EEE and WEEE – from 'cradle to grave';
- exemplary application of the models for making projections on future situations, especially future waste arising;
- preliminary conclusions and recommendations with respect to the needs and demand of Member States and the EEA for improvement and further development of both national and European waste strategies.

The work covers the four relevant phases of EEE and WEEE – production, consumption, collection, and treatment.

The present activities are focused on the compilation of data for the ETC/W partner states Austria, Denmark, Germany, Ireland and Spain, covering the time period 1990 to 1998. Priority has been given to the appliances: refrigerators and freezers, personal computers, TV-sets, copy machines, fluorescent tubes, and small household appliances.

Figure 8. Working scheme



Source: ETC/W

The main sources for mass flow data are the national statistic offices and Eurostat. The main sources for the composition of EEE and for relevant dangerous substances are scientific literature and reports as well as information given by producers and producer associations. In addition, data and information on WEEE published by EEA, EU Commission and national EPAs are taken into account.

Based on the data and information gained, first material flow schemes are designed for the selected appliances (1999). To handle the vast amount of data and the great variety of material flow and treatment schemes, the computer based tool UMBERTO has been used. The complete working scheme is shown in Figure 8. First results (substance flow datasets) will be available in the middle of the year 2000, followed by tests and verifications to eventually modify the computer-based model. In the final stage (end of 2000) this model can be used as a 'tool', to describe the WEEE flow or to make projections for future WEEE flows in specific countries or at EU level – using the datasets developed by ETC/W, combined with national data on mass flow and waste quantities.

6. Waste management facilities

6.1. Introduction

Ensuring that the capacity of recovery and safe disposal facilities is adequate to handle the quantities of waste generated is an important objective of the Community waste policy. In addition, a thorough knowledge about available treatment facilities is a prerequisite for setting realistic and achievable targets for the various waste management options such as material recycling and incineration with energy recovery, taking into account the required time for planning and investments in the Member States. However, at present there is little information available about waste management facilities in the Community.

6.2. Activities in 1999

During 1999 ETC/W has made progress in developing an overview of waste management facilities in the Community. The objective is to provide a database on safe recovery and disposal facilities in EEA Member countries, containing data on type, location and capacity of waste management facilities. In the long term the database will provide additional information about permits, environmental management and pollution control systems as well as allow an assessment of transboundary movements of wastes. As a first step, the database concentrates on hazardous waste treatment facilities and landfills.

In addition to planning purposes in Member States, the information is intended to support the requirements of Directive 91/156/EC, according to which Member States shall take appropriate measures to establish an integrated and adequate network of disposal installations thereby enabling the Community as a whole to become self-sufficient in waste disposal. At present, however, the necessary information is lacking with only limited data compiled through Directive 91/692/EC concerning questionnaires for Member States' reports on the implementation of certain Directives in the waste sector.

The database will help develop a sustainable approach to waste management by ensuring that the capacity of recovery and safe disposal facilities is adequate to handle the quantities of different types of waste generated.

The database is intended to meet the information needs of:

- EEA and European authorities;
- national, regional and local authorities;
- operators of waste management facilities;
- European industries;
- the public and NGOs;

and will be a tool for:

- fulfilling obligations to report according to Community-directives;
- planning waste management activities and policy making;
- controlling of transboundary movement of waste and;
- reporting on specific database contents.

As the database will be a tool for competent authorities in particular, the needs and content have been discussed with EEA member countries during 1998 and 1999. It is a long-term objective of the database that data input should be managed directly in the member countries. During 2000 it will therefore have to be investigated, to what extent data recording and updates can be made directly by NRCs.

The main emphasis of the work in 1999 was put on collecting and importing data about waste management facilities into the database, which was presented in September at the annual EIONET workshop on waste. To supply data of good quality to the database, a permanent contact to the member countries will be essential.

Data from 13 EEA member countries have been imported into the database on waste management facilities. At the end of 1999 datasets on 2 355 companies, 2 343 facilities and 416 landfills were included in the database. However, the completeness of the datasets is not yet very satisfactory. Further measures will have to be taken to complete the existing datasets. The available datasets for example, could be checked in cooperation with EEA member countries and be completed with missing data. Countries that had not delivered their data by the end of 1999 are expected to do so in the beginning of 2000.

Although the database is not complete, a first overview given in a technical report about the waste management facilities database shows that it will become a very helpful tool in European waste management planning: the current situation of EEA member countries can be seen at a glance and analyses can easily be made.

6.3. Extended dataset

ETC/W also considered requirements for an extended dataset for the database mentioned above; a proposal for an extended dataset was prepared and delivered to EEA by the end of 1999 (interim report).

In 2000, the possible content of the extended dataset, which should lead to a consolidated extended dataset will be outlined and finalised after consultation with NRCs.

7. Waste management and waste prevention practices

7.1. Introduction

The problems related to waste generation and management have attracted increasing political attention in the last decade. The interest has focused both on the direct environmental problems related to treatment of waste and on the wider implications of establishing a sustainable society with an increased efficiency in the use of natural resources. Within the Community, a strategy was initially set up 10 years ago, giving highest priority to waste prevention followed by material recovery, energy recovery and safe disposal. The strategy has been supplemented by a number of legal provisions at Community level. At present, however, the amounts of waste throughout Europe are increasing, putting pressure on additional or alternative measures to be taken.

ETC/W has started to provide support to the development of waste prevention and waste management strategies by collecting information and converting this information into a set of electronic catalogues:

Waste management institutions and clean technology centres

The aim of this catalogue is to list relevant institutions, describe their basic organisation and give information on which type of information can be obtained from the institution.

Waste management plans

This catalogue will contain a list of all Waste Management Plans provided to the Commission including some core data and abstracts of selected plans.

Competent authorities

The objective of this catalogue is to give a comprehensive overview of the competent authorities relating to directive defined tasks in member countries. This directly reflects parts of the Framework Directive on Waste.

Waste management and waste prevention strategies and instruments

The objective of this catalogue is to give a full description of the actual situation concerning waste management and waste prevention practices and strategies in member countries.

7.2 Activities in 1999

In 1998 ETC/W created a data model to establish the WASTEBASE. This data model is described in detail in the report 'Report on an overall data model for ETC/W', July 1999.

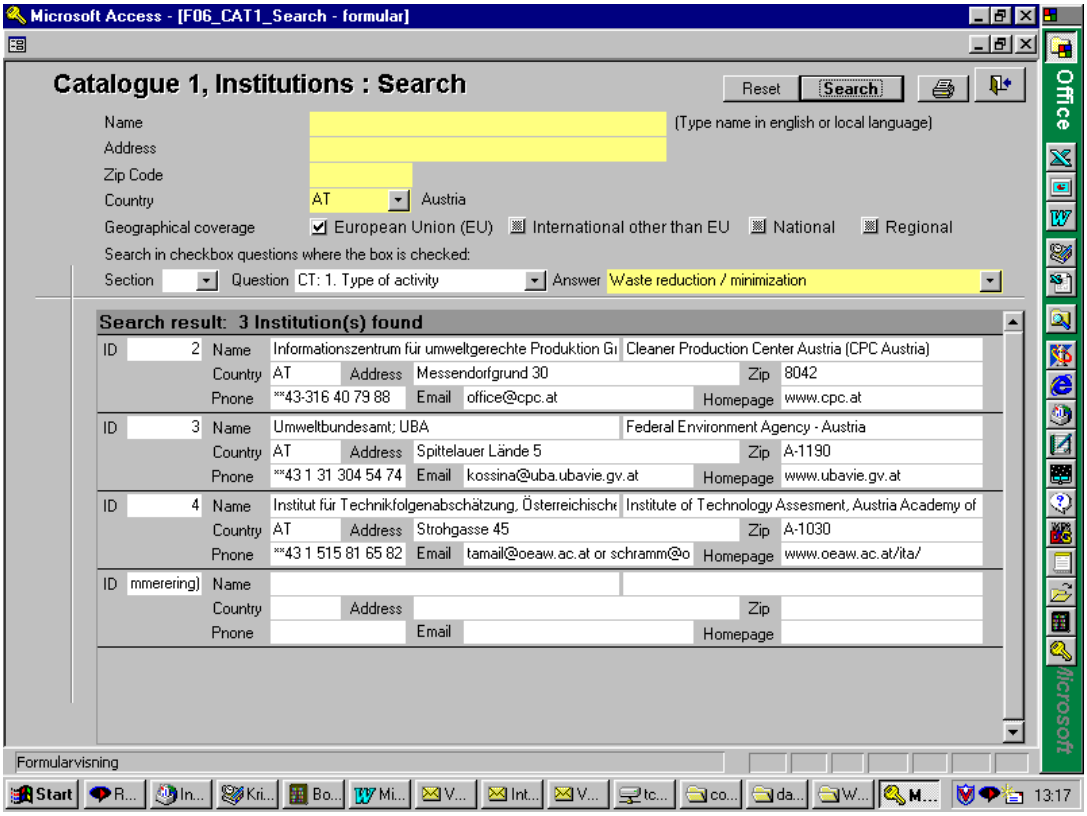
Work in 1999 has mainly been concentrated on setting up the various electronic catalogues as parts of an integrated WASTEBASE. To ensure the functionality of the database, WASTEBASE has been developed as a decentralised Access database that is easy to modify if necessary. This database contains the various catalogues, each of which includes search-function catalogues.

As an example Example 1 shows the result of an inquiry on the catalogue concerning 'Waste management institutions and clean technology centres'. In this example the inquirer asked for:

Country:	AT Austria
Geographical coverage:	EU
Question:	Type of activity
Answer:	Waste reduction/minimisation

The search result in Example 1 listed three institutions in Austria. Clicking on either the ID or any of the fields for Name or Address of the centres displays links to the datasheet of the selected centre. Clicking on the website address activates an Internet search that leads to the website of the selected centre.

Example 1



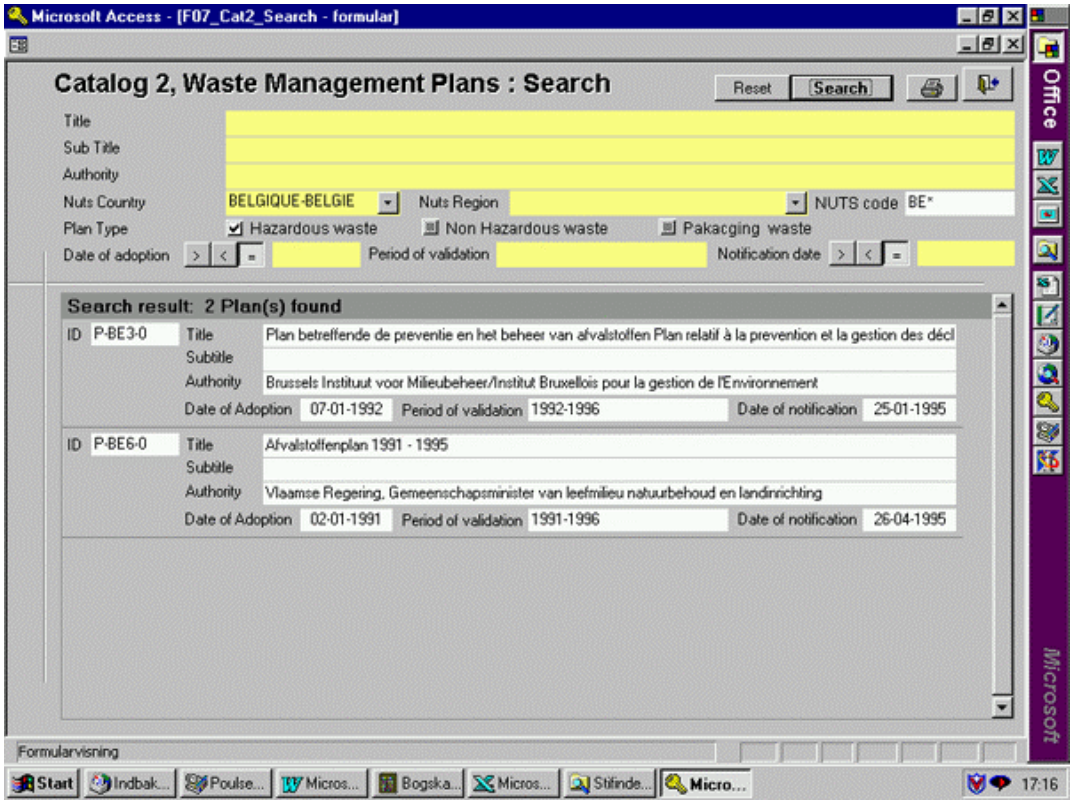
In Example 2 the screen-print shows the result of an inquiry in the catalogue concerning 'Waste Management Plans'. It is possible to create a search on one or more of the following fields: title, subtitle, authority, country, region, nuts code, date of adoption, date of notification, period of validation and finally which types of waste that the individual plan include (hazardous/non-hazardous/packaging). The user can also get an overview of the total number of plans set up in a single country.

In Example 2 the inquirer has asked for:

Country:	Belgique-Belgie
Geographical coverage:	Hazardous waste

The search result in Example 2 listed two Belgian plans on hazardous waste. As above, the user can click on one of the identification sections and go directly to the datasheet of the selected plan.

Example 2



At the end of 1999 the catalogues (except on waste management plans) only contain data from the ETC partner countries. However, they will be extended in 2000 to cover EEA member countries.

The search facilities of the five electronic catalogues are structured in the same way, but the inquiry will for obvious reasons differ from catalogue to catalogue. One of the common search parameters in the five catalogues is the NUTS code (nomenclature of territorial unit for statistics). This has been chosen because search on NUTS code provides the searcher with the ability to define the exact geographical level on which the search should take place.

As the next step the integrated WASTEBASE will be transformed into an Internet application and be made accessible from both the ETC/W and the EEA websites.

8. Development of the waste aspects of EIONET

8.1. Second annual EIONET workshop on waste

The second annual EIONET workshop on waste took place in Vienna (17 and 18 September 1999). The workshop was attended by 15 national reference centres, 4 National Focal Points, the Topic Centre on Air Emissions and representatives from the European and International institutions DG Environment, Eurostat, Joint Research Centre and the Secretariat of the Basel Convention.

The main objective of the workshop was to review the ongoing work of the ETC/W and further improve the network.

The workshop in Vienna was divided into four sessions. Session one was, apart from a presentation from EEA on strategies of the Topic Centres, presentations on 'State of the Art' of selected tasks, with focus on the electronic catalogues on waste minimisation and waste management practices and the database on waste management facilities.

Session two focused on a selected waste stream 'Waste from Electrical and Electronic Equipment (WEEE)'. The session was divided into two parts where the first part held presentations by ETC/W on the work undertaken by the Topic Centre. DG Environment presented the proposed draft Directive on WEEE followed by a presentation on the experiences on WEEE from Austria and Norway. Hereafter, the session continued with group discussions, where three working groups were asked to draw up two lists: one with problems specifically caused by WEEE and another suggesting initiatives to improve the management of WEEE in the European Union.

The working group session concluded that there is a general understanding that the raising amount of waste is one of the biggest challenges for the Community. But not all the waste streams show the same degree of growth or have the same impact on the environment. Especially waste from electrical and electronic equipment contains both elements: a considerable increase in the amount of waste and a large number of dangerous substances which sooner or later will be released into the environment. In addition, there is a lack of usable treatment facilities for the different kinds of WEEE.

During the workshop it became clear, that there were no simple solutions to solve the problems. The participants focused on the lack of common legislation and concluded that the draft Directive on WEEE must come into force as soon as possible. But it was a general conclusion, that a broad range of different instruments is necessary. Producer responsibility and a general regulation of the market were identified as the best means to control the waste stream. Besides, there was a general understanding that the use of economic instruments will have a positive effect on the management of the waste stream.

Session 3 was a site visit to Ebs (Entsorgungsbetriebe Simmering) in Vienna, a hazardous waste pre-treatment/incineration plant.

The final session contained a presentation of the Internet based working tool CIRCLE and of the ETC/W website, as well as a short description of the work carried out in relation to the 1999 yearly indicator report. The next workshop will be in Barcelona during spring 2000 (27-28 April).

8.2. EIONET CIRCLE

As a part of the establishment of EIONET the Internet tool CIRCLE has been introduced to create a platform for cooperation and collaboration with various EIONET parties.

CIRCLE (**C**entre of **I**nformation **R**esources for **C**ollaboration on **E**nvironment) is a powerful and user-friendly tool for group collaboration providing, among other interesting elements, mechanisms for document management, e.g. exchange of documents and discussion forums. Different **I**nterest **G**roups are established within CIRCLE. Three Interest Groups exist in the waste area, one for ETC/W partners and one for the ETC/W contacts with member countries and also a public IG has been put in place, mainly used for discussion on specific waste issues. During the Second Annual EIONET Workshop on waste, the second IG for the network around was demonstrated.

8.3. Contact with national reference centres (NRCs)

An important part of the development of EIONET is the bilateral meetings between ETC/W and NRCs/NFPs. During 1999 ETC/W had the opportunity to visit the NFP/NRC Belgium (June), NFP/NRC Germany (September), NFP/NRC Norway (October) and NFP/NRC Italy (December).

8.4. ETC Website

ETC/W launched its website **http://www.etc-waste.int** in October 1999 which, among other issues, provides background information about the Topic Centre, consortium partners, activities and overview of products.

The ETC/W website at: http://www.etc-waste.int

9. Support to EU policy framing and implementation

9.1. Introduction

The ETC/W work programme is directed towards the main problems of the Community Waste Strategy, aiming at providing the Commission and Member States with the necessary improvements of the knowledge base required in order to implement the Strategy efficiently. As part of this work, ETC/W cooperates closely with the Commission (DG Environment), Eurostat and the Secretariat of the Basel Convention as well as with member countries. Frequent meetings are arranged with these institutions, including regular participation in Commission Working Groups on behalf of EEA, participation in Commission steering committees on tendering of projects and ad-hoc support on various items as part of Commission policy framing and implementation.

9.2. Provision of quantified information

Preparation of efficient Community waste legislation and subsequent monitoring and enforcement of adopted legislation requires a thorough knowledge of the development in waste generation and waste treatment in all Member States. This conclusion is not only valid in relation to statistics on waste generation and waste treatment, but also in relation to waste treatment facilities. Indeed, a thorough knowledge about available treatment facilities is a prerequisite for setting realistic and achievable targets on the various waste management options such as material recycling and incineration with energy recovery, taking into account the required time for planning and necessary investments in the Member States. In addition, this information would support the requirements of the Framework Directive, according to which the Member States shall take appropriate measures to establish an integrated and adequate network of disposal installations thereby enabling the Community as a whole to become self-sufficient in waste disposal.

ETC/W is tackling most of these aspects as part of its work related to waste statistics and waste treatment facilities (see section 6). Within this framework, ETC/W regularly participated in the meetings of the Technical Adaptation Committee (TAC) organised by DG Environment and contributed to the draft proposal for a Regulation on waste management statistics.

9.3. Support to implementation of community legislation

ETC/W contributes to the implementation of Community Regulations with transparent information on how waste management is practised across member countries, securing an exchange of information which could facilitate an appropriate implementation and enforcement of Community waste legislation, including the drawing up of one or more waste management plans.

Development of project on future reporting

ETC/W has been commissioned by DG Environment to develop and structure an electronic version of the questionnaires related to the Member States' reporting obligation. According to the reporting obligations each Member State has to fill in questionnaires related to implementing various waste directives every three years. In the past ETC/W has supported DG Environment by processing the data from Member States for the period 1995-1997. The questionnaires are at this stage

developed as a database, and the Internet-based final version will be ready for use during 2000. In the next reporting period (1998-2000) it will thus be possible for Member States to do the reporting on Internet-based questionnaires, and this will facilitate the reporting and the processing of the collected information.

Topic report on biodegradable waste

The Landfill Directive, adopted in April 1999, obliges the Member States to reduce the quantities of municipal biodegradable waste going to landfill. In response to this, ETC/W plans to produce a topic report on strategies and instruments suitable for meeting these targets for biodegradable waste. To initiate the preparation of this report ETC/W participated in a conference in Vienna organised for the Member States concerning a forthcoming Directive on Compost. This directive should support the demands in the Landfill Directive. The Commission finds it important to give Member States the best opportunity for reaching the objectives in the Landfill Directive by setting up targets for quality products in relation to treatment of biodegradable waste, for example at composting plants.

The principal objective of the topic report (to be published in 2000) will be to provide European-wide information on the current status of biodegradable waste management and the various options available to reduce amounts going to landfill. The report will address the strategic planning requirements to meet the targets and should be seen as a general guidance tool for Member States to assist them with the challenge ahead. It will also outline a methodology and indicators for measuring progress towards the targets set out in the Directive and it will focus on the attainment of these targets.

Other activities

As a follow-up to the Commission Communication on 'The competitiveness of the Recycling Industry', the Recycling Forum was established in 1999. The main terms of reference were

- To assess the key factors for competitiveness, and
- To identify the most appropriate mix of actions to be taken.

Actions to be developed should focus mainly on the proper functioning and the creation of new markets, the improvement of economic structure and innovation. The Forum was composed of representatives of 15 industrial sectors (manufactures and recyclers), Member States experts (economic and environment ministries), environment NGOs, Local Authorities organisations and Commission representatives.

ETC/W in 1999 participated in the plenary sessions and in two of the working groups: *'Economic, Environmental and Social Diagnostic'* and *'Regulatory Approaches'*. The Recycling Forum will finalise its work in the beginning of 2000.

10. Products

A number of products were delivered to the EEA during 1999:

Topic reports

- *Annual Topic Update – Waste.* (No 6/1999).
- *Hazardous waste generation in selected European countries. Comparability of classification systems and quantities.* (No 14/1999).
- G*eneration of household waste and municipal waste in member countries of the European Environment Agency. Comparability and non-comparability* (to be published).

Technical reports

- *Report on an overall data model for ETC/W.* (No 23/1999).
- *Information on waste management practices. A proposed electronic framework.* (No 24/1999).
- *Baseline projections of selected waste streams. Development of a methodology.* (No 28/1999).
- *Development and application of waste factors – An overview.* (No 37/1999).
- *Dangerous substances in waste.* (No 38/1999).

Electronic catalogues

- Electronic catalogue on Waste Minimisation/Clean Technology Institutions/Centres (limited coverage).
- Electronic catalogue on Waste Management Plans.
- Electronic catalogue on Competent Authorities (limited coverage).
- Electronic catalogue on Waste Management Strategies and Instruments (limited coverage).

Environmental signals

- Fact sheets on waste indicators for the *Environmental signals 2000.* Including dataset on eight issues on waste management.
- Chapter on waste for *Environemental signals 2000.*

Interim reports

- Interim report on delivered core data (waste management facilities).
- Interim report on a proposal for extended data set covering all EEA member countries (waste management facilities).

11. ETC workplan 2000

ETC/Waste **Date: February 2000**

EVENT/ACTIVITY	EVENT DATE	RESPONSE DEADLINE	EXPECTED OUTPUT	OUTPUT DATE
Workshop				
Third Annual EIONET workshop on waste	27-28 April		Minutes	May/June
Country visit to:				
Selected NRCs – general issue Selected NRCs – information on waste management strategies, competent authorities and strategies on organic waste			Missions reports	One month after visit
Questionnaires / Request				
Request for data on specific waste streams	2-5/2000	3-6/2000		
Follow up on 'Information on waste minimisation and clean technology centres'		15/1-2000	Part of WASTEBASE	2000
Follow up on 'Information on waste minimisation strategies'		1 /2-2000	Part of WASTEBASE	2000
Draft report for review	**Final drafts to EEA:**		**Expected output:**	
Comparability and non-comparability; classification and terminology of hazardous waste in EEA Countries	6/2000		Topic report	
Contribution to annual indicator report (2001)	6/2000		Waste chap.	
Report on Four datasets, the implementation and the main assumptions made for establishment of the computer based scenarios	6/2000		Tech. report	
Report on specific aspects of waste	10/2000		Topic report	
Report on strategies and instruments for organic waste in relation to the forthcoming Landfill Directive	10/2000		Topic report	
Report on assessment of emissions from various treatment schemes, with particular focus on the selected dangerous substances	11/2000		Tech. report	
Information on waste management facilities in the catalogue, including a proposal to an extended dataset and a manual.	11/2000		Tech. report	
Overview of waste data on construction and demolition waste, sewage sludge, organic waste, waste oil and waste from coalfired power stations.	10/2000		Tech. report	
Annual topic update 2000	12/2000		Topic report	
Other main output				
Dataset on construction and demolition waste, sewage sludge, organic waste, waste oil and waste from coalfired power stations.	3-10/2000		Dataset	
Computer based projection model, including detailed material flow schemes to calculate waste arising from selected appliances, Electrical and Electronic Equipment (EEE), and projections of future waste streams arising from the selected appliances in the ETC/W partner countries	4/2000			
Computer based projection model for making, including projections of future waste arising from selected appliances in the remaining EEA countries to make future waste arising from EEE in general. In addition, an outlook/proposal for the adoption of the model to calculate waste stream arising and making projections of end-consumer goods in general will be provided.	11/2000			
Computer based model for making scenarios in order to evaluate the various measures to reduce emissions to the environment from the treatment of waste from EEE.	11/2000			
Maintenance and updating of electronic catalogues on waste management facilities, notified waste management plans, competent authorities, waste management strategies and instruments, waste minimisation/cleaner technology institutions, strategies and instruments.	10-11/2000		WASTEBASE	

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ETC/W: *Hazardous waste generation in: Austria, Denmark, Germany (North Rhine-Westphalia), Ireland and Spain (The Basque Country and Catalonia). Comparability and non-comparability in relation to classification and quantities for the period 1993-96.*

Annex 1 List of national reference centres

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