Technical report No 23

Report on an overall data model for ETC/Waste

Prepared by:
Rikke Petersen, ETC/Waste
Annelise Ravn, Danish EPA
Niels Henrik Mortensen, Danish EPA

July 1999

Project manager:
Anton Azkona
European Environment Agency

European Environment Agency

Cover design: Rolf Kuchling, EEA

Legal notice

The contents of this report do not necessarily reflect the official opinion of the European Communities or other European Communities institutions. Neither the European Environment Agency nor any person or company acting on the behalf of the Agency is responsible for the use that may be made of the information contained in this report.

A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server (http://europa.eu.int),

©EEA, Copenhagen, 1999

Reproduction is authorised provided the source is acknowledged

Printed in Copenhagen

Printed on recycled and chlorine-free bleached paper

European Environment Agency
Kongens Nytorv 6
DK-1050 Copenhagen K
Denmark
Tel: +45 33 36 71 00
Fax: +45 33 36 71 99
E-mail: eea@eea.eu.int

Contents

Executive summary 5

1. Introduction 8

2. 'Real world' model concerning waste and waste management 9

3. A coherent information model for the ETC/W work programme 10

3.1. An overall information model for ETC/W 10
3.2. Common dimensions 11
3.2.1. The spatial dimension (geography) 12
3.2.2. The temporal dimension (time) 14
3.2.2. Waste oriented categories 16
3.3. Documentation requirements 18

4. Data generation and flow 19

5. Task 1: Review of data availability and compatibility 20

5.1. Diagram of task 1 20
5.2. Definition of task 1 22
5.3. Relation to other project elements 22
5.4. Sources of data 22
5.5. Other comments 23

6. Task 2 : Projection, scenarios and assessments 24

6.1. Relation to other project elements 24
6.2. Sources of data 24

7. Task 3: Dangerous substances in waste 25

7.1. Relation to other institutions. 25
7.2. Relation to other project elements. 25
7.3. Sources of data 26

8. Task 4: Waste treatment facilities 27

8.1. Diagram of task 4 27
8.2. Definition of task 4 29
8.3. Relation to other project elements 32
8.4. Sources of data 32

9. Task 5-6: Waste management and waste minimisation practices 33

9.1. Diagram of task 5-6 33
9.2. Task 5.1 Clean technology and waste management institutions 35
9.2.1. Definition of task 5.1. 35
9.2.2. Relation to other project elements 36
9.2.3. Sources of data 36
9.2.4. Other comments 36
9.3. Task 5.2 General waste plans. 36
9.3.1. Definition of task 5.2. 36
9.3.2. Relation to other project elements 38
9.3.3. Sources of data 38
9.3.4. Other comments 38
9.4. Task 5.3 Competent authority 38
9.4.1. Definition of task 5.3 38
9.4.2. Relation to other project elements 39
9.4.3. Sources of data 39
9.4.4. Other comments 39

9.5. Task 5.4: Waste management strategies and instruments 39
9.5.1. Definition of task 5.4. 39
9.5.2. Relation to other project elements 40
9.5.3. Sources of data 40
9.5.4. Number of occurrences 40
9.5.5. Other comments 40
9.6. Task 6.5: Cleaner production/waste minimisation strategies and initiatives 40
9.6.1. Definition: 40
9.6.2. Relation to other project elements 42
9.6.3. Sources of data 42
9.6.4. Number of occurrences 42
9.6.5. Other comments 42
10. Conclusions 43
Annex 1: Overview of EU waste management legislation 44
Annex 2: Survey of code lists used in context of the ..... European Topic Centre on Waste 46
Annex 3: DPSIR oriented flow concerning waste generation and waste ..... management in EU 55

Executive summary

Background and objectives of the report.

(Chapter 1)

The work programme of the European Topic Centre on Waste (ETC/W) requires a number of databases and electronic catalogues to be set up, covering data as well as information related to waste management and waste minimisation in general.

It is recognised that there is a need to structure the information required by the EEA as well as EEA member countries, the European Commission and other international institutions. The structuring, however, should not only be limited to one database or electronic catalogue, but should also focus on the overall data flow generated as a result of the ETC/W work programme. The main objectives of this report are therefore to:

- develop a common 'view of the world' based on the DPSIR assessment framework adopted by the EEA (**D**riving Forces, **P**ressure, **S**tate of the Environment, **I**mpact, **R**esponse);
- describe an overall information model covering the various tasks of the ETC/W;
- analyse the possibilities to link data across the ETC/W tasks by identifying a set of common dimensions and their classifications (code lists);
- establish the platform for the development and implementation of *WASTEBASE*, an integrated search facility database related to waste management and waste minimisation;
- inform the main clients of the EEA about the information strategy adopted by ETC/W.

A 'Real World' model according to the DPSIR conceptual framework.

(Chapter 2)

One generally important purpose of making a model is to make a conceptual simplification of a chaotic and dynamic world in order to draw attention to the objects, properties and relations of importance to the task focused on.

In the case of waste flow and waste management there are indeed many active parties and many potentially interesting mechanisms:

- **The driving forces** i.e. the sources of waste, e.g. households and industry; the managing institutions organising collection and transport of waste; the waste treatment plants where the waste is either recovered or disposed;
- Waste often ends up being incinerated or disposed in landfill sites, both treatment forms leading to environmental **pressure** in the form of e.g. emission to air;
- The various sorts of pressure to air, soil, water and land use, resulting from waste generation and treatment, affect the **state of the environment** in different ways;
- Some of the resulting **impacts** are considered dangerous for nature and/or human health, e.g. the leakage of dangerous substances from landfills may cause severe pollution of ground water and subsequently of drinking water;
- The set of institutions working with waste planning and regulation at regional, national or international level form some of the **responses** to the problems related to waste.

Put into a diagrammatic form the model outlined above can be pictured as shown in annex 3 '*DPSIR oriented flow concerning waste generation and waste management*'. The ETC/W tasks are primarily oriented towards the aspects of driving forces, pressures and response.

An information oriented model

(Chapter3)

The information oriented model aims at giving an overview of the subject area of ETC/W as defined in its work programme. i.e., which topics are treated within the scope of ETC/W and how are these topics (potentially) interrelated.

An overall information model for the ETC/W work programme includes five different basic entities:

- Waste sources
- Waste quantities
- Waste collection & transport
- Waste treatment facilities
- Waste management/minimisation planning & institutions.

The interrelation between these entities showing the waste stream/waste flow is illustrated as a diagram in Chapter 3.

The entities are interrelated via common types of information – common dimensions. These dimensions provide – in principle – a common view on data collected via the different tasks within the ETC/W work programme.

The main common dimensions for ETC/W are:

- the spatial dimension
- the temporal dimension and
- the waste oriented categories.

The waste oriented categories describe various aspects of the themes 'waste' and 'waste management' such as type of waste source, type of waste fraction, type of waste treatment.

In chapter 3 each dimension is defined, a frame for registration is described and finally the connection between the different task entities and actually used code lists is described in a cross-reference table. Code lists referred to are listed in the annex 'Code lists used in the context of the ETC/W'.

Yet another set of relevant information is briefly described at the end of chapter 3, namely documentation requirements. For that purpose a set of minimum requirements, e.g. the source of data and the time of update, and some common formats for implementation are required.

Generation and flow of waste data

(Chapter 4)

There are many interested parties involved in waste management and waste planning. Besides the national and regional governmental institutions, research centres etc, there are the EU bodies (especially DGXI of the European Commission, Eurostat, EEA and its topic centres), OECD, UN and several international conventions.

The potential overall data flow to the ETC/W is presented in chapter 4. The diagram illustrates the value that each institution within this organisational set up adds to the various data sets. It also illustrates the complexity to be addressed when aiming at common nomenclature, common code lists, etc.

Data models and descriptions of ETC/W tasks 1 to 5

(Chapters 5 to 9)

The ETC/W work programme is described in more detail. The description of the data catalogue oriented projects includes:

- a data diagram showing the main entities and relations of the task
- a definition of the relevant information types including references to code lists
- the task's relation to other project elements
- main sources of input data for the task.

Main conclusions

(Chapter 10)

At present, data on waste at European level is rather incomparable. One of the most challenging tasks of ETC/W is therefore, by way of compiling and assessing already existing data and information, to achieve comparability of registrations made by Member States on waste flow and waste management to a usable level, without losing too many Member State specific aspects and without duplicating work carried out by other institutions like e.g. Eurostat.

The assessment of waste data and information requires at least:

- a common nomenclature (on real world entities and events)
- a set of common classifications referring to the entities, relations etc. in question.

To ensure total comparability, the selected classifications should ideally be encoded, so that for example a specific waste source or waste fraction is always registered in the same way. This may well, however, be the long term result of the present proposal for a Council Regulation on Waste Management Statistics. In order not to duplicate work, ETC/W will therefore focus its activities on the two requirements, i.e. a common nomenclature and a common set of classifications relating to this nomenclature, making use of common code lists such as NUTS, NACE, the R/D list etc. wherever reasonable and realistic. Scrutinisation of existing data into comparable formats will be added wherever possible.

1. Introduction

The work programme of the European Topic Centre on Waste (ETC/W) requires a number of databases and electronic catalogues to be set up, covering data as well as information related to waste management and waste minimisation in general.

It is recognised that there is a need to structure the information required by the EEA as well as EEA member countries, the European Commission and other international institutions. The structuring, however, should not only be limited to one database or electronic catalogue, but should also focus on the overall data flow generated as a result of the ETC/W work programme. The main objectives of this report are therefore to:

- develop a common 'view of the world' based on the DPSIR assessment framework adopted by the EEA (**D**riving **F**orces, **P**ressure, **S**tate of the Environment, **I**mpact, **R**esponse);
- describe an overall information model covering the various tasks of the ETC/W;
- analyse the possibilities to link data across the ETC/W tasks by identifying a set of common dimensions and their classifications (code lists);
- establish the platform for the development and implementation of *WASTEBASE*, an integrated search facility database related to waste management and waste minimisation;
- inform the main clients of the EEA about the information strategy adopted by ETC/W.

The report contains three main sections on data aspects of ETC/W.

The first section (chapter 2) suggests a 'real world' model concerning waste and waste management. The point of making such a model is to ensure a common nomenclature and a common understanding of the entities, relations and interactions related to the subject field.

The second section (chapters 3-4) proposes an overall information model for the various tasks of ETC/W. The purpose of making such a model is to describe how the tasks are – or are not – logically interconnected. The model is accompanied by an analysis of the common dimensions relevant for the subject field. The common dimensions are the 'viewpoints' making it possible to link data across task subjects, e.g. the overall use of NUTS as a common code list for administrative regions within the EU make it possible to combine data from all catalogues at a spatial level.

Besides the temporal and spatial dimension (time and location), especially the category waste type is discussed, because it is an important binding factor between most task catalogues.

In the third section (chapters 5-9) the tasks are described one by one. The description includes a diagram showing the main entities and relations within the subject field of each task, plus a scheme listing the main information types and corresponding code lists.

The report is completed with a set of conclusions concerning future work with waste data.

The report is a result of a project carried out by the Danish Environmental Protection Agency on behalf of ETC/W.

2. ‘Real world’ model concerning waste and waste management

One generally important purpose of making a model is to make a conceptual simplification of a chaotic and dynamic world in order to draw attention to the objects, properties and relations of importance to the task focused on.

In the case of waste flow and waste management there are indeed many active parties and many potentially interesting mechanisms. At first hand there are **the driving forces** i.e. the sources of waste, e.g. households and industry. Then there are the managing institutions organising collection and transport of the very differing kinds of waste, generated by the heterogeneous set of producers. The transported waste ends – hopefully – at a waste treatment plant where it is either recovered or disposed.

Part of the waste returns via recovery to the consumer/producer link. Other sorts of waste end up being incinerated or disposed in landfill sites, both treatment forms leading to environmental **pressure** in the form of e.g. emission to air.

The various sorts of pressure to air, soil, water and land use, resulting from waste generation and waste treatment, affect the **state of the environment** in different ways. These produce **impacts** which can be dangerous for nature and/or human health, e.g. the leakage of dangerous substances from land fills may cause severe pollution of ground water and further on of drinking water.

The set of institutions working with waste planning and regulation at regional, national or international level has, as their prime objective, to formulate, implement and enforce policies and strategies minimising the damaging effects of waste generation etc. They form some of the **responses** to this important societal and environmental issue.

The response may have many forms and make use of many different instruments, e.g. development of cleaner technologies, setting goals for recycling of glass, putting taxes on waste treatment, giving permits to waste treatment facilities, providing information to the public etc. Principally, the response may be oriented towards different targets: either minimising waste generation at the driving force level, reducing pressure by e.g. defining emission permits or cleaning-up in the nature. At present it seems that the main focus is oriented towards the first set of goals.

The above mentioned entities, relations and interactions constitute a simple model describing some of the main aspects of waste management. The description follows the DPSIR assessment framework adopted by EEA: Driving forces – Pressure – State of the environment – Impact – Response. The model can be illustrated as shown in annex 3: ‘*DPSIR oriented flow concerning waste generation and waste management*’.

3. A coherent information model for the ETC/W work programme

This chapter aims at giving an overview of the subject area of ETC/W as defined by the agreement between the Topic Centre and EEA:

- task 1 – review of data availability and comparability
- task 2 – projections, scenarios and assessment
- task 3 – dangerous substances in waste
- task 4 – database on waste management facilities
- task 5 – waste management practices
- task 6 – waste minimisation practices

and how these tasks are (potentially) interrelated.

3.1. An overall information model for ETC/W

An overall information model, based on a modified object oriented analysis, has been developed. The model for the various tasks includes five different basic entities:

- Waste sources
- Waste quantities
- Waste collection & transport
- Waste treatment facilities
- Waste management planning & institutions.

The interrelation between these entities showing the waste stream/waste flow can be described as follows:

A source of waste, e.g. an industrial sector, generates a certain amount of waste via some industrial processes (per year per Member State). The waste is collected and transported either via a municipal or a private management system to a treatment facility where it undergoes treatment (recovery or disposal).

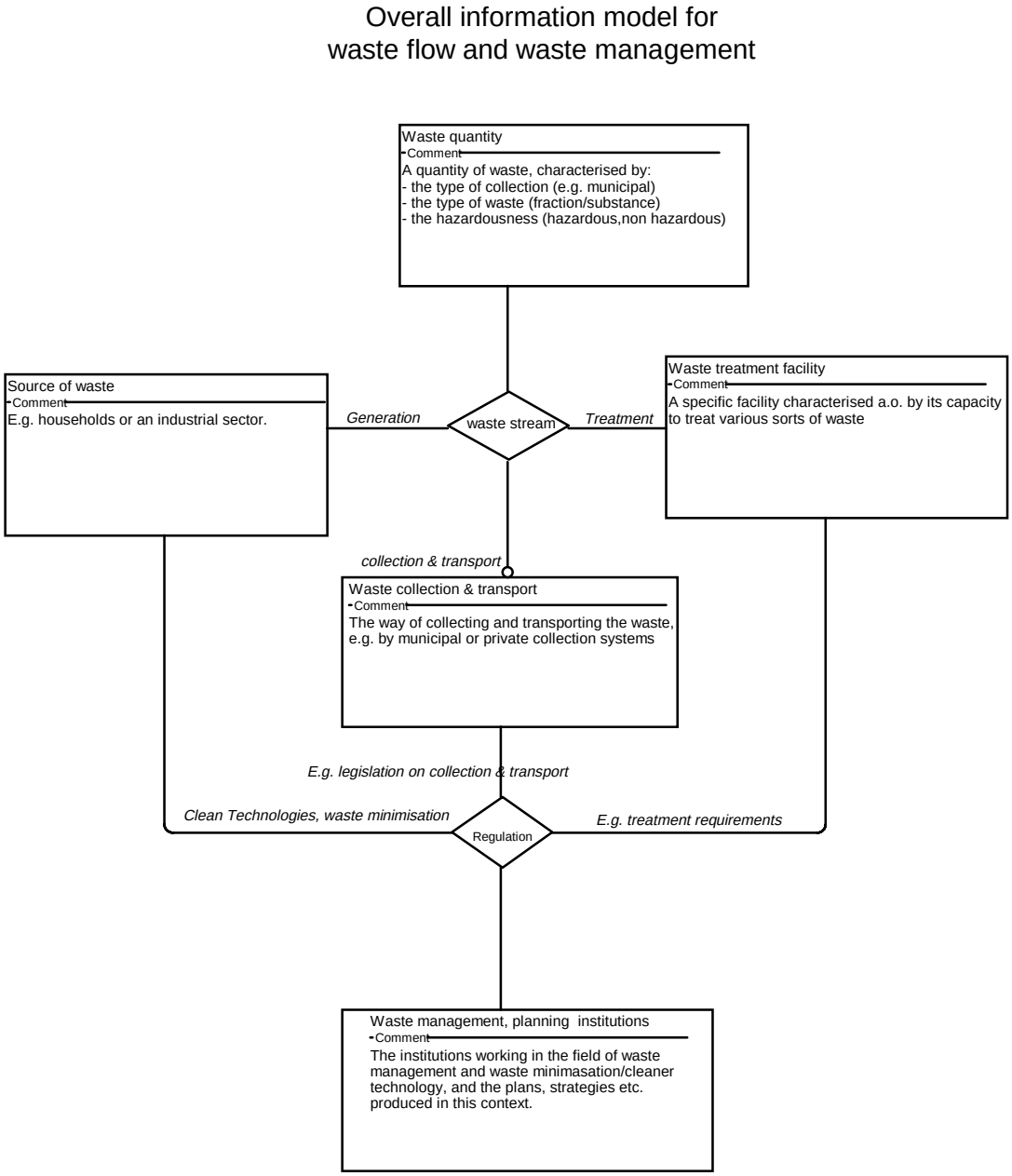
The different administrative levels within the field of waste management respond to this process (waste stream) via legislation, planning, strategies etc. in order to – according to the respective competences – minimise the waste production and maximise the recovery of waste.

The main relation between the ETC/W tasks and the above mentioned entities can be described as follows:

- Waste sources *(task 2: waste factors, scenarios etc., task 3: dangerous substances in waste)*
- Waste quantities *(task 1: comparability of waste data on waste streams, task 2: waste factors, scenarios etc., task 3: dangerous substances in waste)*
- Waste collection & transport
- Waste treatment facilities *(task 4: location, capacity etc. of waste treatment facilities)*
- Waste management planning & institutions *(task 5: various registrations of institutions, plans and strategies related to the field of waste management).*

The entities are interrelated via common types of information – common dimensions. The most important of these relations is the 'waste stream' describing the interrelation between the 'waste source' and the 'waste treatment facility'.

The overall information model can be illustrated as shown in the following diagram:



3.2. Common dimensions

These are the dimensions providing – in principle – a common view on data collected via the different tasks within the scope of the ETC/W, i.e. these 'points of view' give a possibility to link information concerning the various aspects of waste and waste management: sources/generation, collection, amounts, treatment and regulation.

Each dimension is registered at a specific scale. The scale describes the level of aggregation for the dimension in question e.g. for the spatial dimension: member state level (NUTS level 0), large region level (NUTS level 1 to 2).

A dimension may be registered in many different ways. The format and code list for registration of a specific dimension must be commonly specified in order to secure linking of information.

The following chapters describe the main dimensions relevant for the ETC/W tasks. That is, the spatial dimension (3.2.1), the temporal dimension (3.2.2) and the waste oriented categories (3.2.3). Each

dimension is defined, a frame for registration is described and finally the connection between ETC/W task entities and actually used code lists is described in a cross-reference table. The information needs described, only considers the 'substantial' part of the tasks. i.e., documentary needs such as the data source and time of update is described in the last part of this chapter (3.3).

3.2.1. The spatial dimension (geography)

3.2.1.1. Definition

All the entities have geographic dimensions.

Real world entities – e.g. a waste treatment facility – cover specific geographic area that can be represented as an area/polygon on a map or a postal address.

Statistically defined entities – e.g. waste generation – can be aggregated at different geographic scales – e.g. Member State.

The registration of the geographic dimension can be done in different ways, e.g. by reference to a list of NUTS regions or by reference to a specific map projection.

The Topic Centre on CDS (Catalogue of Data Sources) has developed some guidelines and recommended formats for registering addresses, ZIP-codes etc., which as far as possible will be followed by the ETC/W[1].

3.2.1.2. Used geographic scale

- Actual location of the real world entity.
- NUTS level 0 to 5.

3.2.1.3. Frame for registration of the geographic dimension

Types of registration of the geographic dimension:

- Actual location:
  - represented as a point:
    - Postal address
    - X and Y coordinates
- NUTS – level 1 to 5 – area covered.

Technical specification of the form of registration:

- Addresses: A text field.
- NUTS code: A text field.
- Used map projection: Geographic coordinates – decimal degrees.[2]
- Geographic locations covering an area are stored in a GIS system.
- Geographic locations representing a point are stored in the database as two numeric fields.

[1] These guidelines can be found at the home page of CDS: http://www.mu.niedersachsen.de/cds.

[2] The used map projection, the units used and the format has to be defined in corporation with ETC/ Landcover and ETC/CDS.

Cross-reference table – Tasks/entities and the registration of the geographic dimensions.

Task	Entities – from diagrams	Geographic reference system	Level
1	Waste quantity	Statistically defined entity: Reference to NUTS-list	Level 0 and in some cases level 1 to 2. In special cases: level 5 (large cities)
	Waste source	Statistically defined entity: Reference to NUTS-list	Level 0 and in some cases level 1
2	Waste factors	Statistically defined entity: Reference to NUTS-list	
4.	Waste treatment facility	Real world entity: Postal address Geographic coordinates – when possible Reference to NUTS-list	See above. Lowest level of NUTS.
6.1	Cleaner technology and waste management centres	Real world entity: Postal address Reference to NUTS-list	Level 3 or 5
5.2	General notified waste management planes	Real world entity: Reference to NUTS-list	Level 0 to 5
	Selected notified waste planes	Real world entity: Reference to NUTS-list	Level 0 to 5
	Planned/factual waste quantity	Statistically defined entity: Reference to NUTS-list	Level 0 to 5
5.3	Competent authority	Real world entity: Postal address Reference to NUTS-list	Level 0 to 5
5.4	Waste management strategies and instruments	Real world entity: Reference to NUTS-list	Level 0 and in some cases level 3
	Waste management instrument	Real world entity: Reference to NUTS-list	Level 0 and in some cases level 3
6.5	Cleaner technology strategies and instruments	Real world entity: Reference to NUTS-list	Level 0 and in some cases level 1
	Cleaner technology instruments	Real world entity: Reference to NUTS-list	Level 0 and in some cases level 1

3.2.2. The temporal dimension (time)

All the entities have temporal dimension.

Real world events – e.g. notification of a waste treatment plan – may have a specific time stamp.

Statistical defined entities – e.g. waste generation – may be aggregated at different time scales representing different duration of time – e.g. per year.

The registration of the time stamp and the duration of time can be done in different ways.

3.2.2.1. Used temporal scale

Scale:

- YEAR
- Real time/actual

3.2.2.2. Frame for registration of the time dimension

Types of registration:

- Time stamp
    1. Clock time.
    2. Date
    3. Month
    4. Year
- Time duration
    - Periods: Year.
    - From and to date:
        'From date' and 'to date'.
        or
        'from year' and 'to year'.

Technical specification of the form of the registration[3]:

- Year: CCYY
- Month: CCYYMM
- Date: CCYYMMdd
- Clock time: CCYYMMddhhmmss

[3] The exact format has to be defined according to the definition used by ETC/CDS - the actual used is according to ISO8601.

3.2.2.3. Cross-reference table – Tasks/entities and the registration of the dimension of time

Task	Entities – from diagrams	Types of registration	Scale of registration
1	Waste quantity	Statistically defined entity: Duration of time	Year
1	Waste source		Year
4.	Waste treatment facility	No time dimension	
6.1	Cleaner technology and waste management centres	Real world events: • Date of establishment	Date – lowest level of time
5.2	General notified waste management planes	Real world events: • Date of adoption • Date of notification Duration of time: • Date of plan period start • Date of plan period end	Date – lowest level of time
	Selected notified waste planes	Real world events: • Date of adoption • Date of notification Duration of time: • Date of plan period start • Date of plan period end	Date – lowest level of time
	Planned/factual waste quantity	Statistically defined entity: Duration of time	Year
5.3	Competent authority	Real world events: • date of foundation	Date – lowest level of time
5.4	Waste management strategies and instruments	Real world events: • Date of adoption Duration of time: • Date of coming into action • Date of expire (optional)	Date – lowest level of time
	Waste management instrument	Real world events: • Date of adoption Duration of time: • Date of coming into action • Date of expire (optional)	Date – lowest level of time
6.5	Cleaner technology strategies and instruments	Real world events: • Date of adoption Duration of time: • Date of coming into action • Date of expire (optional)	Date – lowest level of time
	Cleaner technology instruments	Real world events: • Date of adoption Duration of time: • Date of coming into action • Date of expire (optional)	Date – lowest level of time

3.2.2. Waste oriented categories

These are the dimensions describing various aspects of the themes 'waste' and 'waste management'.

Different classifications of waste are used in task 1 to 6. These classifications are often not comparable, but it seems to be possible to extract some common dimensions:

- type of waste source/waste generating sector
  e.g. a NACE encoded sector

- type of process generating waste
  e.g. electrolyse

- type of waste collection system
  e.g. municipal

- type of waste fraction
  e.g. glass and bottles

- type of waste substance
  e.g. cadmium

- type of waste treatment
  e.g. recovery

- hazardous/non hazardous
  e.g. non hazardous

In most cases the actually used classification lists include a combination of these dimensions, e.g. the European Waste Catalogue (EWC) combines the dimensions process, source and fraction in its view.

The combination of dimensions mirrored in the various classification lists are not common for the ETC/W tasks. Furthermore, the classifications of each single dimension e.g. 'fraction' are not always common. The actual status for the classification lists and their use in the different tasks are described in the annex '*Code lists*'. Also code list identifications such as 'ETC/W 1a' used in the following cross-reference table, refer to this annex.

It must be emphasised that it is a prerequisite for combining data across the ETC/W tasks, that a common set of classification lists are defined/identified, at least at some upper level of aggregation. Otherwise, it will only be possible to link data together via time and space.

3.2.3.1. Cross-reference table – Tasks/entities and common waste oriented dimensions

Common dimension	Task	Entities – from diagrams	Code list name – from appendix	Level in code list
Source	1	Waste quantity	EWC, ETC/W 1a + 1b, Member State classifications	
	1 + 2 + 3	Source	NACE	
	4	Waste treatment facility	EWC	
	6.1	Cleaner technology and waste management centres	EWC, ETC/W 5.1b NACE codes	EWC top level
	5.2	Selected notified waste plans	EWC, ETC/W 5.2 NACE codes?	EWC top level
	5.3	Competent authority	Local list	
Process	1	Waste quantity	EWC,	Top level
	6.1	Cleaner technology and waste management centres	EWC, ETC/W 5.1b , SNAP	EWC top level?
	5.2	Selected notified waste plans	Local code list – not defined	
Fraction	1	Waste quantity	EWC, ETC/W 1a + 1b, Member State classifications	
	4	Waste treatment facility	EWC[4]	
	6.1	Cleaner technology and waste management centres	EWC, ETC/W 5.1b	EWC top level?
	5.2	Planned/factual waste quantity	Local code list	
Substance	3	No entity defined		
	4	No entity defined yet		
Hazardous/non hazardous	1	Waste quantity	EWC, HWL, ETC/W 1a + 1b	
	4	Waste treatment facility	EWC[5]	
Collection	1	Waste quantity	EWC, ETC/W 1a + 1b	
	4	Waste treatment facility	EWC	
	5.2	Planned waste quantity	ETC/W 5.2	
	5.3	Competent authority	Local code list	
Treatment	1	Waste quantity	R/D list	
	4	Waste treatment facility	R/D list. Could be supplemented by NACE+SNAP[6]	
	5.2	Planned waste quantity	ETC/W 5.2	

[4] Member States classification could be used if necessary, but first priority is given to EWC.
[5] Member States amendment could be included.
[6] The two supplementary classifications are not a part of the core data set.

3.3. Documentation requirements

Generally all data sets collected in connection with the tasks of ETC/W will be supplied with a basic documentation of:

- the source of the data
- the time of update.

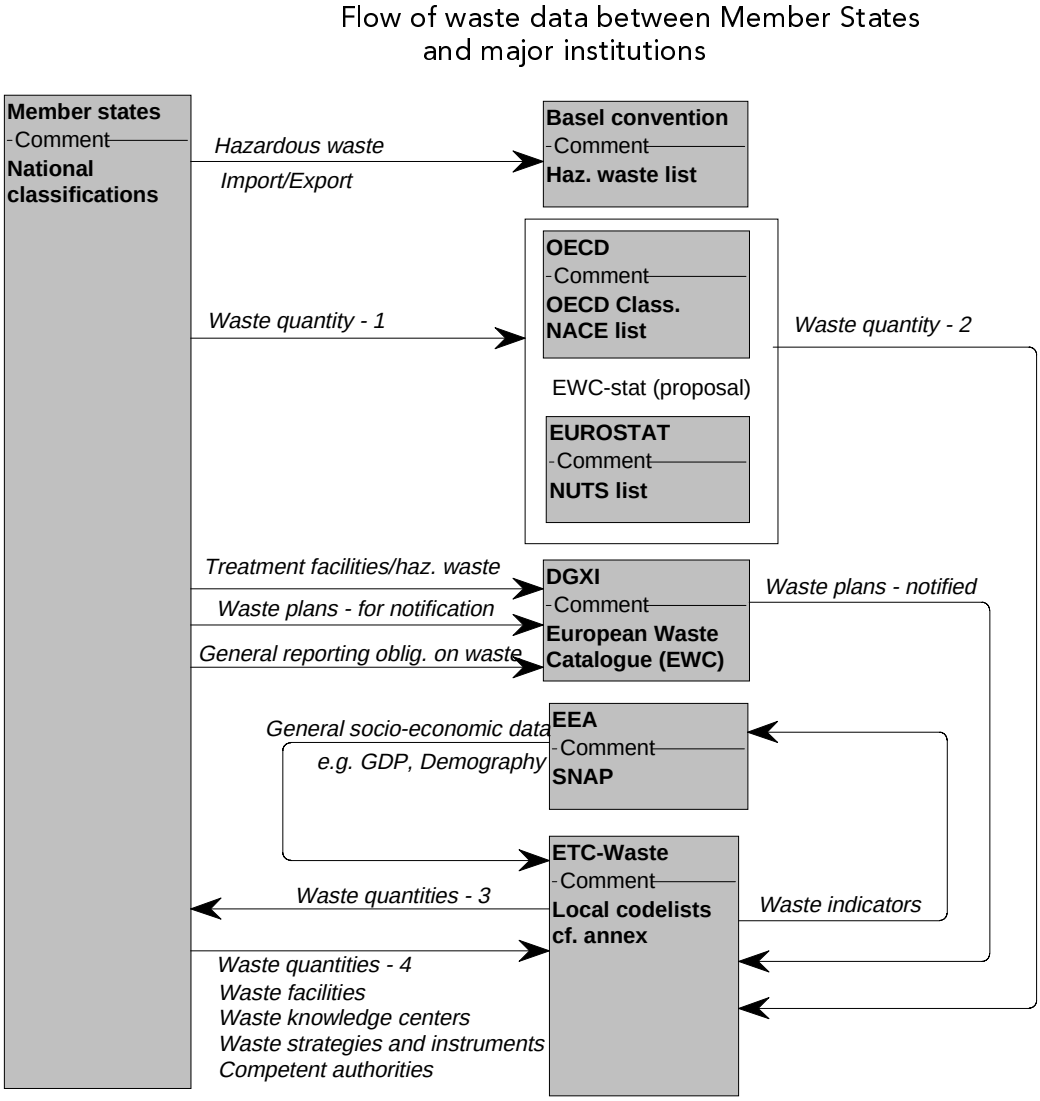
In some cases it will also be reasonable to supplement the input data with comments in the form of a free text field.

Common minimum requirements and formats for this kind of information will have to be followed, including a common way of referring to data sources (e.g. Member States). In this way it will be possible for all involved parties and later on for external users to find the documentation, regardless of the nature of the topic and the designer of the data set.

4. Data generation and flow

There are many interested parties involved in waste management and waste planning. Besides the national and regional government institutions, research centres etc., there are the EU bodies (especially DGXI, Eurostat, EEA and its topic centres), OECD, UN and several international conventions.

Without going into detail with existing collections of data on waste and waste management, the overall picture of data flow to ETC/W can be described as follows:



The most important general and waste oriented code lists are listed in connection with the responsible institution under the headline 'Comment'.

A short review of relevant EU legislation is given in the annex '*Overview of EU Waste management legislation*'.

The diagram draws attention to what kind of value the institutions adds to the various data sets within this organisational set up, illustrating the complexity to be addressed in the search for common nomenclature, common code lists, etc.

5. Task 1: Review of data availability and compatibility

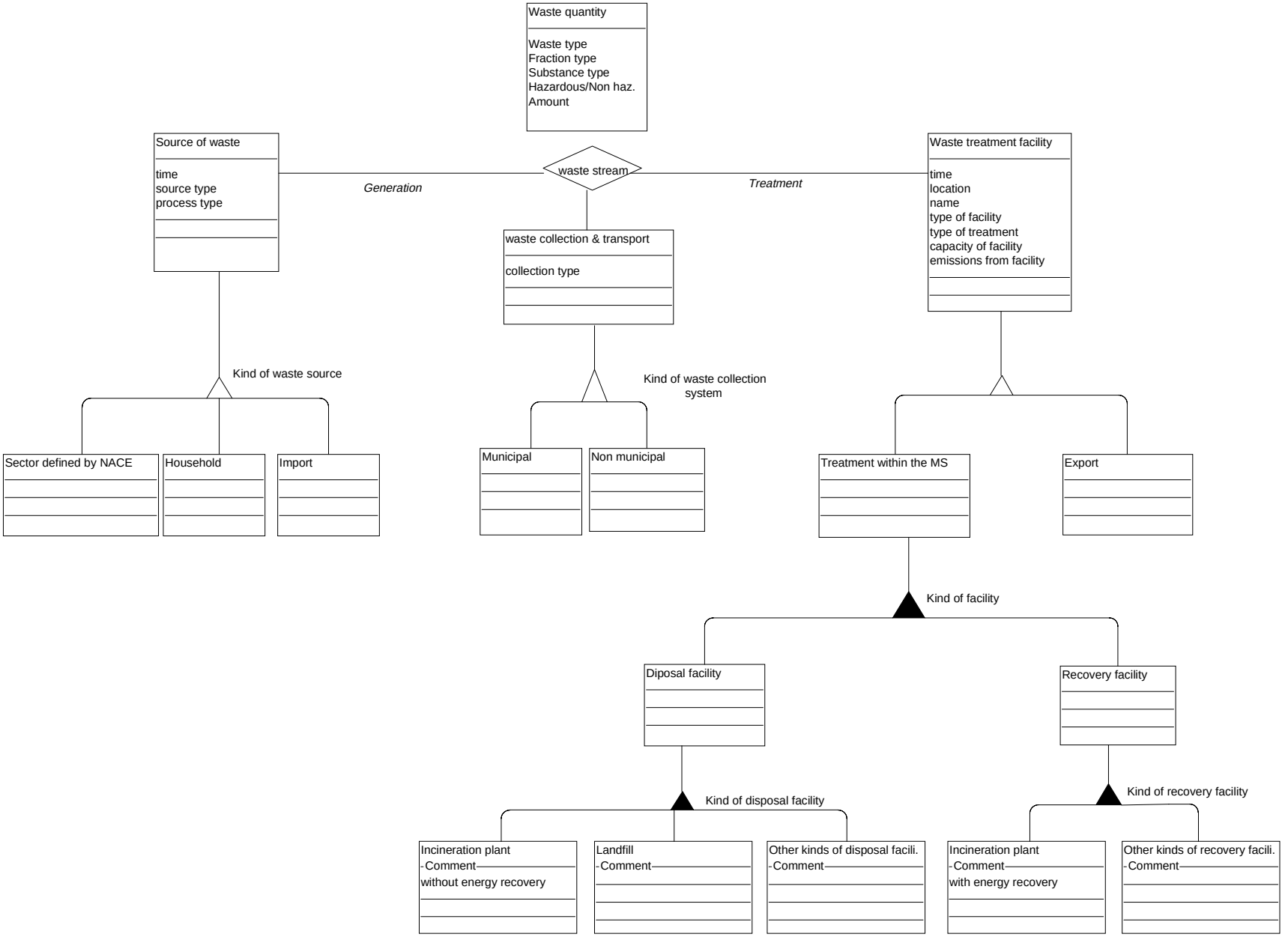
5.1. Diagram of task 1

The information model concerning task 1 – waste streams – describes the interaction between waste generation (from a source), waste collection/transport and waste treatment at a waste treatment facility.

Ideally, each set of data on waste includes – besides information on time and location – information on the source, the collection form, the type of waste, the type of treatment and the amount of waste.

The task can be presented in more detail as follows.

Waste stream



5.2. Definition of task 1

Waste quantity		
Definition of entity: waste stream generated by a source, collected and transported by a waste management system and treated by a waste treatment facility. The entity is statistically defined, i.e. it is the result of a statistical processing of data, and not a reflection of a real world state or event. ***Unique identifier***: Time, geography and waste type. ***No of occurrences***: Initially: No. of NUTS * no. of waste types * 4 years.		
Inf. type	**Description**	**Classification list**
Time	Year of registration from 1993	1993 ...
Geography	Area covered	NUTS-list level 0 to 2. In special cases down to level 5.
Waste type	Type of *source/process* and/or type of *collection system* and/or type of *treatment* and/or type of waste *fraction* and/or of *hazardous/non hazardous*.	• Member state definitions • OECD/EUROSTAT classification • EWC definition • EWC/STAT • ETC/W def.
Source of waste		NACE code
Type of treatment		R/D-code
Amount	Weight in kilo tonnes[7]	

5.3. Relation to other project elements

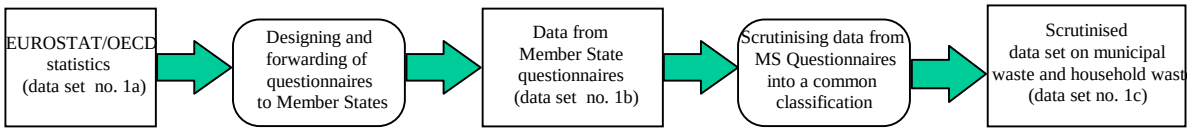
- Sources of waste (task 3).
- Waste factors (task 2, task 3).
- Waste treatment facility (task 4, task 3).
- Waste collection and transport?
- Indirectly: waste management planning and institutions (task 5).

5.4. Sources of data

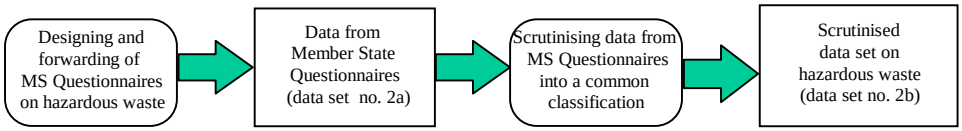
- Initial: Eurostat/OECD (municipal waste/household waste)
  Member States (hazardous waste).
- Secondary: Questionnaires to NRC.
- Update: National Reference Centres via ETC/W.
  The data flow concerning task 1 may be described as follows:

[7] For initial Member State data it should be possible to register amounts measured in m^3.

Municipal waste and household waste:



Hazardous waste:



In the case of household/municipal waste as well as hazardous waste, there is a need to register the various 'stages' of data refinement, mirroring the elaboration of data from official statistics/member state registrations to a scrutinised ETC/W data set based on a common set of classifications.

5.5. Other comments

Presentation of waste quantity data will often have the form of quotients showing the amount for a specific waste category related to the Gross National Product or per capita of the area covered.

The elaboration of a set of recommendations for future registration of waste streams in Member States is an important planned output of task 1 that can help implementation of reporting obligations and future regulations on waste data collection.

6. Task 2 : Projection, scenarios and assessments

The long-term objective of task 2 is to derive waste factors for different sources of waste, related to both economic aspects and waste generating process aspects, to

- provide a basis for making projections of future waste arisings,
- demonstrate a methodology for generating waste scenarios depending on the economic development and technical changes,
- improve the prevention, treatment and disposal of waste.

The more immediate objectives of this task are to focus on a limited number of industrial and hazardous waste flows and the main industrial sectors/production processes in order to, within this field:

- provide an overview of existing waste factors,
- assess the practicability and use of existing waste factors,
- provide a list of different approaches to derivation of hazardous waste factors,
- develop and improve specific waste factors,
- compare derived waste factors with empirical data on waste amounts.

Input/output requirements for task 2

Process:	Input:	Output:
Assessment of practicability and experiences made with existing waste factors	Existing waste factors	An overview of existing waste factors and their use/usability
Derivation of improved waste factors	**Either:** observed amounts of waste related to an activity (e.g. mill. ECU produced in a given branch) **or:** technical descriptions of material flows (production techniques/consumption of goods)	Waste factors at **either** an aggregated level of branches/consumer goods **or** at technology level (for a clearly defined number of hazardous /industrial waste sources and waste types).
Comparison of generated waste scenarios with empirically observed waste production	• the general socio-economic development e.g. for the past decade • waste factors per activity and the development of these	Projections and scenarios on future waste generation and flows (at first hand for two selected member states/regions and a limited number of hazardous waste types)

6.1. Relation to other project elements

- waste generation and flow (task 1, task 3)

6.2. Sources of data

Member State input on hazardous waste factors, their derivation and application and the experiences made. Also input from Joint Research Centre (JRC), the activities concerning the Council Directive (96/61/EC) on Integrated Pollution Prevention and Control (IPPC) and on Best Available Technologies (BAT).

7. Task 3: Dangerous substances in waste

The objective is to provide documentation on the dangerous substances and materials in waste which causes special problems in Member States and how the environmental impact from some of these substances and materials can be minimised by means of e.g. material substitution, good housekeeping, clean technologies, better source separation and handling, etc.

As a first step, and in order to identify the substances in waste which causes special problems to human health and the environment, 1-2 dangerous substances and relevant waste streams will be selected for further studies based on their environmental impact. Based on the studies, available technologies for removing the substances from the waste flow will be analysed. The identification of the dangerous substances will focus on the treatment phase, tracking down the substances from the treatment phase to the source of generation. Existing information about substitution, good housekeeping, available technologies etc. will be analysed, and conclusions and recommendations will be made with respect to the needs and the demands of Member States and the EEA for improvement and further development of both national and European waste strategies.

Input/output requirements for task 3

Process:	Input:	Output:
Selection of 1 to 2 dangerous substances, selection of 1 waste treatment technology, relevant waste streams 1	Waste management plans Waste quantities – task 1 Waste factors – task 2. Existing information on waste qualities, treatment technologies and emissions from treatment facilities.	Technical report on the selection of the dangerous substances and relevant waste streams
Compiling and analysis of existing information on substitution, good housekeeping, etc.	Existing information on substitution, good housekeeping, etc. Information about waste management, task 1. Information about waste minimisation, task 5, catalogue 5.	Technical report on existing information
Conclusions and recommendations with respect to the needs and demands of Member States and EEA.		Technical report on substitution, good housekeeping etc.

7.1. Relation to other institutions

- ETC/Air Emission
- ETC/Inland waters
- ETC/Soil
- OECD
- Eurostat
- IPPC – pollution emission register
- DGXI

7.2. Relation to other project elements

- Waste generation and flow (task 1)
- Projection, scenarios and assessments (task 2)
- Database on waste management facilities (task 4)
- Documenting waste management and waste minimisation practices (task 5-6)

7.3. Sources of data

OECD/Eurostat – waste quantities
Task 1 - Waste quantities
Task 2 - Waste factors
Task 5 - Waste management plans
National Reference Centres
Research institutions.

8. Task 4: Waste treatment facilities

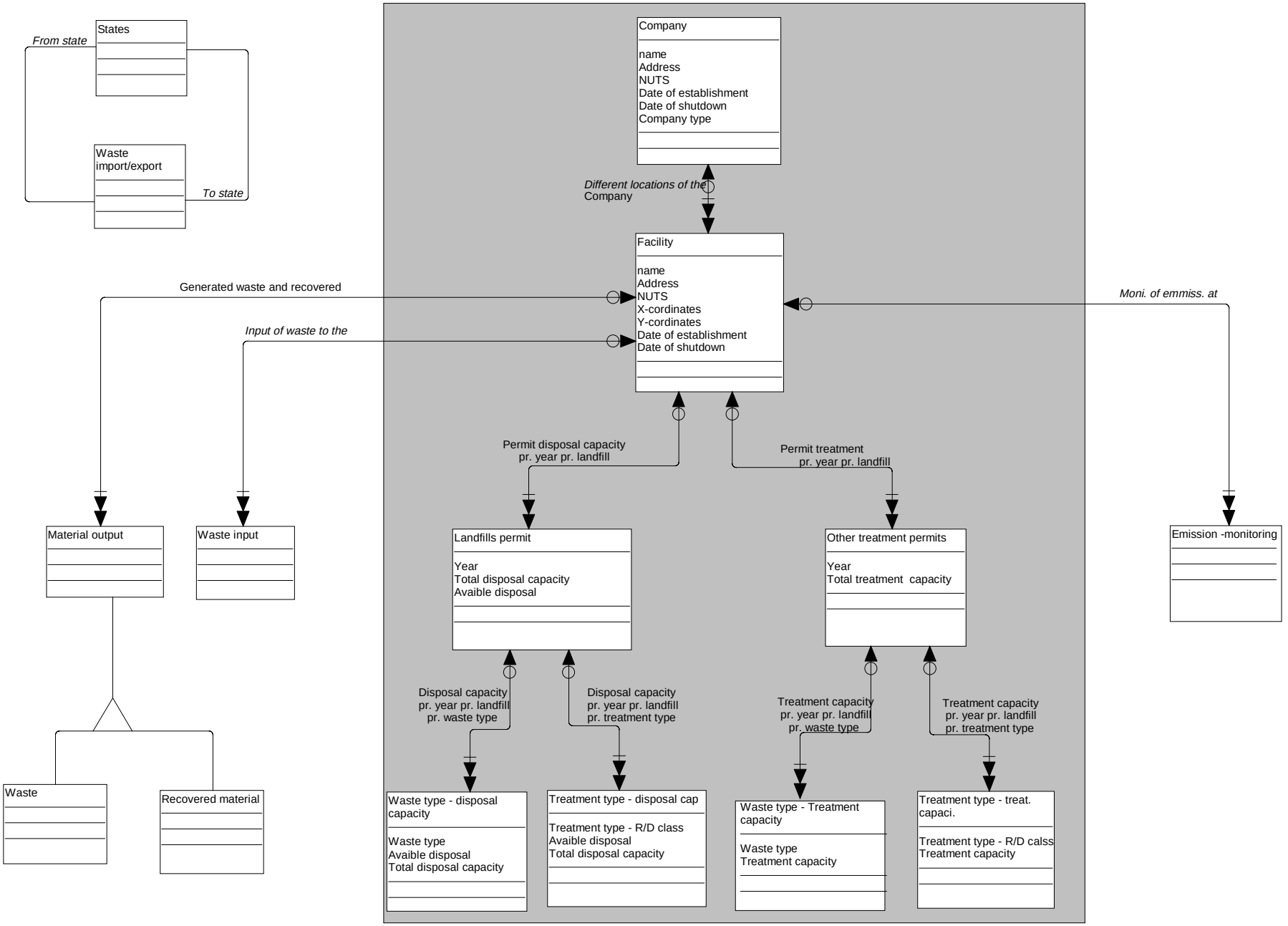
8.1. Diagram of task 4[8]

An overall view of task 4 including the long term development objectives of this task can be illustrated as the diagram in the following page.

A temporal dimension has been added to various entities in order to be able to follow the historical development in capacities etc.

[8] This chapter is based upon reports etc. on task 4. The diagram and descriptions may differ slightly from these documents, focusing on information modelling.

Waste treatment facilities



The aspects of data considered at present in task 4 are framed within the grey box, while elements of the extended data set are indicated outside this box. In the following, only the core set of data is described in more detail.

8.2. Definition of task 4

Company		
Definition of entity: a company manages one or more facility locations ***Unique identifier:*** Time, geography and name (id). ***No. of occurrences***:		
Inf. type	**Description**	**Classification list**
Time	Real world events: • date of establishment • date of shutdown	
Geography	Location • Reference to administrative area • Address of the company	• NUTS code list level 0-5
Name	Registered name of the company	
Company type	E.g. private, public	

Facility		
Definition of entity: A facility, managed by a company, is defined as a physical unit placed at the same location. The facility can handle one or more treatment types. ***Unique identifier:*** Time and name (id). ***No. of occurrences***:		
Inf. type	**Description**	**Classification list**
Time	Real world events: • date of establishment • date of shutdown	
Geography	Location • Reference to administrative area • Address of the facility • Represented as a point	• NUTS code list level 0-5 X-coordinate and Y-coordinate
Name	Name of the facility	

Landfill permit		
Definition of entity: Permit for a landfill – capacity information. ***Unique identifier:*** Name of facility and time ***No. of occurrences***:		
Inf. type	**Description**	**Classification list**
Time	Duration: • Year	
Total disposal capacity	Total annual disposal capacity in m3 at the landfill.	
Available disposal capacity	Total annual disposal capacity in m3 at the landfill.	

Waste type – disposal capacity		
Definition of entity: Permit for a landfill pr. waste type – capacity information. ***Unique identifier:*** Name of facility, time and waste type. ***No. of occurrences***:		
Inf. type	**Description**	**Classification list**
Time	Duration: • Year	
Waste type	The type of waste	EWC
Total disposal capacity	Total annual disposal capacity in m3 at the landfill.	
Available disposal capacity	Total annual disposal capacity in m3 at the landfill.	

Treatment type – disposal capacity		
Definition of entity: Permit for a landfill pr. treatment type – capacity information. ***Unique identifier:*** Name of facility, time and treatment type ***No. of occurrences***:		
Inf. type	**Description**	**Classification list**
Time	Duration: • Year	
Treatment type – R/D class	The treatment type	R/D-class
Total disposal capacity	Total annual disposal capacity in m3 at the landfill.	
Available disposal capacity	Total annual disposal capacity in m3 at the landfill.	

Other treatment permits		
Definition of entity: Permit for non landfill waste treatment facilities – capacity information. ***Unique identifier:*** Name of facility and time ***No. of occurrences***:		
Inf. type	**Description**	**Classification list**
Time	Duration: • Year	
Total treatment capacity	Total annual capacity in tones of the facility to treat	

Waste type – treatment capacity		
Definition of entity: Permit for a treatment facility pr. waste type – capacity information. ***Unique identifier:*** Name of facility, time and waste type ***No. of occurrences***:		
Inf. type	**Description**	**Classification list**
Time	Duration: • Year	
Waste type	The type of waste	EWC
Total treatment capacity	Total annual capacity of the facility to treat the specified waste type	

Treatment type – treatment capacity		
Definition of entity: Permit for a landfill pr. treatment type – capacity information. ***Unique identifier:*** Name of facility, time and treatment type ***No. of occurrences***:		
Inf. type	**Description**	**Classification list**
Time	Duration: • Year	
Total treatment capacity	Total annual capacity of the facility to treat the specified R/D class	
Treatment type – R/D class	The treatment type	R/D-class

8.3. Relation to other project elements

- Task 1 (waste streams)
- Task 3 (dangerous substances in emissions)
- Task 5. 2 (waste management plans)
- Task 5.3 (competent authorities)

8.4. Sources of data

Member State input.

9. Task 5-6: Waste management and waste minimisation practices

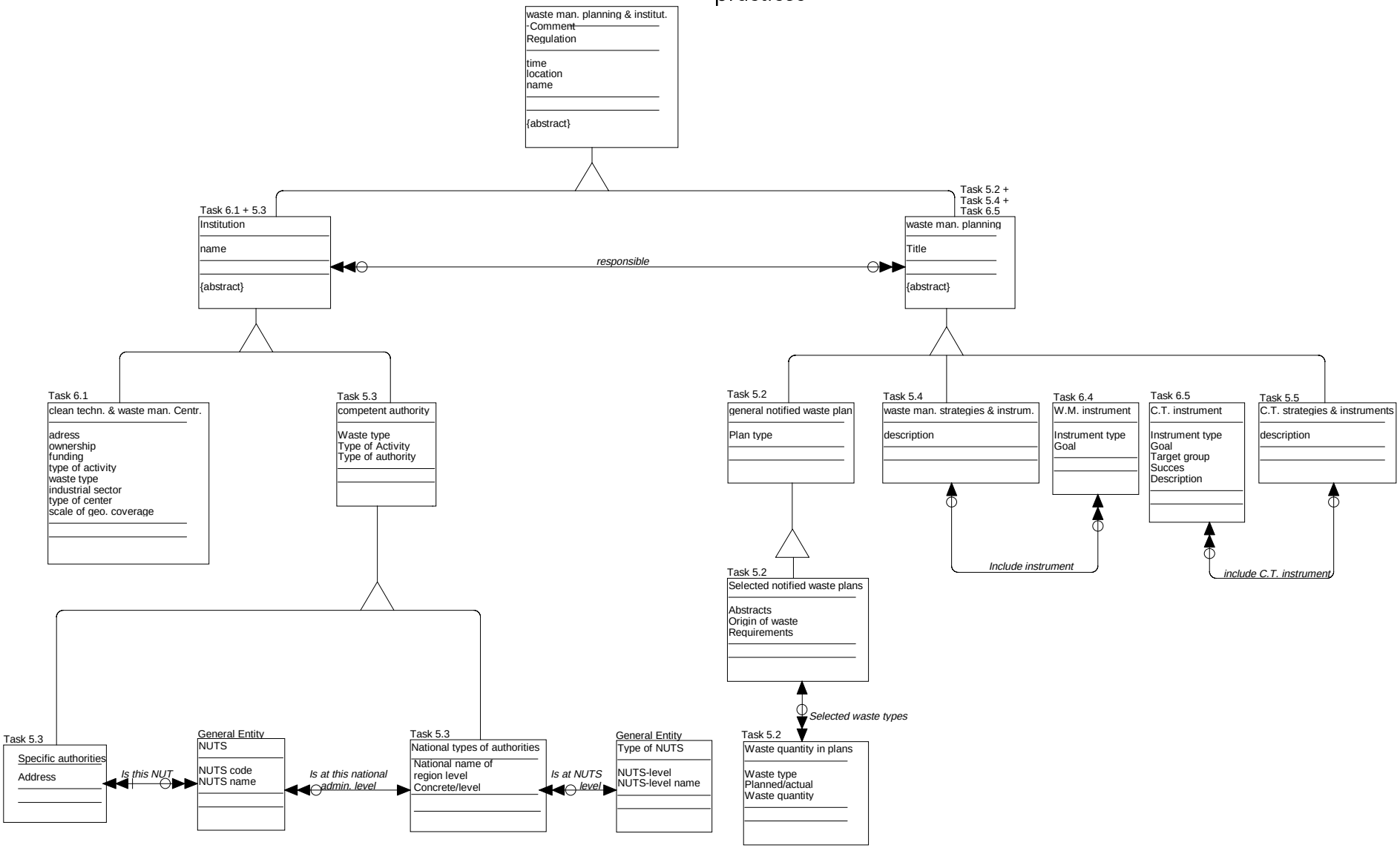
9.1. Diagram of task 5-6

The information model concerning task 5 and 6 – waste management and waste minimisation practices – describes the institutions involved in waste management and waste minimisation planning and the planning activities themselves.

These entities are primarily interconnected via time and space e.g. year and administrative region (NUTS). Further linking requires that a common dimension is identified and connected with a common classification list.

The task can be presented in more detail as follows.

Waste management practices



9.2. Task 5.1: Clean technology and waste management institutions

9.2.1. Definition of task 5.1.

Clean technology (CT) and waste management (WM) institutions		
Definition of entity: Official institutions (with a steady activity on waste management and cleaner production, which can provide free or low cost information)[9] ***Unique identifier:*** Time, geography and name. ***No. of occurrences***: approx. 300 - 500 (core data set).		
Inf. type	**Description**	**Classification list**
Time	Real world events: • Foundation date	
Geography	Location • Reference to administrative area • Address of the institution Scale of geographic activity areas:	• NUTS code list level 5 • International level, European level, national level and regional level
Name	Name of the institution: • official name • acronym • name in English	
Industrial sector	Only relevant for the CT-Centres,	NACE Code and descriptive keywords.
Waste type	Only relevant for the WM-Centres • detailed • head types	• EWT/W 5.1b • EWC + descriptive keywords. • Code-list in questionnaire
Type of centre		Waste Management Centre (WMC), Clean Technology Centre (CTC)
Type of activity	• If WMC: • If CTC:	• Waste disposal, recovery, planning, etc. • Cleaner production, waste reduction, product design, etc.
Ownership		Governmental institution, Half-public, foundation NGO, etc.
Stable funding		None, public, private, others - to be specified

[9] At a later stage of development the catalogue is planned to also comprise consultants and research centres within the field of waste management and clean technology.

9.2.2. Relation to other project elements

- Waste plans?
- If CTC:
  Waste sources – on branch level.
- If WMC
  Waste treatment facilities?

9.2.3. Sources of data

- Initial: VITO and NRC.
- Update: Centres them selves and NRC?

9.2.4. Other comments

Link to centres?

9.3. Task 5.2: General waste plans

9.3.1. Definition of task 5.2.

Notified waste management plans – general level:		
Definition of entity: Plans notified by DGXI. ***Unique identifier***: Time (year of adoption), geography (National code and NUTS level of the competent authority) and title. ***No. of occurrences***: approx. 600.		
Inf. type	**Description**	**Classification list**
Time	Real world events: • Date of adoption • Date of notification Duration of time: • Date of plan period start • Date of plan period end	
Geography	Responsible authority Area covered Comment on area coverage	NUTS-list level 0-5 NUTS level 0-5 Free text
Title	Name of the plan; Number of the plan	
Plan type	Based on directive requirements for Member State waste plans	Hazardous waste, non-hazardous waste , packaging waste

Selected notified waste plans		
Definition of entity: Selected – primarily national – actual plans notified by DGXI. ***Unique identifier:*** Time (year of adoption), geography (NUTS-code of the competent authority) and title? ***No. of occurrences***: approx. 15		
Inf. type	**Description**	**Classification list**
Time	Real world events: • Date of adoption • Date of notification Duration of time: • Date of plan period start • Date of plan period end	
Geography	Responsible authority Area covered Comment on area coverage	NUTS-list level 0-5 NUTS level 0-5 Free text
Abstract	Based on keywords related to the Framework Directive, national legislation and other kinds of instruments[10] – a common disposition has to be created.	

Planned/factual waste quantity		
Definition of entity: Selected – primarily national – plan/fact data. ***Unique identifier:*** Time (year of adoption), geography (NUTS-code of the competent authority) and title? ***No of occurrences***: approx. 20 * 15		
Inf. type	**Description**	**Classification list**
Time	• Plan year	
Geography	• Area covered	NUTS-list level 0-3
Information type	Is the figure a planned waste amount (goal) or a factual amount mentioned in the plan?	plan/factual
MS Waste type	Free text describing the Member State classification	Member State Code lists
Waste type	[11]	EWC
Waste quantity	The weight measured in tonnes?	
Waste source	Member State description – free text	
Waste treatment		R/D+ Member State Classification
General techn. requirements		
Comments	Free text	

[10] Connected to the keyword concerning waste treatment there should be a possibility to link to specific waste treatment facilities (task 4)

[11] The classification of waste types in this data set should follow the guidelines of task 1 in order to enable comparison of the waste amounts.

9.3.2. Relation to other project elements

- Competent authority (task 5.3).
- Waste treatment facilities (task 4)?

9.3.3. Sources of data

- Initial input: DGXI incl. COWI project (hazardous waste) and GOLDER project.
- Updating: DGXI – eventually ETC/W in co-operation with the member states (NRCs)

9.3.4. Other comments

Link to full text plans.

9.4. Task 5.3: Competent authority

9.4.1. Definition of task 5.3

Competent authority		
Definition of entity: An official institution/administrative level in charge of a specific competence within the field of waste management – covers 5 entities in the diagram, including 2 general entities. ***Unique identifier: Time, geography and name.*** ***No. of occurrences***: approx. 200.		
Inf. type	**Description**	**Classification list**
Time	Real world events: • Date of foundation • Time stamp: time of update	
Geography	• NUTS level • full address	NUTS level 0 to 2
Name	Name of institution/administrative level	
Type of activity	Combined with the area of competence	[Plans; collection; Treatment and disposal] combined with [municipal waste; household waste; trade- and office waste]
Waste type Waste type	• detailed • head definition	• National or regional defined. • Code-list in questionnaire
Area of competence	NUTS level 0 to 5	
Type of authority	Independent or part of a higher level of authority. Juridical or implementing authority.	

9.4.2. Relation to other project elements

- Waste management's plans and strategies (task 5.2 and 5.4).
- Waste treatment facilities (task 4)?

9.4.3. Sources of data

- Initial input: NRC – questionnaire and interviews.
- Updating: NRC online.

9.4.4. Other comments

Link to national databases with full address of competent authorities.

9.5. Task 5.4: Waste management strategies and instruments

9.5.1. Definition of task 5.4.

Waste management strategy		
Definition of entity: typical one per state/larger region. ***Unique identifier: Time, geography and title.***		
Inf. type	**Description**	**Classification list**
Time	Real world events: • Date of adoption Duration of time: • Date of coming into action • Date of expire (optional)	
Geography	Area covered	NUTS-list level 0 - 1
Title	The official title of the strategy	
General objective		
Description	Keywords	?

Waste management instrument		
Definition of entity: typical one per state/larger region. Unique identifier: Time, geography and name. ***No of occurrences***:		
Inf. type	**Description**	**Classification list**
Time	Real world events: • Date of adoption Duration of time: • Date of coming into action • Date of expire (optional)	
Geography	Area covered	NUTS-list level 0 to 1
Name	The official title of the instrument	
Goal:	Specific objective (free text?).	
Instrument type:		Regulatory, economic, voluntary etc.
Text		

9.5.2. Relation to other project elements

- Competent authority.

9.5.3. Sources of data

- Initial input: NRC – questionnaire.
- Updating: NRC online.

9.5.4. Number of occurrences

Approx. 50 together with task 6.5 on CT strategies and instruments.

9.5.5. Other comments

Links to national databases with full text description of the strategy/instrument.

9.6. Task 6.5: Cleaner production/waste minimisation strategies and initiatives

9.6.1. Definition of task 6.5.

Cleaner Production/Waste Minimisation Strategy		
Definition of entity: typical one per state/larger region. *Unique identifier: Time, geography and title.* ***No of occurrences***: approx. 200.		
Inf. Type	**Description**	**Classification list**
Time	Real world events: • Date of adoption Duration of time: • Date of coming into action • Date of expire (optional)	
Geography	• area of regulation	NUTS level 0-1
Title	Official title of the strategy	
Responsible org.	Name of the responsible organisation (some times alias a competent authority)	
Status	Describes the legal status of the strategy	Voluntary/mandatory
Waste type	Waste type included in the strategy	
Target group	Industrial branch, consumer	NACE, ETC/W def.
Success	Success and experiences made with the strategy	Success level (1..5) and free text description
Description	Free text?	

Cleaner technology instrument/initiative		
Definition of entity: typical one per state/larger region. *Unique identifier: Time, geography and title.*		
Inf. Type	**Description**	**Classification list**
Time	Real world events: • Date of adoption Duration of time: • Date of coming into action • Date of expire (optional)	
Geography	Area covered	NUTS-list level 0 - 1
Goal	Free text and if possible numerical reduction target for specific waste types.	EWC, reduction target
Instrument type		Regulatory, economic, voluntary etc.

9.6.2. Relation to other project elements

- Competent authority
- Cleaner technology centre.

9.6.3. Sources of data

- Initial input: Studies commissioned DG XI, EEA, OECD
- NRC – questionnaire.
- Updating: NRC online.

9.6.4. Number of occurrences

Approx. 50 together with task 6.5 on Waste Management strategies and instruments.

9.6.5. Other comments

Link to national databases with full text description of the strategy/instrument.

10. Conclusions

At present data on waste at European level appears to be quite noncomparable. How waste streams are defined/physically composed varies from Member State to Member State, depending on infrastructure, production and consumption patterns, socio-economic conditions, technological preconditions, etc. Furthermore, the practices of collecting data on waste, at a national level, differ considerably between the Member States.

One of the most challenging tasks of the ETC/W is therefore, by way of compiling and assessing already existing data and information, to achieve comparability of registrations made by Member States on waste flow and waste management to a usable level, without losing too many Member State specific aspects and without duplicating work carried out by other institutions e.g. Eurostat.

The assessment of waste data and information requires at least two major steps:

Firstly, the nomenclature (on real world entities and events) has to be agreed upon, e.g. by using the DPSIR assessment framework as described in chapter 2 of this report. Secondly, referring to the entities, relations etc. in question, a set of common classifications should be elaborated. For example it may be useful to classify the entity 'waste stream' by some or all of the dimensions described in chapter 3 [12]

To ensure total comparability, the selected classifications should ideally be encoded, so that for example a specific waste source or waste fraction is always registered in the same way. However, this may well be the long term result of the present proposal for a Council Regulation on Waste Management Statistics. In order not to duplicate work, the ETC/W will therefore focus its activities on the two minimum requirements mentioned above, i.e. a common nomenclature and a common set of classifications relating to this nomenclature, making use of common code lists such as NUTS, NACE, the R/D list etc. wherever reasonable and realistic. Also transfer of existing data into comparable formats will be added wherever possible, cf. task 1 and 4.

Regarding many of the data collections to be developed and maintained by ETC/W, a large degree of sub-specifications considering Member State or regional xxx will probably have to be incorporated. This, of course, makes it impossible to automatically aggregate data across Member States, unless the codification used is identical at some (upper) level. In the same way, the automatic generation of cross-national time series on specific waste themes has as a prerequisite that some common level of registration is defined. On these conditions, comparing data across the Member States is a 'manual' process requiring a good deal of expert knowledge in the field of waste.

When ETC/W data is to be presented, for example on the EIONET Telematic Network, the common nomenclature and classifications may, nevertheless, be used as a basis for organising the presentation form, providing a common view of data and, at the same time, preserving the individual Member State ways of codifying their data.

[12] The suggested dimensions are: the source of waste, the process generating waste, the fraction/substance aspect of waste, the hazardous/non hazardous and finally the collection and treatment form.

Annex 1: Overview of EU waste management legislation

The overall structure of EU Waste management legislation is set out in the **Waste Framework Directive** and the complementary **Hazardous Waste Directive.** These directives establish the framework for waste management structures, which has been elaborated by two types of 'daughter' directives: One group sets down requirement for the permitting and operations of waste disposal facilities. The other group deals with specific types of waste such as oils, packaging and batteries.

Framework Directive on waste
Council Directive 75/442/EEC provides the framework whereby the Member States should control the disposal of wastes nationally. The framework provides a common terminology and definitions of waste. The Member States must encourage the prevention or reduction of waste and its harmfulness by encouraging the development of clean technologies, technical product improvements and disposal techniques. The Member States must also encourage the recovery of waste and its use as a source of energy.

To meet the goal of making the European Community self-sufficient in waste disposal, Member States must establish an integrated and adequate network of disposal installations.

The national authorities under the Directive must draw up waste management plans, covering the wastes to be recovered or disposed of, technical requirements, special requirements, special arrangements for particular wastes and suitable disposal sites or installations.

Hazardous waste
The principal aim of the Council Directive 91/689/EEC is to formulate a common definition of hazardous waste and introduce greater harmonisation of the management of such waste. It lists hazardous waste, constituents and properties which render waste hazardous.

Hazardous waste management plans have to be published by the competent authorities.

Member States must require registration and identification of every site where hazardous waste is delivered and must require packaging and labelling according to Community and international standards when such waste is collected, transported and temporarily stored.

Shipment of waste
Regulation 259/93/EEC on the supervision and control of shipments of wastes within, into and out of the European Community establishes a system for controlling the movement of waste which implements the Basle Convention, the OECD Council Decisions on transfrontier movements of waste, and the fourth ACP-EEC (Lomé) Convention. Whilst the Basle Convention deals only with hazardous waste, the Regulation also covers shipments of non-hazardous waste. The Regulation sets up separate regimes governing shipments within the EU, import, export and transit shipments and the different requirements depend on whether the waste is destined for recovery or disposal, and whether it is listed in the annexes on the green, amber or red list. In general terms, it can be said that the amber and red lists consist of hazardous waste and the green list of non-hazardous waste.

Hazardous Waste Incineration
The Hazardous Waste Incineration Directive 94/67/EEC is a daughter directive to the Waste Framework Directive. Member States must set and enforce operating conditions and emission limit values for hazardous waste incineration plants through permits.

Waste Incineration from New and Existing Installations
Directives 89/369/EEC and 89/429/EEC apply parallel sets of permitting requirements and operating restrictions to new and existing municipal waste incineration plants.

Proposed Landfill Directive
The proposal requires all wastes to be treated before being landfilled. Co-disposal would be phased out. In effort to reduce EU's total methane emissions, the revised proposal aims to reduce the quantity of biodegradable municipal waste sent to landfills; in addition, methane from both new and existing landfills would have to be collected and used.

Specific Wastes
Disposal of waste oils
Council Directive 75/439/EEC aims to create a harmonised system for the collection, treatment, storage and disposal of waste oils. It gives the highest priority to the regeneration of waste oils, then to combustion; and last to their destruction or controlled storage or tipping.

Titanium Dioxide Waste
The Titanium Dioxide Directives 78/176/EEC and 82/883/EEC aim to prevent and progressively reduce pollution caused by waste from processing of titanium dioxid.

Disposal of PCBs and PCTs
Council Directive 96/59/EC aims at the elimination of polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs) and at the decontamination of equipment containing them.

Sewage sludge used in agriculture
Council Directive 86/278/EEC aims to control the use of sewage sludge in agriculture by establishing maximum limit values for concentrations of heavy metals in soil and in the sludge, and maximum quantities of heavy metals which may be added to the soil.

Batteries and accumulators containing dangerous substances
Council Directive 91/157/EEC was adopted to mandate the recovery and controlled disposal of spent batteries and accumulators containing certain amounts of mercury, cadmium or lead.

Packaging and packaging waste
Directive 94/62/EC implements the Union's strategy on packaging waste. It aims to harmonise national packaging waste management measures, to minimise environmental impacts of packaging waste and to avoid the erection of barriers to trade within the European Union.

Recovery and recycling targets are established to be met within five years of the enactment of implementing legislation in the Member States.

Expected new initiatives

For the moment following the new initiatives are on the way: Proposal for Directive on End-of-life vehicles and a Proposal for Directive on electrical and electronic waste.

Annex 2: Survey of code lists used in context of the European Topic Centre on Waste

2.1. Code lists concerning the spatial dimension (Geography)

2.1.1. NUTS

NUTS									
Source:	EUROSTAT								
Main dimensions:	Administrative regions								
Main structure:	**Community C**	**National code**	**Description**	**LEVEL0**	**LEVEL1**	**LEVEL2**	**LEVEL3**	**LEVEL4**	**LEVEL5**
	UK		UNITED KINGDOM	1	0	0	0	0	0
	SE		SVERIGE	1	1	0	0	0	0
	PT		PORTUGAL	1	0	0	0	0	0
	NL		NEDERLAND	1	0	0	0	0	0
	LU		LUXEMBOURG (GRAND-DUCHE)	1	1	1	1	0	0
	IT		ITALIA	1	0	0	0	0	0
	IE		IRELAND	1	1	1	0	0	0
	GR		ELLADA	1	0	0	0	0	0
	FR		FRANCE	1	0	0	0	0	0
	FI		SUOMI/FINLAND	1	0	0	0	0	0
	ES		ESPANA	1	0	0	0	0	0
	DK	000	DANMARK	1	1	1	0	0	0
	DE		DEUTSCHLAND	1	0	0	0	0	0
	BE		BELGIQUE-BELGIE	1	0	0	0	0	0
	AT		ÖSTERREICH	1	0	0	0	0	0
	UKB0026015	2615	WEST	0	0	0	0	0	1
	UKB0026014	2614	VICTORIA BRIDGE	0	0	0	0	0	1
	UKB0026013	2613	SOUTH	0	0	0	0	0	1
	UKB0026012	2612	SLIEVEKIRK	0	0	0	0	0	1
	UKB0026011	2611	SION MILLS	0	0	0	0	0	1
Used in:	Tasks 1, 4 and 5								

2.2. Code lists concerning sources/processes of waste

2.2.1. NACE

NACE (Nomenclature generale des Activités economiques dans les Communautes Européennes)	
Source:	EU
Main dimensions:	Source (branches)
No of levels:	4 levels
Main structure:	1. Highest level (letters A to Q) 2. Head groups (2 digits) 3. Groups (3 digits) 4. Low level groups (4 digits) Example: A.05.01 (Fisheries)
Used in:	Task 1 (and 5.1, cf. code list 3.2)

2.2.2. Industrial sectors (according to the NACE codes)

ETC/W 5.1a	
Source:	ETC/W: 'Brief status report and discussion papers for task 5.' 17th April 1998. Pp 15-16
Main dimensions:	Source (industrial sectors)
No of levels:	1
Main structure:	Approx. 40 entries consisting of unique or combined 2-digit NACE codes.
Used in:	Task 5.1 / Clean Technology Centres

2.2.3. SNAP code: a process oriented nomenclature

SNAP	
Source:	Corinair, referred to by: ETC/W: '2nd Draft Questionnaire Catalogue V' / mail
Main dimensions:	Process
No of levels:	
Main structure:	
Used in:	Task 5.5

2.3. Code lists concerning types of waste

2.3.1. EWC

EWC (European Waste Catalogue)	
Source:	EEC
Main dimensions:	Source, process, fraction
No of levels:	3 levels
Main structure:	1. Highest level: a 2 digit code describing sectors, processes or fractions 2. Second level: a 2 digit code describing sectors, processes or fractions 3. Third level: a 2 digit code describing processes or fractions (no sectors?)
Used in:	Tasks 1, 4, 5.1 and 5.2. Comprises both hazardous and non-hazardous waste.

2.3.2. EWC/STAT

EWC/STAT

Source:	EUROSTAT – DGXI
Main dimensions:	
No of levels:	

Main structure: Substance-oriented aggregation of the European Waste Catalogue (EWC)

Aggregation				EWC			Hazardous according to Decision 94/904/EEC
Aggregation-codes Categories	Aggregation-codes Categories	Aggregation-codes Categories (english)	Codes and categories	Codes	Categories (english version)		
1-digit	2-digit	3-digit	4-digit level	6-digit level			For non-hazardous: no entry
1 Chemical compounds waste	**01.1** Spent solvents	**01.11** Halogenated spent solvents	02 03 Waste from food preparation and processing	02.0303 P*	wastes from solvent extraction		
			07 01-07 waste from organic chemical processes (basic chemicals, plastics, dyes and pigments, pesticides, pharmaceutics, cosmetics and other fine chemicals)	07.01.03	organic halogenated solvents, washing liquids and mother liquors	x	
				07.02.03	organic halogenated solvents, washing liquids and mother liquors	x	
				07.03.03	organic halogenated solvents, washing liquids and mother liquors	x	
				07.04.03	organic halogenated solvents, washing liquids and mother liquors	x	
				07.05.03	organic halogenated solvents, washing liquids and mother liquors	x	
				07.06.03	organic halogenated solvents, washing liquids and mother liquors	x	
				07.07.03	organic halogenated solvents, washing liquids and mother liquors	x	
			14 01-05 Waste from solvent use (metal, textile and natural products degreasing, machinery maintenance, wastes from electronic industry, coolants, foam/aerosol propellents and recovery of solvants and coolants)	14.01.01	chlorofluorocarbons	x	
				14.01.02	other halogenated solvents and solvent mixes	x	
				14.01.04	aqueous solvent mixes containing halogens	x	
				14.02.01	halogenated solvents and solvent mixes	x	
				14.03.01	chlorofluorocarbons	x	
				14.03.02	other halogenated solvents	x	
				14.04.01	chlorofluorocarbons	x	
				14.04.02	other halogenated solvents and solvent mixes	x	
				14.05.01	chlorofluorocarbons	x	
				14.05.02	other halogenated solvents and solvent mixes	x	
			20 01 Municipal waste, seperately collected	20.01.13 P*	solvents	x	
		01.12 Non halogenated spent solvents	02 03 Waste from food preparation and processing	02.03.03 P*	wastes from solvent extraction		
			07 01-07 waste from organic chemical processes (basic chemicals, plastics, dyes and pigments, pesticides, pharmaceutics, cosmetics and other fine chemicals)	07.01.04	other organic solvents, washing liquids and mother liquors	x	
				07.02.04	other organic solvents, washing liquids and mother liquors	x	
				07.03.04	other organic solvents, washing liquids and mother liquors	x	
				07.04.04	other organic solvents, washing liquids and mother liquors	x	
				07.05.04	other organic solvents, washing liquids and mother liquors	x	
				07.06.04	other organic solvents, washing liquids and mother liquors	x	
				07.07.04	other organic solvents, washing liquids and mother liquors	x	
			14 01-05 Waste from solvent use (metal, textile and natural products degreasing, machinery maintenance, wastes from electronic industry,	14.01.03	other solvents and solvent mixes	x	
				14.01.05	aqueous solvent mixes free of halogens	x	
				14.02.02	solvent mixes or organic liquids free of halogenated solvents	x	

Used in:	Task 1

2.3.3. Basel convention list of hazardous waste

	Basel Convention
Source:	UN
Main dimensions:	Source, process, fraction, substance
No of levels:	1
Main structure:	Y1 Clinical wastes from medical care in hospitals, medical centers and clinics Y10 Wastes from the production and preparation of pharmaceutical products Y11 Waste pharmaceuticals, drugs and medicínes Y12 Wastes from production, formulation and use of inks, dyes, pigments, paints, laquers, varnish Y13 Wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives Y14 Waste chemical substances arising from research and development or teaching activities which are not identified and/or are new and whose effects on man and/or the environment are not known Y15 Wastes of an explosive nature not subject to other legislation Y16 Wastes from production, formulation and use of photographic chemicals and processing materials Y17 Wastes resulting from surface treatment of metals and plastics Y18 Metal carbonyls Y19 Beryllium, beryllium compounds Y2 Wastes from production and preparation of pharmaceutical products Y20 Hexavalent chromium compounds Y21 Copper compounds Y22 Zinc compounds Y23 Arsenic, arsenic compounds Y24 Selenium, selenium compounds Y25 Cadmium, cadmium compounds Y26 Antimony, antimony compounds Y27 Tellurium, tellurium compounds Y28 Mercury, mercury compounds Y29 Thallium, thallium compounds Y3 Waste pharmaceuticals, drugs and medicines Y30 Lead, lead compounds Y31 Inorganic fluorine compounds excluding calcium fluoride Y32 Inorganic cyanides Y33 Acidic solutions or bases in solid form Y34 Basic solutions or bases in solid form Y35 Asbestos (dust and fibres) Y36 Organic phosphorous compounds Y37 Organic cyanides Y38 Phenols, phenol compounds including chlorophenols Y39 Ethers Y4 Wastes from production, formulation and use of biocides and phytopharmaceuticals Y40 Halogenated organic solvents Y41 Organic solvents excluding halogenated solvents Y42 Organohalogen compounds excluding inert polymerized materials and other substances referred to in this Tabel Y43 Any material contaminated with any congenor of polychlorinated dibenzo-furan Y44 Any material contaminated with any congenor of polychlorinated dibenzo-p-dioxin Y5 Wastes from the manufacture, formulation and use of wood preserving chemicals Y6 Wastes from production, formulation and use of organic solvents Y7 Wastes from heat treatment and tempering operations containing cyanides Y8 Waste mineral oils unfit for their originally intended use Y9 Waste oil/water, hydrocarbon/water mixtures, emulsions

2.3.4. *MS Classifications of waste types*

MS Waste Classification	
Source:	Member States
Main dimensions:	
No of levels:	
Main structure:	
Used in:	Task 1

2.3.5. *ETC/W – Task 1 : Household waste and other municipal waste broken up by type of collection, sources and waste categories*

ETC/W 1a	
Source:	Tech. Report to the EEA on 'Main structure for listing information from Member States for harmonising data 1993-1996 about municipal waste and household waste' table 5. Based on OECD/Eurostat questionnaires.
Main dimensions:	Collection, Source, Fraction
No of levels:	4
Main structure:	Household Waste total (A) 1. Traditional collection (bagged waste) Separately collected: 2. Bulky household waste total 3. Food waste and garden waste. Total 4. Paper and Cardboard 5. Glass and bottles without deposit 6. Metals (ferrous and non- ferrous) 7. Small scale hazardous waste 8. Other separately collected household waste Other Municipal Waste Total (B) 9. Comm. activities etc. Traditional collection (bagged waste) Separately collected Paper and cardboard Glass and bottles without deposit Garden waste … Other waste from comm. activities etc. 10. Hospitals total … 11. Municipal services. Municipal waste total (C). 12. Traditional collection Separately collected: 13. Bulky waste total … 14 Food waste and garden waste. Total. … 15. …. 16. …. 22. Municipal services Household waste from rural areas not served by municipal services.
Used in:	Task 1

2.3.6. *ETC/W – Task 1 : Household waste collected outside the municipal collection scheme (e.g. by DUAL system, churches, non-profit organisations, private institutions and businesses) and not included in the above list.*

ETC/W 1b	
Source:	Tech. Report to the EEA on 'Main structure for listing information from Member States for harmonising data 1993-1996 about municipal waste and household waste' table 6.
Main dimensions:	Collection, Source, fraction
No of levels:	3
Main structure:	Household Waste total (A) 1. Traditional collection (bagged waste) Separately collected: 2. Bulky household waste total ... 3. Food waste and garden waste. Total ... 4. Paper and Cardboard 5. Glass and bottles without deposit 6. Metals (ferrous and non- ferrous) 7. Small scale hazardous waste 8. Other separately collected household waste
Used in:	Task 1

2.3.7. *Type of waste (according to the European Catalogue 94/3/EC)*

ETC/W 5.1b	
Source:	ETC/W: 'Brief status report and discussion papers for task 5.' 17th April 1998, pp 14
Main dimensions:	Source, process, fraction
No of levels:	1
Main structure:	list with 20 entries
Used in:	Task 5.1

2.3.8. *Subdivision of waste types.*

ETC/W 5.2	
Source:	'Brief status report and discussion papers for task 5.' 17th April 1998. Pages 27ff
Main dimensions:	Collection, source, impact.
No of levels:	2
Main structure:	Municipal waste or Household waste Hazardous waste in general or from Households (small scale)
Used in:	Task 5.2

2.4. Code lists concerning waste fractions

2.5. Code lists concerning hazardous/non hazardous

2.6. Code lists concerning waste treatment

2.6.1. R/D-list

R/D-list	
Source:	Commission decision of 24 May 1996 adapting Annexes II.A and II.B to Council Directive 75/442/EEC on waste (96/350/EC)
Main dimensions:	type of waste treatment
No of levels:	1
Main structure:	Disposal Operations: A. Operations which do not lead to the possibility of resource recovery, recycling, reclamation, direct re-use or alternative uses: D1: Deposit into or onto land (e.g. landfill, etc.) D2: Land treatment (e.g. biodegradation of ...) ... D15: Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced) Recovery Operations: B. Operations which may lead to resource recovery, recycling, reclamation, direct reuse or alternative uses R1: Use principally as a fuel or other means to generate energy R2: Solvent reclamation/regeneration ... R13: Storage of wastes pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection on the site where it is produced)
Used in:	Task 4,

2.7. Code lists concerning regulation of waste

2.7.1. Activities of waste management centres

ETC/W-5.1c	
Source:	ETC/W: 'Brief status report and discussion papers for task 5.' 17th April 1998
Main dimensions:	?
No of levels:	1
Main structure:	Waste disposal Recovery Planning Composting Collection Systems Legislation Others (to be specified with keywords)
Used in:	Task 5.1

2.7.2. Cleaner Technology centres

ETC/W-5.1d	
Source:	ETC/W: 'Brief status report and discussion papers for task 5.' 17th April 1998
Main dimensions:	?
No of levels:	1
Main structure:	Cleaner Production Waste Reduction/minimisation Energy Saving Greenhouse Gas Reduction Product/Process Design Pollution Control Renewable Energy Water Use and Savings Waste Management Systems Others (to be specified with keywords)
Used in:	Task 5.1

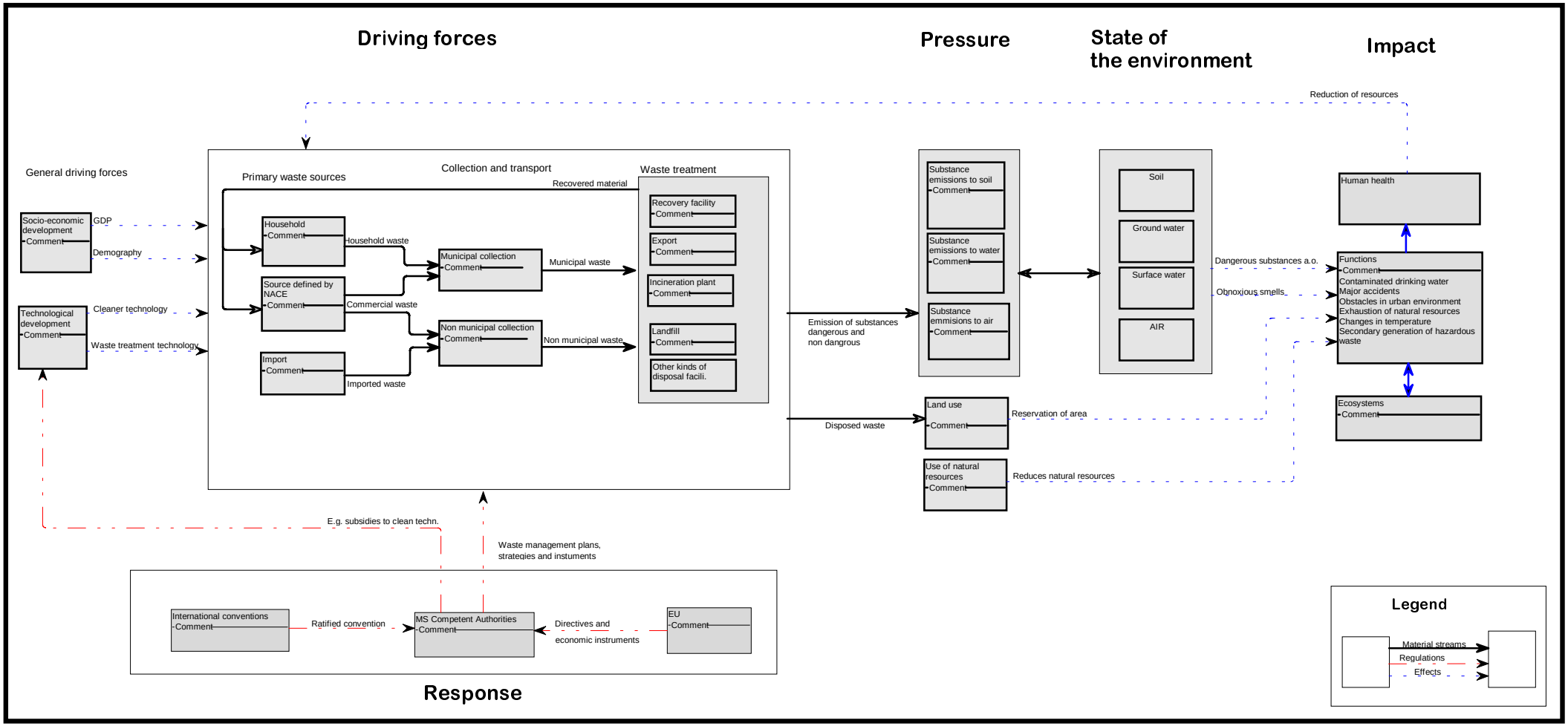
B.7.3. Characterisation of the cleaner technology schemes

ETC/W-5.5a	
Source:	ETC/W: 'Brief status report and discussion papers for task 5.' 17th April 1998.
Main dimensions:	?
No of levels:	1
Main structure:	Regulatory instruments … Economic instruments …. Voluntary Agreements …
Used in:	Task 5.5

2.7.4. *Key instruments for waste minimisation/cleaner production strategies*

ETC/W-5.5b	
Source:	ETC/W: '2nd Draft Questionnaire Catalogue V' 12th October 1998
Main dimensions:	
No of levels:	2
Main structure:	Mandatory Instruments (regulation) Bans and restrictions Economic instruments tax duty license Financial support and economic incentives Suasive Instruments (information, PR, Education (includes a specification of target group) Environmental Management systems, Env. reports and eco-labelling includes a specification of target group a.o.)
Used in:	Task 5.5

2.7.5. *Tasks, responsibilities for institutions responsible for waste minimisation/cleaner production*

ETC/W-5.5c	
Source:	ETC/W: '2nd Draft Questionnaire Catalogue V' 12th October 1998
Main dimensions:	?
No of levels:	1
Main structure:	Setting priorities Enactment of laws Strategic Planning Approval and control Scientific support Information and public relations International co–operation Miscellaneous
Used in:	Task 5.5

Annex 3: DPSIR oriented flow concerning waste generation and waste management in EU