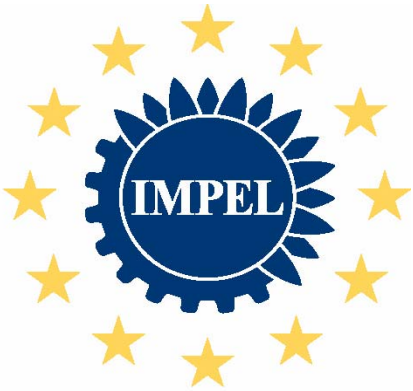

European Union Network for
the Implementation and Enforcement
of Environmental Law

WASTE PERMITTING AND ENFORCEMENT

THE NETHERLANDS

MAY 2005

Introduction to IMPEL

The European Union Network for the Implementation and Enforcement of Environmental Law is an informal network of the environmental authorities of EU Member States, acceding and candidate countries, and Norway. The European Commission is also a member of IMPEL and shares the chairmanship of its Plenary Meetings.

The network is commonly known as the IMPEL Network

The expertise and experience of the participants within IMPEL make the network uniquely qualified to work on certain of the technical and regulatory aspects of EU environmental legislation. The Network's objective is to create the necessary impetus in the European Community to make progress on ensuring a more effective application of environmental legislation. It promotes the exchange of information and experience and the development of environmental legislation, with special emphasis on Community environmental legislation. It provides a framework for policy makers, environmental inspectors and enforcement officers to exchange ideas, and encourages the development of enforcement structures and best practices.

Information on the IMPEL Network is also available through its website at: http://europa.eu.int/comm/environment/impel

Title report: – IMPEL – Waste permitting and enforcement project. The Netherlands, May 2005	**Number report:** 2005/10
Project manager: Mrs P.A. Weenink-Driessen, The Netherlands Mrs D.B. Bücker, The Netherlands	**Report adopted** at IMPEL Plenary Meeting: 30.11.-02.12.2005, Cardiff
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Project group members:

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- Mrs. M. Dolberg, Denmark
- Mr. M. Mikulasek, Czech Republic
- Mr. R. Bolwerk, Germany
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- Mr. S. Padovani, Italy
- Mrs. B. Schijven, The Netherlands
- Mrs. D. Bücker, The Netherlands
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- Mrs. R. Karlsson, Sweden
- Mrs. M. Mohlin, Sweden
- Mr. I. Brindley, United Kingdom

Executive summary:

This report describes the results of a permitting and enforcement project carried out by twelve EU Member States, aiming at improving cooperation and information exchange on the permitting and enforcement of environmental conditions at landfills and waste incineration plants within the framework of the Integrated pollution prevention and control Council Directive 96/61/EC (IPPC) and the Waste incineration Directive (2000/76/EC), the Landfill of waste directive (99/31/EC). The project is linked to the 6th Environmental Action Plan, through section 2.1 "Improving the implementation of existing legislation" and "Permitting" art. 3(2), and art 8(1).

A management summary is enclosed further on in this report.

Contents

Colophon

Management summary

Background and project aim

From the 25th to the 27th of May 2005 a Waste permitting and enforcement project was carried out between twelve EU countries within the framework of the Integrated pollution prevention and control Council Directive 96/61/EC (IPPC), the Waste Incineration Directive (2000/76/EC) and the Landfill of Waste Directive (99/31/EC) with the following goals:

- Exchange of experience and information regarding permitting conditions and enforcement of these conditions at waste incineration plants and landfills;
- Exchange of information on the possibilities for reuse and recycling of waste products;
- Development and dissemination of good practice in the regulation of waste facilities;

Thus leading to:

- Improved quality of permitting and enforcement in waste facilities;
- Greater consistency in permitting and enforcement throughout the EU;
- Implementation of conditions regarding recycling and reuse in waste permits.

The proposal for this project was presented and adopted at the IMPEL Plenary meeting in Amsterdam (The Netherlands) in December 2004. Representatives from Denmark, the Czech Republic, Ireland, Portugal, Sweden, Scotland, United Kingdom, Germany, Italy, Poland, Slovakia and The Netherlands participated in the project.
The project set up and –focus is explained in more detail in chapter 2 of this report.

Main project approach and working procedure

The project started out with a questionnaire that was sent to all the participants. Information on permitting and enforcement of waste incineration plants and landfills in each Member State was thus gathered, as was information on recycling and reuse of waste materials. The answers to the questionnaire were collated in The Netherlands and sent to all the participants in preparation of a three-day project in Zwolle (The Netherlands). During the project, workshops and presentations were held on waste permitting and enforcement in landfills and incineration plants and the possibilities for recycling and reuse of waste.

Project results and main conclusions

Main project results and –conclusions derived from this project are:

- The network of permitting- and enforcement authorities of the participating countries has improved
- Contacts were made between participants responsible for supervision and permitting of waste disposal and processing facilities in the different countries
- Practical experiences and information was exchanged.
- There is a difference in the way a permitter looks at a condition and the way an inspector looks at the same condition
- Thus leading to the conclusion that conditions in a permit should be formulated more precisely
- Member States have different systems for financial security of landfills
- Permitting- and enforcement *structures* are very similar within the Member States
- There is, however, a huge variation in the way permits are issued and the conditions that are applied
- Member States are being consistent in their implementation of the IPPC Directive
- Member States have many different ways to solve the same problems
- There is still a lot to do on the topic of reuse and recycling of waste materials

The project results are presented in more detail in chapter 3, and conclusions are laid down in chapter 4.

Recommendations

Based upon the experiences and results of the project, the following recommendations can be given:

- Reuse and recycling of waste should be worked out in more detail in a separate project. There is a big eagerness within the Member States to exchange information on this subject and to learn from the experiences from others;

- A common system for financial security for the after care of landfills should be set up for all Member States
- Permit conditions should be formulated more precisely to improve enforcement. This should be worked out in a separate project.
- Permits should be able to 'breathe' in order to give the permitholder room to operate. Just how much 'air' is needed and acceptable, should be discussed further
- Attention should be focussed on the role of the permitter and the inspector. Can these functions be united in one person, or should they be separated?

1 background, management and aims

1.1 BACKGROUND

The IMPEL document "The role and scope of IMPEL", agreed at the IMPEL Plenary meeting in June 2002 in Santiago de Compostela states that waste management issues should be a new area for IMPEL. The IPPC directive is aimed at ensuring that all EC Member States issue integrated permits to a common schedule of industry, including large scale waste facilities. The Landfill and Incineration directives require that Member States issue waste permits to landfill and incineration activities.
However, conditions and enforcement vary strongly within the Member States. The project was carried out with the intention of examining the differences and similarities within the Member States, to learn and discuss the type of conditions applied in waste permits and to share experiences of inspections and enforcement. Furthermore the possibilities for recycling and reuse of different waste materials could be exchanged.

1.2 PROJECT MANAGEMENT

The project was carried out under the responsibility of the Dutch Conference of Provinces in The Netherlands. The provinces of Limburg and Overijssel were entrusted with the preparation and execution of the project. The project team consisted of one licenser and one inspector, both fully experienced in waste permitting and enforcement.

1.3 PROJECT AIMS

The project aimed to encourage the collaboration between Member States on waste issues, provide a basis for exchange of experiences and develop good practice in the regulation of waste facilities.
Furthermore it was the objective of this project to improve permit conditions of waste facilities by exchanging experiences and information and to achieve greater consistency in enforcement activities. The project team feels that these aims and objectives were all accomplished. By comparing conditions, discussing their enforceability and exchanging experiences these goals were met.
The project also aimed to implement common conditions regarding reuse and recycling. Although interesting discussions were held on the matter of reuse and recycling of waste materials and many new ideas were presented, there was not enough time to discuss the implementation of these conditions in permits.

2 Project setup and - program

2.1 PROJECT SETUP

The project started with a questionnaire which was sent out to all the participants. The questionnaire focused on permitting and enforcement at landfills and incineration plants and reuse and recycling of waste materials. The answers to the questionnaires were collated and sent to all participants in preparation of the project.
The questionnaire and the results were also used to determine the final program of the project. Thus it was possible to focus on the problems within the Member States when issuing waste permits and enforcing conditions. The response to the questionnaire also gave a good insight on the problems each Member State encountered (in permitting and in enforcement) and the successes that were reached in the past. And so, the response was also used to invite different participants to give a presentation.
Questionnaire and collated data are attached to this report as annexes 3 and 4.

2.2 PROJECT PROGRAM

The project was separated in three main themes: landfills, incineration plants and reuse and recycling of waste. Starting out with a general introduction, one day was planned for each theme. Representatives from Denmark, the Czech Republic, Ireland, Portugal, Sweden, Scotland, United Kingdom, Germany, Italy, Poland, Slovakia and The Netherlands participated in the project (representatives from Cyprus, Spain and a second participant of the Czech Republic were initially inscribed, but did not attend after all). The list of participants has can be found in annex 1.
The project program has been included to this report as annex 2.

3 Project results

3.1.1 GENERAL INFORMATION

The project started with an introduction on permitting and enforcement in The Netherlands. In The Netherlands, environmental legislation is spread out in three authorities: the national authority, the regional authority and the local authority. At the national level the legislation is made and permitting and enforcement of nuclear installations and mining installations take place. The regional level consisting of the 12 provinces, is responsible for permitting and enforcement of the larger industries, such as chemical industries and waste installations (mostly the 5000 IPPC-industries). The local level, consisting of nearly 450 counties is responsible for permitting and enforcement of all the other industries. Environmental legislation is based on the Environmental Management Act (EMA). This act deals with all matters of waste management and waste installations. The use of BAT (best available techniques) is in the Netherlands translated into national standards. The EMA however, does not include legislation concerning water, spatial planning, health and safety, procedures or sanctions. These are all described in separate laws. Environmental enforcement has been embedded in administrative law and in criminal law. The process of permitting takes a long way in the Netherlands. Before a company gets a permit, appeals can be submitted. The procedure can thus last for years. Permitting and enforcement are divided on the organizational level. Separating these two working areas is more efficient and avoids conflict of interests.

A representative from the European Commission then gave a presentation on legislation and new developments in the European Union concerning landfills and incineration plants (annex 5).

3.1.2 LANDFILLS

A workshop was held on permitting and enforcement at landfills. After discussing with each other what type of conditions should be included to an environmental permit for a landfill, another group was asked to give their opinion on these conditions from the view of an inspector. It became clear that although some conditions make perfect sense on paper, they are difficult to enforce in practice. This then led to interesting discussions on how conditions should be formulated. An inspector prefers non-disputable conditions, clearly formulated and enforceable. On the other hand, this leads to tight permits which do not allow any room for changes. It was agreed that permits should be able to "breathe" (annex 6).
The participant from the United Kingdom, Ian Brindley, presented the problem of financial security at landfills. In accordance with article 8 of the Directive on the Landfill of waste (1999/31) adequate provisions should be made by the applicant of a landfill to ensure that the obligations (including after-care provisions) are discharged and that the closure procedures are followed. The United Kingdom is reviewing its approach of this requirement and during this presentation views and experiences were shared (annex 7).
It became clear by the end of the presentation, that each Member State has tackled this requirement in its own way. The representative of Ireland explained that bonds have proven the best alternative, while in Italy insurance and bank guarantees are commonly used. The Netherlands works with a quite different way of

financial security. During the operational period of a landfill, the operator must pay 5 euros per ton of waste that is disposed of in the landfill. The money is paid to the Regional authority, who takes the responsibility for the aftercare, once the landfill ceases to operate. The aftercare is never ending and the funds are accessible only to the regional authority.

3.1.3 INCINERATION PLANTS

The next part of the project was spent on waste incineration plants. Participants from Germany and Portugal each gave a presentation.
Mr. Richard Bolwerk, from the Council Government of North-Rhine Westphalia in Münster, Germany, gave a presentation about waste incineration in cement kilns. This led to discussions on the enforcement of emissions and the reduction of waste products (annex 8).
Mr. Bruno Simplicio, from the Environmental General Inspectorate of Portugal gave a presentation about a successful enforcement action in Portugal. Forty illegal clinical waste incineration plants, located in public hospitals and health care centers were shut down. The result of this action was that all clinical waste in Portugal is now incinerated in one central incinerator located in Lisbon. Due to this, permitting and inspecting of clinical waste incineration can now focus on one installation, which makes the work of the Inspectorate more efficient. The closing down of these illegal clinical waste incinerators was a good example of how to deal with this problem. It became apparent during this presentation, that illegal incinerators is a problem in several Member States.
The afternoon was spent visiting a waste installation in Wijster (The Netherlands). At this site a landfill, an incineration installation and a recycling installation were viewed.

3.1.4 REUSE AND RECYCLING

The last day of the project was spent on recycling and reuse of waste.
Mr. Math Oehlen of the Afvalsamenwerking Limburg, described how the province of Limburg managed to decrease the amount of household waste being disposed of in incinerators or landfills. Prevention, reuse and recycling were topics that were focused on in the 90-ties. Eventually this led to differentiation in tariffs (Diftar), a system in which households pay for the amount of residual waste that they dispose of. Either by weight of the waste or by the number of waste deliveries, each household gets its own bill at the end of the year. This system made sure that each individual became more aware of the costs of waste disposal and the possibilities for prevention, reuse and recycling. From a total of 278 kilograms of residual waste per person per year, Limburg has gone to 234 kg. per person per year. While stimulating the inhabitants to reduce the amount of waste, new possibilities for separating waste materials were offered. Paper, plastic, glass, cardboard and textiles can all be disposed of in separate containers that are then processed in the recycling industry.
Mr. Marcel Vlottes of the province of Overijssel then gave a presentation about the dismantling and recycling of end-of-life vehicles in The Netherlands (annex 9).
The morning was concluded with a short brainstorming workshop regarding the types of waste materials that can be recycled or reused in the different countries. As said, the time we had to fully discuss the recycling of waste materials was short. Nevertheless it turned out to be an interesting session because, even though most Member States recycle in part the same waste materials, there are certain differences. It was new for most participants that snow is a product that is reused in Sweden and that The Netherlands have set up a structure for the recycling of diapers (annex 10).

4 Conclusions and recommendations

4.1 INTRODUCTION

Evaluation of the project and learning from the experiences is an important aspect of the project. At the end of the three-day project, participants were asked to describe what was learned, what was missed and what they recommend for future projects.
In short, the participants felt that they learned most from each other. Discussions during the project itself but also in the evening hours, proved to be very useful and broadening for the mind. This is actually what IMPEL is all about: learning from the experiences of others.

4.2 EXPERIENCES AND RESULTS

The project was set up to exchange practical information between permit makers and inspectors regarding landfills, incinerators and recycling of waste. This practical way of working with each other during the project was highly appreciated by all participants.
At the end of the three-day program, participants were asked to fill in an evaluation form.
The results of these evaluations are summarized below.

4.2.1 LEARNING POINTS

- Member States have similar approaches to the environmental problems
- Discussions that were held changed the way in which some participants will do their work in the future ("I will remember the points we discussed when I issue the next landfill-permit")
- Conditions in a permit should be formulated more precisely
- Simplifying conditions in a permit helps the colleague that does the enforcement (less cross references)
- When permitting and enforcement is done by the same person contradictions of interests can arise
- Knowing what type of conditions are applied in a waste permit in other Member States, makes it easier to formulate own conditions
- Member States have different systems for financial security
- Monitoring and web applications as used in Lombardy, Italy are a good example of how this can be done `
- Vehicle dismantling and recycling in The Netherlands is a good example for other Member States
- It was interesting to see how an integrated waste facility is managed
- It was interesting to learn how clinical waste can be managed
- Burning of oil from animal waste is not allowed according to the Waste Incineration Directive
- Fly ash from waste incinerators should be considered hazardous waste

4.2.2 WHAT WAS MISSED?

- Transboundary waste transport; import and export of waste
- Reuse and recycling of waste did not get enough attention

- More information on recycling techniques
- More information on treatment of leachate
- Technical detail on landfill engineering and - monitoring
- Information and participation of other new Member States (e.g. Lithuania, Estonia)

4.2.3 OVERALL CONCLUSION

- The European Commission should consider cultural differences between the Member States when drawing up new legislation
- It is necessary to classify exactly the meaning of waste and the difference between recovery ("R1") and disposal ("D10") by the European Commission
- The permitting structures and enforcement of conditions are carried out in a similar way within the Member States
- There is, however a huge variation in the way permits are issued throughout the European Community and the conditions that are applied
- Separating enforcement from the permitting seems to be a trend within the EC
- Specifying European Waste Codes in permits is problematic and difficult to enforce
- Member States have very different approaches to solve the same problems
- Member States are generally being consistent in their implementation of the Directives
- It was interesting to learn how other Member States comply with the IPPC directive
- There is still a lot to do, it would be good to have a separate project on reuse and recycling of waste
- Tackling landfills, waste incineration and recycling in one short project is very ambitious. Discussions remained at a high level because of it
- Very interesting discussions were held. They lead to a common opinion on how things should be done.

4.3 CONCLUSIONS

All participants agreed that the project was useful for their work in permitting and/or enforcement. Discussions were raised on all topics and these will continue within their own Inspectorate. New ideas were born and a network of permitters and enforcers dealing with landfills and incineration plants was established. Perhaps the project was too ambitious; discussing three topics in three days, made it necessary to cut some discussions short. On the other hand, there was so much common interest in the group, that each subject was tackled with new energy. Not only did the participants learn from each other about landfill, incineration and recycling, for many participants working within IMPEL was new and the contacts with colleagues from other Member States was inspiring. This project drew most participants closer to IMPEL and gave each of them a fuller view of the work that is being done within other Member States.

4.4 RECOMMENDATIONS

Based on the evaluation it can be stated that there is an overall feeling that IMPEL should focus more on Reuse and Recycling of waste. Not only on the techniques that are used within the different countries, but also on the implementation in the national legislation and the enforcement of recycling conditions in permits. Reuse and recycling of waste is a relatively new area for many Member States, and exchanging experiences and techniques at this stage could be worthwhile.
It was clear after the presentation on financial security, that each Member State has solved this problem in its own way. Regretfully, there was not enough time to spend more time on this topic, though it was evident that financial security for the after care of landfills is a problem within most Member States. We would therefore

recommend that IMPEL focuses on this problem in a separate project and tries to achieve a common way to solve the financial security problems that Member States are dealing with.

In the evaluation many participants expressed their appreciation for the workshop on "Conditions in an permit". Looking at a condition from the point of view of an inspector was an interesting exercise for many participants. How enforceable is a condition? How much room for deviation does it allow? If the condition contains a cross reference, is it clear what is meant (for the inspector and for the operator)? Is the cross reference easy to access? If a permit should be able to 'breathe' (usually to the advantage of the permitholder), then how much 'air' in the permit is enforceable? It would be very interesting to discuss these and other questions regarding the formulation of a condition in a separate project. Perhaps more uniformity could then be reached within the Member States.

During the project the matter of separating the role of the permitter from the inspector was discussed several times. We did not reach a common point of view on this subject. Some Member States have a strict separation of these two areas to avoid a conflict of interest, other Member States feel that combining these two in one person is more efficient. It would be interesting to discuss this subject further in a separate workshop.

Last but not least, it is recommended that 'new' Member States be encouraged to participate more frequently in IMPEL projects. This will not only benefit their knowledge on environmental matters, but also establish an informal network on which they can rely when dealing with new (environmental) issues.

ANNEX 1 List of project participants

National representatives

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Note :	Mr Gil de Bernabe (Spain) And Mr. Petr Svoboda (Czech Republic)	Both were enlisted for this project, but did not participate after all.

Project management and –secretariat/organisation

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ANNEX 2 Project program

IMPEL WASTE PROJECT

25 – 27 may 2005

Province of Overijssel
Zwolle, The Netherlands

24th of May 2005 **Evening**

		Arrival of the participants
19.30		Get together, informal drinks
20.20		Dinner

25th of May 2005 **Day 1**
Morning

9.00		Departure from hotel to the house of the Province of Overijssel
Session 1		
10.00		1.1 Welcome 1.2 Presentation: Permitting and Enforcement in The Netherlands 1.3 Presentation: European Environmental Legislation for landfills, incinerators and recycling and reuse of waste.
12.30		Lunch (sandwich buffet)

Afternoon/evening Session 2 Workshops		
14.00		Landfill 2.1 Parallel workshops Landfills 2.2 Presentations of the workshops
17.30		Informal drinks
19.00		Zwolle City tour
20.15		Dinner

26th of May 2005 **Day 2**

Morning Session 3		
9.00		Incineration 3.1 Presentation Germany: Incineration in cement kilns 3.2 Presentation United Kingdom: Financial security 3.3.Presentation Portugal: Illegal clinical waste incinerators
11.00		Coffee break
11.20		3.4 Presentation: Landfill and waste incineration of the VAM in Wijster
12.00		Lunch (sandwich buffet)

Afternoon/evening **Session 4** **Excursion**		
13.00		Departure by bus to VAM in Wijster
17.45		Arrival in Zwolle
20.00		Dinner

27th of May 2005 **Day 3**

Morning **Session 5**		
9.00		Recycling and reuse of waste 5.0 Presentation Italy (Lombardy): Environmental Protection Regional Agency, role and organization in Waste and IPPC (added presentation on request of the participant of Italy) 5.1 Presentation: separation and recycling of municipal waste in Limburg (NL) 5.2 Presentation: Vehicle dismantling and recycling
10.00		Coffee break
10.20		Workshops 5.3 Parallel workshops: Recycling and reuse of waste
11.20		5.4 Presentation of the results of the workshops
12.00		5.5 Closing of the project Closing by mr. G. Ranter, Member of the Provincial Executive for Environmental Enforcement of the Province of Overijssel
12.30		Lunch

ANNEX 3 Questionnaire

1. Introduction

1. Please state your name, address, country, telephone-number and email address
2. Where are you employed?
3. Please give a description of your work and your training.
4. Are you, through your work, involved with environmental permitting or enforcement?
5. Are you involved in waste disposal issues? In what way?
6. Are you in any way involved with separation of waste material and reuse/recycling of waste?

2. Permitting and enforcement at landfills

1. How many landfills are located in your area?
2. Can you state how many of these are for hazardous waste, non-hazardous waste (and municipal waste) and inert waste?
3. How many of these landfills have a permit in accordance to the Council Directive on landfill of waste (1999/31/EC of 26 April 1999)?
4. How many landfills have no environmental permit?
5. How many of the landfills have done an 'environmental impact assessment' ?
6. When do you expect all the landfills in your area to have a permit in accordance to the specifications of the Directive?
7. Which difficulties do you (or your colleagues) encounter when issuing a permit for a landfill?
8. Which difficulties do you (or your colleagues) encounter when enforcing conditions as stated in the permit?
9. How often (per year) does the inspector carry out an integrated inspection (as described in the IPPC Directive) of the landfill?
10. Which difficulties does the operator of a landfill encounter when trying to comply with the permit conditions?
11. What kind of conditions are applied to landfill permits to protect the soil?
12. What kind of conditions are applied to landfill permits to protect the groundwater?
13. What kind of conditions are applied to landfill permits to protect the air?
14. What kind of conditions are applied to landfill permits to protect surface water?
15. What kind of after-care do you require at landfills? Are conditions regarding the after-care included in the permit?
16. Do you require financial security from the operator to ensure that all obligations flowing from the permit are fulfilled? If so, how do you get this security?
17. Does your legislation prohibit the disposal of certain waste materials in landfills?
18. If the answer is yes, please state which waste materials this concerns and how they

are then disposed of.

19. What steps have you taken to reduce the amount of biodegradable waste going to landfills?
20. What measures are taken to reduce the production of methane gas in landfills?
21. What is required from operators to control the emission of gas?
22. Can you give an estimate of the percentage of municipal waste that is disposed of in landfills in you area? In your country?
23. Can you give an estimate of the percentage of industrial waste that is disposed of in landfills in you area? In your country?

3. Waste permitting and enforcement at waste incineration plants

1. How many waste incineration plants are located in your area?

1a How many of these waste incineration plants co-incinerate waste (like in cement kilns, steel or power plants; whose main purpose is energy generation or the production of material products)?

1b How many of these plants incinerate hazardous waste?

1c How many incineration plants are for 'mixed municipal' waste (waste from households as well as commercial, industrial and institutional waste which because of it's nature and composition is similar to waste from households) ?

The questions below all refer to waste incineration plants without the purpose of energy generation or the production of material products.

2. How many of these plants have an integrated permit and are controlled in accordance to the Integrated Pollution Prevention and Control Directive (IPPC)?
3. How many incineration plants have a permit in accordance to the Directive on waste incineration (2000/76/EC)?
4. If not all waste incineration plants have an integrated permit as stated in the IPPC Directive, then when do you expect that this will be the case?
5. How many incineration plants have no environmental permit at all?
6. For how many plants was an environmental impact assessment study done before the permit was issued?
7. Which Reference documents (BREF) do/did you apply to issue an incineration permit?
8. Which Best available technique (BAT) do/did you apply to issue this permit?
9. Which difficulties do you encounter when issuing a permit for a waste incinerator?
10. Which difficulties do you encounter in the enforcement of the permit-conditions for a waste incineration plant?
11. Which difficulties does the operator of the installation encounter when trying to comply with the permit conditions? Can conditions easily be met?
12. What penalties can be given to operators of installations whom do not comply with the conditions in the permit?
13. What kind of conditions are applied to a permit to protect the soil?
14. What kind of conditions are applied to a permit to protect the groundwater?
15. What kind of conditions are applied to a permit to protect the air?
16. What kind of conditions are applied to a permit to protect surface water?
17. What kind of conditions are applied to a permit to protect the risks for human health?
18. How often (per year) does an inspector carry out an integrated inspection (as described in the IPPC Directive)

of an incineration plant?

19. Does your legislation prohibit the disposal of certain waste materials in incinerators?
20. If the answer is yes, please state which waste materials are prohibited and how they are then disposed of.
21. Can you give an estimate of the percentage of mixed municipal waste that is disposed of in a waste incineration plant in your area? In your country?

4. Recycling and reuse of waste at waste installations (landfills and incineration plants).

In this chapter we would like to know what is required of waste installations,(landfills and incineration plants) regarding recycling and reuse of waste materials.

1. Do you include recycling- and reuse-conditions to a permit of a waste installation?
   If the answer is yes: proceed to question number 2.
   If the answer is no: proceed to question number 8.
2. What is required in such conditions? For what kinds of waste?
3. Is there a difference in conditions regarding recycling and reuse, for incineration plants and for landfills? Please explain.
4. Can operators easily meet the permit conditions regarding recycling and reuse?
5. How are recycling and reuse conditions enforced?
6. Which difficulties does an inspector encounter regarding these matters?
7. What does your legislation state on recycling and reuse of industrial waste?
8. What are the developments concerning reuse and recycling of waste that you foresee in your country in the near future?
9. What are your targets concerning recycling and reuse?
10. Can you mention developments concerning recycling or reuse you would like to share with us?
11. What is done to encourage the separation of waste?

5. Enforcement at waste installations

1. What is the competence of an environmental inspector?
2. What training/schooling does an inspector for waste installations have?
3. What does the inspector do when an installation is not complying with the conditions of the permit? Could you describe the steps that are taken to get the installation to comply?
4. Is enforcement embedded in an enforcement strategy?
5. If so, can you explain the steps in this strategy?
6. Does the police accompany an inspector during the inspections?
7. Which sanctions and competences does your legislation allow you to enforce compliance?
8. Which steps are taken when an installation persists in non-compliance?
9. What are the problems you (or your colleagues) encounter when enforcing environmental laws?
10. Can you describe a case where enforcement of a waste installation was carried out successfully?
11. Can you describe a case where the enforcement did not lead to success?

ANNEX 4 Compilation of the questionnaires

Country	Responsible persons	Institution
Cyprus	Mrs. E. Christodoulidou	Environment Service, Ministry of Agriculture Natural Resources and Environment
Czech Republic	Mr. P. Špièák	Czech Inspection of Environment
Denmark	M.Sc. mr. L. Kroer	Storstrøm County/ Industrial Environment Division
Denmark	M.Sc. Mrs. M. Dolberg	Viborg Amt/ County of Viborg
Germany	Mrs. G. Both	State Ministry for the Environment and Nature Conservation, Agriculture and Consumer Protection
Germany	Dipl. Ing. Mr. R. Bolwerk	Bezirksregierung Münster / NRW
Ireland	Dr. Mr. J. Derham	Environmental Protection Agency
Ireland	Mr K. Reynolds	Environmental Protection Agency
Italy	Mr. S. Padovani	A.R.P.A. Lombardia
Poand	Mr. Paweł Trzaskowski	Voivodeschip Inspectorate for Environmental Protection
Portugal	Mrs. A.C. Caldeira	Inspectorate General of Environment
Scotland	Mr. A. Bond	Scottish Environmental Protection Agency
Slovakia	Ing. Mrs. J. Legathova	Slovak Inspectorate of the Environment
Slovakia	Ing. Mr. I. Miklos	Regional Inspecorate of the Environment Banská Bystrica
Spain	mr. J. Gil de Bernabe	Conselleria de Medio Ambiente, Xunta de Galicia
Sweden	Mr. J. Sällström	County Administrative Board in Örebro
Sweden	Mrs. M. Mohlin	County Administrative Board in Skåne
The Netherlands	Mrs. Ing. D. Hornung-Couwenberg	Ministry of Housing, Spatial Planning and Environment
The Netherlands	Mrs. Ir. D. Bücker	Province of Limburg
The Netherlands	Mrs. Ing. P.A. Weenink-Driessen	Province of Overijssel
United Kindgdom	Mr. I. Brindley	Environment Agency for Engeland and Wales

WASTE PERMITTING AND ENFORCEMENT AT LANDFILLS

1. How many landfills are located in your area?
2. How many of these are for hazardous waste, non-hazardous waste (and municipal waste) and inert waste?
3. Do the landfills have a environmental permit? How many do not have a permit?
4. How many of these landfills have a permit in accordance to the Council Directive on landfill of waste (1999/31/EC of 26 April 1999)?
5. How many of the landfills have done an 'environmental impact assessment'?
6. When do you expect all the landfills in your area to have a permit in accordance to the specifications of the Directive?

TABLE 1	**Total number of landfills**	**hazardous waste**	**Non-hazardous waste (incl. municipal**	**Inert waste**	**Permit?**	**Permit 1999/31/EC**	**EIA?**	**Deadline permit Directive on landfill of waste**
Cyprus	107	7		100	None	None	2 approved EIA	Within 3 years
Denmark (Storstrom County)	4	1		4	Yes	2 permits, 2 in 2005/6	none	2006
Denmark (Viborg County)	8	2	4	5	Yes	None	1 EIA	End of 2006
Germany (NRW)	236	10	176	40	Yes	236	Most of them	15/07/2009
Ireland	42[1]	0	42	10	Yes	42	80%	2009
Italy (Lombardy)	102[2]	7		85	Yes	Application for all landfills	7	October 2007
Poland	90	5	84	1	Yes, 15 without permit	75	81	31/12/2009
Portugal	3	0	3	0	Yes, 1 without permit	1	none	2007, 1 closure
Scotland	257	0	70	45	Yes	5	Not available	March 2007, 142 closures
Slovakia	160	15	124	21	Yes	38	75%	31/12/2008
Slovakia **Banska Bystrica County**	26	1	21	4	Yes	26	Not available	30/10/2007 (IPPC)
Spain	26	2	22[3]	2	Yes,	8	16 EIA for new	Closure

[1] Excluding 200 small land reclamation projects

[2] 10 located in the area of an industry in which you can dispose only the waste produced in the same industry

[3] 13 landfills of demolition and construction waste (RDC), 2 of RDC and non-hazardous waste, 7 of non-hazardous waste

					3 without permit		landfills 67 closure projects	a.s.a.p. 16/07/2009
Sweden (Orebro)	-	-	-	-	-	-	-	-
Sweden (Skane)	16	2	12	2	Yes	7	16	31/12/2008 5 closures
The Netherlands (Limburg)	5	0	4	1	Yes	4	4	1 closure
The Netherlands (Overijssel)	5	0	4	1	Yes	4	4	-
United Kingdom	57	0	14	43	Yes	4	6 EIA's	2007

7. Do you (or your colleagues) encounter difficulties when issuing a permit for a landfill?

TABLE 2	**Yes or No**	**Please, specify what kind of difficulties:**
Cyprus	Yes	The NIMBY syndrome, people around the area complain about the construction of landfills.
Denmark (Storstrom County)	Yes	Interpretation of landfill regulation (Danish implementation of 1999/31/EC directive), regulation can appear inflexible and does not in some cases work very well with the real facts of the landfill, inflexible regulation makes it in some cases difficult to substantiate specific conditions.
Denmark (Viborg County)	Yes	The legislation is made for big, large-scale landfills. For some small landfills with at specific kind of waste, it is often too strict and complicated. The neighbours don't want a landfill in their area and are afraid of noise and pollution
Germany (NRW)	Yes	Protests from affected citizens.
Ireland	Yes	Splitting the competency between Planning Authorisation and nvironmental Authorisation. Public perception and objection.Assessment of ecological impact (from noise, dust, odours, traffic, disturbance, barriers, …) Use of new geotechnical design solutions that on the face of it do not conform to Landfill Directive standards (e.g. geosynthetic drainage layers, or geosynthetic clay liners)
Italy (Lombardy)	Yes	We don't have technical difficulties, but only political in the government of the territory (NIMBY effect).
Poland	No	Voivodship Inspectorate of Environmental Protection does not issue permits
Portugal	Yes	To have sure that the measures proposed by the operator and defined in the permit, are the appropriate to assure the total protection of the environment, especially the quality of discharge of waste water (leachates).
Scotland	Yes	Poor information on site hydrogeology in previously mined areas and poor information on gas generation. Lack of resource is also an issue.
Slovakia (Banska	Yes	There is little or no information about quality of environment on the site of installations (landfill) at a given time. It is difficult to lay down appropriate emission limit values for

Bystrica County)		pollutant in IPPC permit. In some cases an additional determination of the quality of environment must be carried out by the authorized organizations.
Spain	No	
Sweden (Skane)	Yes	It is sometimes difficult to establish that the geological barrier is sufficient. Also the question of financial security almost always is a matter where there are different opinions as to the amount and how the security should be posted. Another area that often causes problems is how the leachate should be treated, and to what levels. Problems regarding noise and odour are often substantial, especially at plants that treat waste biologically. This often leads to protests from people living in the vicinity of the plant.
The Netherlands (Limburg)	Yes	It is difficult to translate de Landfill Directive into a Dutch permit, because of the misunderstanding of the meaning of the word 'compartiment'. It is also a problem to overcome the gap between ledgislation and the daily practice.
United Kingdom	Yes	It is difficult to get the applicant to submit an application that contains sufficient technical detail for a permitting decision to be made. There are often objections to the installation from local residents groups The site needs planning permission under land-use planning law before an environmental permit can be granted. The relationship between the two sets of legislation is often difficult

8. Do you (or your colleagues) encounter difficulties when enforcing conditions as stated in the permit?

TABLE 3	**Yes or No**	**Please, specify what kind of difficulties:**
Cyprus	No	No permit is issued yet for landfills, but I don't think that we will have any particular problem.
Denmark (Storstrom County)	Yes	There is often problems with the construction of the membrane and the leachate system, requires normally several inspections (up to 10 inspections pr. cell), in some cases we demand that some of the construction is dismantled and then done again to correct specifications.
Denmark (Viborg County)	No	-
Germany (NRW)	No	-
Ireland	Yes	For landfill – general house keeping, landfill gas odour, noise, litter, waste filling overtaking installation of engineering requirements, damage of landfill engineering structures by machinery, improper waste acceptance procedures/control, traffic, progressing capping and restoration.
Italy (Lombardy)	No	We have a guidance line for enforcing condition that everybody knows, so we usually have no problem in state enforcing condition in the permit. We have also an official meeting with the member of the territory (Municipal and Province) and the owner of the plant.
Poland	Yes	a lack of scales on landfills, difficulty in checking whether the insulation layer is apropriate, nonconformance of waste register on landfills.
Portugal	Yes	The control/inspection of the criteria and procedure of acceptance of waste in the landfills.
Scotland	Yes	Lack of resource. Long time taken for an offence to get to court.
Slovakia	No	Major activity of department of integrated permitting and control (DIPC) until 2007 will be issuing of integrated permits. DIPC did not carry out control of imposed correction measures until now.

Spain	No	-
Sweden (Skane)	Yes	We have to rely on the information the operator gives us as Sweden has a system of control by self-monitoring. Not all operators have the standard of self-monitoring that is required. Often the legislation changes very quickly and it takes quite a long time to update the permit.
The Netherlands (Limburg)	Yes	Enforceability of permit conditions Communication between permitting and enforcement departments
United Kingdom	Yes	Ambiguity/enforceability of permit conditions.

9. How often (per year) does the inspector carry out an integrated inspection (as described in the IPPC Directive) of the landfill?

TABLE 4	**Inspection according to Directive on landfill of waste**
Cyprus	No integrated inspections are carried out. After permitting, we are planning to inspect each landfill at least 4 times a year.
Denmark (Storstrom County)	2 regular inspection pr. year. Up to 10 inspection pr. year in connection with construction of new cells/enlargement of the landfill
Denmark (Viborg County)	1 time per year at the landfill but on regular basis depending on the type and size of landfill we get results from analyses of groundwater and percolate
Germany (NRW)	-
Ireland	For non-hazardous waste landfills approximately 3 to 4 times a year, with a detailed two inspector audit once every two years. Also enforcement officers attend the site to take water, leachate and gas samples/measurements at least twice a year.
Italy (Lombardy)	Usually two times per year or more.
Poland	At least once a year
Portugal	At least once in a year, depending of the performance of the operator or the assessment of risk of the installation.
Scotland	This is based on a risk assessment of the nature of the site and the past compliance of the operator. Typical inspection frequencies are in the range 4 – 36 inspections each year.
Slovakia	In generally reconsideration and updating of permit conditions by the DIPC must be done every once in 8 years at least. DIPC inspectors will have carried out control of imposed correction measures (for landfills granted by IPPC permit in the year of 2004) by the end of this year.
Spain	All the establishments subject to the Law 16/2002 of IPPC (Integrated control and prevention of pollution) and all the groups of potentially atmosphere pollutant activities belonging to the group A (according to the Decree 833/75 the landfills belong to this group), have a priority of 1 in the level of action, what means that the minimum frequency of the inspections carried out will be of 1-2 years. Naturally inspections with a greater frequency can be performed and will be planned in the General Inspection Plan of the year.
Sweden (Skane)	Inspection at least once a year

The Netherlands (Limburg)	At least once a year a routine inspection. If the operation can't comply with the permit conditions, there will be a next inspection. Also in case of a calamity inspection will be carried out.
United Kingdom	Very few landfills yet permitted under the IPPC Directive – we anticipate that regulation of such sites will move from frequent routine inspections (though there will be times i.e. new engineering works when these will still be necessary) towards less frequent but more in-depth audit inspections.

10. Does the operator of a landfill encounter difficulties when trying to comply with the permit conditions?

TABLE 5	**Yes or No**	**Please, specify what kind of difficulties:**
Cyprus	-	Not applicable.
Denmark (Storstrom County)	Yes	Large investments etc.
Denmark (Viborg County)	No	The permits are always made in agreement with the operator/ owner. The big, complicated landfills are owned by local authorities. They are also thinking about the environment and not only money.
Germany (NRW)	-	-
Ireland	Yes	For landfill – general house keeping, landfill gas odour, noise, litter, waste filling overtaking installation of engineering requirements, damage of landfill engineering structures by machinery, improper waste acceptance procedures/control, traffic, progressing capping and restoration. Also, allowing business/process change within the confines of a permit.
Italy (Lombardy)	No	We think that the operator has no difficulties because he knows before all the conditions of the permit and can discuss with us all the technical conditions in the official meeting before the issuing of the permit.
Poland	Yes	A main problem is insufficient financial means.
Portugal	Yes	To comply the self-monitoring requirements defined in the National Law - Decree n.º 152/2002 of 23 of May (transposition of the Council Directive 1999/31/EC and another parameters according the National Law for: waste water, soil, groundwater and emissions).
Scotland	Yes	Length of permit makes it difficult to remember all requirements. No provision made for extreme weather.
Slovakia	Yes	Generally it means an additional costs for operator of landfill to comply with the requirements of IPPC permit.
Spain	Yes	
Sweden (Skane)	Yes	Sometimes the operator has been a bit optimistic when applying for the permit and has difficulties in complying with the conditions. The increasing amount of produced waste also means that conditions regarding the amount of waste that can be treated at the plant are a limit that the operators find unnecessary. The proficiency and knowledge of the operator varies, as well as the standard of the self-monitoring systems.
The Netherlands (Limburg)	Yes	To comply the permit requirements in time. Sometimes they don't understand the permit requirements (plan of urgency, intervention points).

United Kingdom	Yes	Sometimes they say the permit requirements are not clear and they do not know what they have to do the achieve compliance

11&12. What kind of conditions are applied to landfill permits to protect the soil and groundwater?

TABLE 6	
Cyprus	Not applicable. The conditions applied to the permits will be accordingly to the Directive 1999/31/EC (Annex I,III) e.g to protect soil, surface and groundwater: 1) to have an effective collection of the leachate 2) using a combination of a wall of geological isolation and a proper membrane in the lower and upper part of the landfill 3) k>= $1*10^{9}$ m/s
Denmark (Storstrom County)	Conditions that specify the construction of a membrane and a leachate system. Conditions that specify the establishment of monitoring wells upstream.
Denmark (Viborg County)	We demand membranes, when not inert waste. The percolate is lead to wastewater treatment plant. We are monitoring the groundwater and percolate to see if there are any change in the compounds.
Germany (NRW)	Requirements for technical safety measures (geological barrier, basal liner, leachate and gas collection, top cover etc.), operation and disposable wastes, monitoring groundwater at inflow and outflow regions of the landfill.
Ireland	Full containment. Stripping of soil and safe storage until ready for use in restoration. CQC/CQA of engineering, monitoring, leachate collection & removal
Italy (Lombardy)	All the area of the landfill is closed by a net; every tracks must wash the wheels before leaving the plant; every area used for moving waste is realized whit a surface sealing. We also have special condition for the storage of leachate before the disposal outside of the landfill (HDPE or iron tanks etc.)
Poland	Tightening the bottom of landfill. Checking the tightening of bottom. Checking of ground water level and composition every 3 months during the exploitation of landfills and every 6 months after their exploitation is finished.
Portugal	The conditions are defined in the National Law - Decree n.º 152/2002 of 23 of May (according to the Council Directive 1999/31/EC), such as : all the landfills must be implemented and conceived, in a matter to obey to the necessary conditions to avoid the air pollution, soil, surface water and groundwater. The conditions are also defined in the National Law for water and waste water.
Scotland	See attached Permit Template
Slovakia	A landfill site shall have a sealing system for the landfill depending on the class of the landfill. A landfill must be sealed in such a way that a geological barrier or an artificial base sealing layer for the landfill and a top sealing layer for the landfill result in protection of the groundwater. The landfill must be equipped and operated in such a way that dirt from it, caused mainly by the vehicles/means of transport, is not dispersed onto public roads and the surrounding land. Appropriate measures shall be taken at any landfill in order to control leachate and manage the leachate regime providing in particular for: - control of water from precipitations entering into the landfill body, - prevention of surface water and groundwater from entering into the landfill waste, - drainage and collection of leachate,

	- the treatment of leachate collected from the landfill in order to comply with discharge values into the sewerage system or recipient or transport of the leachate to a suitable sewage treatment plant. A landfill site shall have a groundwater monitoring system. For monitoring groundwater quality in the vicinity of a landfill site, a sufficient number of measuring points must be constructed; there must be at least three, one in the groundwater inflow region and two in the outflow region. The frequency of groundwater composition measurements shall be determined depending on the character of the landfill and on the basis of knowledge and the evaluation of the velocity of groundwater flow in the area during the operation phase of the landfill and also during its after-case phase.
Spain	….
Sweden (Skane)	The Landfill Directive is fully implemented in Swedish legislation. This means that it is not necessary to condition a geological barrier etc in the permit. Hazardous waste has to be stored on a hardened surface and under a roof. Containers for liquid hazardous waste also have to have a dyking which can contain the volume of the largest container plus 10 % of the volume of the rest of the containers. There are conditions concerning the geological barrier. In Sweden a natural barrier that complies with the conditions in the Landfill Directive is permitted. There can be conditions that regulate the size of the natural barrier. The leachate has to be collected and treated before it is discharged. There has to be an emission and recipient monitoring program.
The Netherlands (Limburg)	Conditions that specify the construction of a bottom sealing and a top cover (after closure) with a leachate system. Conditions that specify the establishment of monitoring groundwater.
United Kingdom	Subject to the other conditions of this Permit, there shall be no other emissions to land from the Permitted Installation. No emission from the Permitted Installation shall give rise to the introduction into groundwater of any substance in List I and List II (as defined in the Groundwater Regulations 1998 (S.I. 1998 No. 2746)).so as to cause pollution. For substances other than those in List I or II (as defined in the Groundwater Regulations 1998 (SI 1998 No.2746)), the Operator shall ensure that all appropriate measures are taken to prevent or where that is not practicable to reduce emissions to groundwater from the Permitted Installation provided always that the techniques used by the Operator shall be no less effective than those described in the Application. Subject to the terms of this condition, the activities of disposal, or tipping for the purpose of disposal, of waste, that are authorised by this landfill permit shall cease 3½ years from date of issue of this Permit, unless by that date the operator has submitted to the Agency a written review of the Hydrogeologocal Risk Assessment submitted as part of the original Application for the permit. The Risk Assessment review shall include a review of the responses in Section 1.2.1 to 1.2.10 of Part B of that original application. The written review shall show whether at the specified date, the level of risk to groundwater meets the terms of the Groundwater Regulations 1998.

13. What kind of conditions are applied to landfill permits to protect the air?

TABLE 7	
Cyprus	To protect air: proper collection and treatment of gas that it is produced in landfills
Denmark (Storstrom County)	Conditions that specify which type of waste is allowed in the specific cells – a positive-list, general demand of daily coverage of the waste with a layer of sand or earth.
Denmark (Viborg	At landfills with biodegradable waste (old landfills), we collect the gas.

County)	
Germany (NRW)	Requirements for technical safety measures (geological barrier, basal liner, leachate and gas collection, top cover etc.), operation and disposable wastes
Ireland	Containment & capping, gas collection, passive venting via carbon filters, active extraction to gas flare or generation plant. Monitoring. Daily cover, spraying roads, accelerated revegetation of caps.
Italy (Lombardy)	Every day the operator of a landfill must cover the waste with natural material or PEAD film and at the end of waste disposal he must cover the landfill with the condition of the Directive.
Poland	Installation of the organised system of landfill degassing. Checking the emission and composition of landfill gas every month during the exploitation of landfills and every six months after their exploitation is finished.
Portugal	The conditions are defined in the National Law - Decree n.º 152/2002 of 23 of May (according to the Council Directive 1999/31/EC)and the National Law for emissions.
Scotland	See attached Permit Template
Slovakia	Landfill gas shall be collected from all landfills receiving biodegradable waste. A landfill site shall have a drainage system for landfill gas and an installation for its use or disposal, except for landfills for wastes where landfill gas is not likely to originate. The collected landfill gas must be treated and used to produce energy; if the landfill gas collected cannot be used to produce energy, it must be foiled in a manner which minimizes or does not have any negative effects on the environment and human health (biofiltration).
Spain	….
Sweden (Skane)	Every landfill where biodegradable waste has been disposed has to have a collection of landfill gas for as long as the gas is produced in such an amount that is possible to collect it. If possible, the gas has to be used for production of energy. If that is not possible, the gas has to be flared.
The Netherlands (Limburg)	Measurement of the composition and pressure of the gas every month. Collection of gas and recovery of energy. Disposal of certain waste is prohibited because of odour nuisance.
United Kingdom	The Operator shall ensure that all appropriate measures are taken to prevent or where that is not practicable to reduce fugitive emissions of substances to air from the Permitted Installation in particular from: open surfaces, unfilled, operational and filled landfill surfaces storage areas buildings pipes, valves and other transfer systems provided always that the techniques used by the Operator shall be no less effective than those described in the Application, where relevant. The Operator shall use all appropriate measures so as to prevent or where that is not practicable to reduce emissions of landfill gas, litter and particulate matter from the Permitted Installation provided always that the techniques used by the Operator shall be no less effective than those described in the Application, where relevant. The Operator shall ensure that all appropriate measures, including BAT, are taken to prevent or where that is not practicable to reduce odorous emissions from the Permitted Installation, in particular by: controlling operational activities to minimise the generation of odour limiting the use of odorous materials restricting odorous activities controlling the storage conditions of odorous materials optimising the performance of abatement systems timely monitoring, inspection and maintenance employing, where appropriate, an approved odour management plan leachate storage in sealed containers

	provided always that the techniques used by the Operator shall be no less effective than those described in the Application, where relevant.

14. What kind of conditions are applied to landfill permits to protect surface water?

TABLE 8	
Cyprus	Not applicable. The conditions applied to the permits will be accordingly to the Directive 1999/31/EC (Annex I,III) e.g to protect soil, surface and groundwater: 1) to have an effective collection of the leachate 2) using a combination of a wall of geological isolation and a proper membrane in the lower and upper part of the landfill 3) k>= $1*10^{9}$ m/s
Denmark (Storstrom County)	Conditions that specify the establishment of a membrane on the side of the landfill and intersection walls.
Denmark (Viborg County)	The water from landfills (not inert waste) are collected and lead to wastewatertreatment plant. We monitor the water quality in nearby streams and lakes.
Germany (NRW)	Requirements for technical safety measures (geological barrier, basal liner, leachate and gas collection, top cover etc.), operation and disposable wastes. Moreover, during operation, if necessary, minimisation of disposal surface, laying down in-between covers.
Ireland	Full containment & capping, use of interceptors and sediment traps, monitoring, drainage collection & treatment, reed beds, etc.
Italy (Lombardy)	Around the landfill there is a collector for the rain that falls to the surface of the landfill. This water is treated if necessary or instilled in a surface water-course.
Poland	Organised system of collecting and treating of landfill effluent, checking the content and composition of landfill effluent every 1 to 3 months during the exploitation of landfills and every 6 months after their exploitation is finished. Checking the flow and composition of surface waters every 3 months during the exploitation of landfills and every 6 months after their exploitation is finished.
Portugal	The conditions are defined in the National Law - Decree n.º 152/2002 of 23 of May (according to the Council Directive 1999/31/EC) and the National Law for water and waste water.
Scotland	See attached Permit Template
Slovakia	Run-off (rain or melted snow) from open landfill surfaces should be separated from contact with waste. Run-off can become contaminated by contact with waste or by accumulation of solids. There shall be a suitable peripheral drainage system of suitable dimensions for the drainage of surface water from the vicinity of the landfill. The ground is to be provided with necessary gradients and possible raised edges to prevent diffuse pollution from surface run-of or accidental spillage, (example: wheel washers, fuel storage tanks, waste receipt and handling) and to ensure that any spilled liquids run off to a collector and are removed or treated in accordance with regulatory provisions.
Spain	….
Sweden (Skane)	Sweden has a lot of surface water, more than many other countries. It is therefore important with conditions that regulate and control the protection of surface water. Leachate and contaminated surface water from areas where waste is treated or stored has to be collected and treated before it

	reaches ground- or surface water.
The Netherlands (Limburg)	Rainwater is collected and lead to wastewatertreatment. The water is treated before it reaches ground- or surface water. Monitoring of surface water quality in nearby ditches, streams and lakes. Moreover, the operator has to put up a plan for measurements, when an intervention point is reached.
United Kingdom	The Operator shall ensure that all appropriate measures are taken to prevent or where that is not practicable to reduce fugitive emissions of substances to water (other than Groundwater) and sewer from the Permitted Installation in particular from: all structures under or over ground surfacing bunding storage areas provided always that the techniques used by the Operator shall be no less effective than those described in the Application, where relevant. There shall be no release to water that would cause a breach of an EQS established by the UK Government to implement the Dangerous Substances Directive 76/464/EEC.

15. What kind of after-care do you require at landfills? Are conditions regarding the after-care included in the permit?

TABLE 9	
Cyprus	Not applicable yet. The conditions will be accordingly to the Directive 1999/31/EC in Article 13 and Annex III.
Denmark (Storstrom County)	Condition that request the pumping of leachate and monitoring of leachate, groundwater and surface water if relevant for a minimum of 30 years, also conditions that request landscaping according to local plans.
Denmark (Viborg County)	In the present permits we only have conditions regarding the re-establish the area. We are revising the permits and are going to include conditions regarding after-care
Germany (NRW)	Control of the installations for technical safety, leachate, groundwater etc. Operation permissions include provisions for after-care.
Ireland	Active management of the facility in aftercare until the Agency (us) decides that the facility is stable and no longer represents a risk to the environment (30 or 50 years ++). Yes there is a condition for the preparation and maintenance of closure and aftercare plans.
Italy (Lombardy)	All permits have after-care condition, especially for the management of leachate and biogas, but also for the management of all area of the landfill (like the Directive).
Poland	Monitoring
Portugal	The after-care is the same defined in the Council Directive 1999/31/EC (the permit defined the plan for closure and aftercare procedures, including the monitoring of the meteorological data, emission and groundwater data).
Scotland	See attached Permit Template
Slovakia	Operator of the landfill is obliged upon definitive cessation of activities to return the site of operation to a satisfactory state. A landfill must be sealed in such a way that a geological barrier or an artificial base sealing layer for the landfill and a top sealing layer for the landfill result in protection of the soil, surface water and groundwater after closure. The operator of the landfill shall ensure monitoring and control of the landfill for at least 30 but not more

	than 50 years after issuing the certificate of closure of the waste landfill.
Spain	In agreement to the Real Decree 1481/2001: "the procedure of landfill closure, or of part of the same one, could be initiated when the corresponding conditions enunciated in the authorization are complied, with authorization of the competent authority at the request of the exploitative company, or by decision motivated of the competent authority. A landfill, or splits of the same one, only could be considered finally closed after the competent authority have carried out a final inspection in situ, have evaluated all the reports presented by the exploitative company and have communicated to it the approval of the closure performed; this will mean in no case a decreasing in the responsibility of the exploitative company, according to the conditions of the authorization. After the final closure of the landfill, and according to what have been reflected in the authorization, the exploitative company will be responsible for its maintenance, of the vigilance, analysis and control of lixiviates of the landfill, and, in its case, of the gases generated, as well as of the state of groundwater in the surrounding area of the same one. The time limit of the postclosured phase, in which the exploitative company will be responsible for the landfill, will be set by the competent authority in the terms of the authorization, taking into account the time during which the landfill can contain a significant risk for the health of the people and the environment, and the legislation in relation to the civil responsibility of the waste possessor. In no case this period limit will be lower to thirty years. The exploitative company will notify to the competent authority, as well as to the corresponding Council, every significant negative effect for the environment revealed in the procedures of control during this phase and will obey the decision of the competent authority on the nature and the calendar of the corrector measures that should be adopted".
Sweden (Skane)	There are conditions concerning the after-care in the permit. The operator has to present a plan of how the after-care should be carried out.
The Netherlands (Limburg)	There is a special legislation for aftercare. We require aftercare for the organisation of the maintenance, finance and environmental measures for at least 100 year. The operator has to carry out the construction of a top cover, a leachate system, a gas collection system. The operator has to make a plan for the aftercare with calculations of the costs of the monitoring and the measures taken to protect the soil, surface and groundwater from pollution. After a landfill closure the operator has to pay the province the amount of money that is calculated and the aftercare will be carried out by the province.
United Kingdom	Conditions regarding the after-care are included in the permit. They require collection and treatment/disposal of landfill gas and leachate and environmental monitoring. They also require maintenance and repair of all the environmental control systems and the low-permeability cap.

16. Do you require financial security from the operator to ensure that all obligations flowing from the permit are fulfilled? If so, how do you get this security?

TABLE 10	**Yes or No**	**Please, specify what kind of financial security**
Cyprus	Yes	We always require financial security from the operator to ensure that the obligations in the permit will be fulfilled, that no pollution to the environment will be caused and human health will be protected.
Denmark (Storstrom County)	Yes	a bank-deposit
Denmark (Viborg County)	Yes	We are going to require a certain amount per ton waste
Germany	Yes	A bank guarantee

(NRW)		
Ireland	Yes/No	Yes for private sector landfills, no for local municipality operated facilities.
Italy (Lombardy	Yes	Before issuing a permit we require a financial security that depend on the volume of the landfill, the area of landfill and the after-care management. We get the financial security from bank or assurance company.
Poland	No	It is allowed by the law but, in practice, the authorities issuing the permit do not require financial security
Portugal	Yes	It's defined for the National Authority of Waste and given by a National Bank.
Scotland	Yes	SEPA will accept that applicants are "in a position to make financial provision" if they can demonstrate that they have sufficient financial means to fund the requirements of the licence, including those arising on closure. SEPA will carry out a credit check to assess whether applicants are of sufficient financial standing. Where a Credit Reference Check has failed (or is not appropriate) an applicant may provide recent evidence (not more than 3 months old) from a third party as to its financial standing. It must be credible evidence stating that the applicant is in a position to access adequate funds. This could include**:** A statement of account addressed to the applicant from a financial institution. A letter to the applicant from a financial institution showing that the applicant has sufficient overdraft or loan facilities.
Slovakia	No	We don't require financial security from the operators in the permit. Operators have obligation from the Act No. 223/2001 on the waste to create special purpose financial reserve, which can be use for the closure, reclamation and monitoring of the landfill in the after –care phase only.
Spain	Yes	In agreement to the Real Decree 1481/2001: "the applicant has placed, or he will place before the beginning of the elimination operations, the bails or guarantees required in the Law 10/1998, of 21 of April, of Residues, and in its norms of development, on the way and amount determined in the authorization. To these effects, the constitution of this guarantee on a progressive way, in relation with the increasing quantity of released wastes, could be authorised and will be maintained while the exploitative company is responsible for the subsequent maintenance to the closure of the landfill. Nevertheless, the competent authority could authorize anticipated refunds of up to the 50% of the total amount of the bail or equivalent guarantee, since a year after the acceptance of the closure of the landfill, always that the remaining guarantee the fulfilment of the subsequent maintenance, vigilance and control plan on the part of the exploitative company l".
Sweden (Skane)	Yes	We require a financial security. It has to be a bank deposit or, for example a municipality can stand surety for the municipal landfill.
The Netherlands (Limburg)	Yes	We require financial security by means of a bank guarantee, a fund or an assurance
United Kingdom	Yes	We do require financial security. The operator can either set up a fund to build up a sum of money during the operational lifetime of the site which can be spent on closure and aftercare costs, or they can take out an insurance bond that pays out of they fail to undertake the required aftercare.

17&18. Does your legislation prohibit the disposal of certain waste materials in landfills?
If the answer is yes, please state which waste materials this concerns and how they are then disposed of.

TABLE 11	Yes or No	Please, specify which waste materials this concerns and how they are then disposed of
Cyprus	Yes	Used tyres: a unit is now being constructed for the shredding of used tyres and then recovery of the material. The operator is trying to get all the required permits. Liquid wastes: the management of these is accordingly to the Control of Pollution on Soil and Water Law. Each stream of liquid waste might be treated in different ways e.g. treated by the same industry that produces the waste, in waste treatment plants, for irrigation purposes in agriculture e.t.c Hospital wastes: a unit has permit for the management of a particular category of wastes from hospital Veterinary: a proposal for the incineration of dead animals is being discussed. Nowadays dead animals are buried to a specific place in a main disposal site because the only unit for rendering them was burned.
Denmark (Storstrom County)	Yes	Combustible waste, since 1997 combustible waste has to be disposed of to an incineration plant.
Denmark (Viborg County)	Yes	Biodegradable waste (from households and industries) are going to incineration plant, composting plant or biogas-plants
Germany (NRW)	Yes	(Decision depends on the kind of landfill.) Disposal of non-treated wastes with high organic carbon content is forbidden after 01.06.2005. This case applies basically to municipal wastes.
Ireland	Yes	Wastes prohibited from landfill (1) (a) Subject to paragraph (b), the wastes specified in sub-article (2) shall not be accepted or disposed of in a landfill facility (b) In the case of a landfill facility other than a new landfill facility or a landfill facility for hazardous waste, the requirement of paragraph (a) shall apply no later than 16 July 2009. (2) The following wastes are specified for the purposes of sub-article (1) – (a) liquid waste, (b) waste which, in the conditions of landfill, is explosive, corrosive, oxidising, highly flammable or flammable as defined in Annex III of Council Directive 91/689/EEC18, (c) infectious healthcare waste, assessed as likely to cause disease in humans or animals, arising from medical or veterinary establishments, and waste specified under category 14 of Annex 1.A of Council Directive 91/689/EEC, (d) any other waste which does not satisfy such waste acceptance criteria as shall, from time to time, be determined in accordance with Annex II of Council Directive 91/689/EEC. (3) (a) Subject to paragraph (b), whole used tyres (other than tyres used as on-site engineering material) shall not be accepted or disposed of at a landfill facility. (b) In the case of a landfill facility other than a new landfill facility or a landfill facility for hazardous waste, the requirements of paragraph (a) shall apply no later than 16 July 2009. (4) Shredded used tyres shall not be accepted or disposed of after – (a) 16 July 2006, in a new landfill facility or a landfill facility for hazardous waste, (b) 16 July 2009, in a landfill facility other than one referred to in paragraph (a). (5) (a) Subject to paragraph (b), waste that has not been subject to treatment (other than inert waste for which treatment is not technically feasible, or any other waste the treatment of which will not reduce its volume or the risk of environmental pollution) shall not be accepted or disposed of in a landfill facility. (b) In the case of a landfill facility other than a new landfill facility or a landfill facility for hazardous waste, the requirements of paragraph (a) shall apply no later than 16 July 2009.

		Waste to be accepted in different classes of landfill. (1) Only hazardous waste that fulfils relevant waste acceptance criteria may be accepted for disposal at a landfill for hazardous waste. (2) A landfill for non-hazardous waste may only be used for the disposal of – (a) municipal waste, (b) non-hazardous waste, other than municipal waste, that fulfils relevant waste acceptance criteria, (c) stable, non-reactive hazardous waste (such as that which is solidified or vitrified) with leaching behaviour equivalent to that of non-hazardous waste referred to in paragraph (b), that fulfils relevant waste acceptance criteria, and (d) such other wastes as may from time to time be specified in accordance with the provisions of Article 16 and Annex II of the Landfill Directive. (3) A landfill for inert waste may only be used for the disposal of inert waste that fulfils relevant waste acceptance criteria. (4) Where hazardous waste of the type referred to in paragraph (2)(c) is disposed of in a landfill for non-hazardous waste, it shall not be deposited in cells destined to be used for the disposal of biodegradable non-hazardous waste. (5) The dilution or mixture of waste solely in order to fulfil relevant waste acceptance criteria is prohibited. (6) For the purpose of this article, "relevant waste acceptance criteria" means (a) such criteria as may be specified by the Agency, having regard to Articles 6 and 11 of the Landfill Directive, pending the determination referred to in paragraph (b), and (b) such criteria as shall be determined in accordance with the provisions of Article 16 and Annex II of the Landfill Directive. (7) In the case of a landfill facility other than a new landfill facility or a landfill facility for hazardous waste, this article shall have effect no later than 16 July 2009.
Italy (Lombardy)	Yes	There are a lot of waste that are not aloud to disposal in landfill: Liquid waste, infective sanitary waste, waste from research activity, tyres, Waste with PCI ≥ 13.000 kJ/kg and RDF (since 1/07/2007), hazardous and non hazardous waste with dry substance < 25%; CER 15 except for 150105 and 150106; dismissed vehicles, CER 160601, animal waste with BSE risk, explosive and inflammable, substances with PCB > 50 ppm, municipal waste (if not treated), acid and basic. Liquid waste are treated in biological - chemical – physical waste water plants; dismissed vehicles are removed after treatment; the other waste are disposed in incineration plants;
Poland	Yes	1) liquid waste, including waste consisting of water (over 95 % of its total mass), except for sludges, 2) having explosive, corrosive, oxidising, flammable and higly flammable properties, 3) septic medical and veterinary waste, 4) produced as a result of experimental/development research or didactic activity, which are not identified or are new and their environmental impact is not known, 5) tyres and their parts, except for bicycle tyres and tyres having the outer diameter bigger than 1400 mm, Disposal of such waste rests on its recovery or disposing in other ways than landfilling. It depends on its kind (re-use/recycling of tyres, chemical treatment of liquid waste, incineration or sterilisation of medical and veterinary waste, thermic conversion /e.g. tyres/, regeneration /e.g. acids and basis/ etc.

Portugal	Yes	Disposal prohibit for this waste materials and defined in National Law(Decree n.º 152/2002 of 23 of May): Liquids waste; flammable waste; explosive or oxidising waste; hospital and other clinical waste which is infectious; used tyres, except the ones used in the protection of the cells(diameter lower than 1400 mm); any other type of waste which does not meet the acceptance criteria laid down in the National Law
Scotland	Yes	Regulation 11 of the Landfill (Scotland) Regulations 2003 prohibits the disposal of liquid wastes; wastes which are explosive, corrosive, oxidising, or flammable; infectious clinical waste; new chemicals who's effect on the environment is unknown; and most tyres. These wastes are generally disposed of by incineration or by partial treatment prior to landfill.
Slovakia	Yes	It is prohibited to perform landfilling of: 1. Liquid wastes 2. Waste which, in the conditions of a landfill, is explosive, corrosive, oxidizing, highly flammable or flammable 3. Infectious waste from medical and veterinary establishments 4. Used tires and shredded used tires, excluding tires that may be used as construction material for building a landfill, bicycle tires and tires with an outside diameter above 1,400 mm 5. Wastes where the contents of injurants exceeds limit concentration values under Annex 5 To Act No. 223/2001 Coll. On Waste and on Amendment of Certain Acts A waste holder shall be obliged neither to recover wastes or provide for waste disposal in its own operation. If it is not possible, waste must be offered neither for recovery or disposal to another person. The way of disposal: - material or energy recovery if it is possible - waste treatment including sorting - physical, chemical or biological process that changes the characteristics of the waste for the purposes of its further handling - incineration plants, co-incinerate waste - treating waste by solidification, the waste shall be solidified using inorganic or organic binding material in order to prevent the escape of substances harmful to the environment
Spain	Yes	Residues and not admissible treatments in a landfill. The following wastes will not be admitted in a landfill: a) liquid wastes. B) Wastes that, in release conditions, could be explosives, corrosive, oxidants, easily inflammables or inflammables, in accordance with the definitions of the board 5 of the annex I of the Regulation for the development of the Law 20/1986, of 14 of May, Basic of Hazardous and Toxic Residues, approved by means of Real Decree 833/1988, of 20 of July, and modified by the Real Decree 952/1997, of 20 of June. C) wastes that be infectious in accordance with the characteristic H9 of the board 5 of the Real Decree 833/1988, as well as residues of the category 14 of the board 3 of the same Real Decree. D) from July 16, 2003 , pneumatic used entire, with exclusion of the tires utilized as elements of protection in the landfill, and from July 16, 2006 , pneumatic used cut into pieces; nevertheless, the tires of bicycle they will be admitted and the tires whose exterior diameter be over 1.400 millimetres. E) Another waste that do not comply the criteria of admission established in the annex II. Wastes that could be admitted in the different kinds of landfills. Only can be placed in landfills wastes that have been object of some prior processing. This

		disposition will not apply to the inert wastes whose processing be technically unfeasible neither to any another wastes whose processing contribute not to the objectives established in the article 1 of the Real Decree, reducing the quantity of wastes or the risks for the human health or the environment. The landfills of hazardous wastes only will admit dangerous residues that comply the requirements set in the annex II for this kind of landfills. The landfills of not hazardous wastes could admit: a) urban Residues. B) not hazardous wastes of another origin that comply the pertinent criteria of admission of wastes in landfills of not hazardous wastes set in the annex II. C) Not reactive hazardous wastes, stable or originating from a process of stabilization, whose lixiviation behaviour be equivalent to not hazardous wastes mentioned in the previous paragraph b), and that comply the pertinent criteria of admission established, in their case, in the annex II. These hazardous wastes will not be placed in cells destined to biodegradable not dangerous residues. The landfills for inert residues only will admit inert residues that comply the criteria of admission set in the annex II for these kinds of landfills. Provisional criteria of admission for residues of the Annex II (Until the common institutions have not completed the annex II of the Directive 1999/31/CE, we will apply with provisional character the residues admission criteria collected in this section.) The authorization of each landfill will set the relation of the types of admissible residues (will indicate its codes LER and, in its case, its codification with arrangement to the annex I of the Real Decree 833/1988) in the specific installation. To be able to figure in the list of residues admitted in a specific dump, the wastes should comply the following conditions: a) In landfills for inert residues: they should be adjusted to the definition of inert residue included in the article 2, paragraph b), of the Real Decree 1481/2001. B) In landfills for not hazardous wastes: they should be adjusted to the definition of not hazardous waste included in the article 2, paragraph a), of the Real Decree 1481/2001. Only the processes will be admitted like stabilization of a hazardous waste if: change the danger of the constituents of this residue, transforming it of dangerous in not dangerous, or they guarantee that the dangerous constituents that not have been transformed completely in not hazardous constituents cannot be spread in the environment to short, medium or long time limit. The processes that consist of a mere solidification, that only change the physical state of the residue by means of additives, without varying their toxicological and chemical properties, will not be admitted like stabilization. C) In landfills for hazardous wastes: they should be adjusted to the definition of hazardous waste included in the article 3, paragraph c), of the Law 10/1998, of 21 of April, of Residues, and they will show a total content or lixiviation of potentially dangerous components sufficient low as for suppose there is no risk for the health of the people or for the environment. Likewise, they will not impede a sufficient stabilization of the residues during the predicted useful life of the landfill. The competent authorities could set in the authorization of a landfill complementary conditions to the previous, most restrictive on the admissibility of residues. These complementary conditions could be based on the properties of the residues. For example, and without exhaustive character, they could base on: limits on the total composition of the residue, limits on the lixiviation of pollution elements, limits on the matter organic content in the residue or in the potential lixiviate, limits on components of

		the residue that can attack the waterproofing and drainage of the landfill.
Sweden (Orebro)		
Sweden (Skane)	Yes	Since 2002 it is forbidden to dispose waste that is suitable for treatment in a waste incineration plant and since January 1st in 2005 the disposal of biodegradable waste I prohibited. The capacity for aerobic and anaerobic digestion and incineration is not yet sufficient so some landfills have an exemption from the prohibition. The exemption is a permit which is given for one year at a time. The disposal of the following waste materials is also prohibited: • liquid waste • waste which is explosive, corrosive, oxidizing, highly flammable or flammable • hospital and other clinical wastes arising from medical or veterinary establishments, which are infectious • whole used tyres from two years from the date laid down in Article 18(1), excluding tyres ,excluding in bicycle tyres and tyres with an outside diameter above 1 400 mm • chemical substances from research or education which are not identified or where the substances effects on health or environment are not known
The Netherlands (Limburg)	Yes	It is forbidden to dispose hazardous waste, except asbestos. Hazardous waste has to be disposed in a special hazardous landfill, but we don't have such a landfill in Limburg. It is prohibited to dispose waste that can be incinerated or recycled. It is also prohibited to dispose waste without any treatment. For example sewage sludge first has to be dehydrated before it can be disposed in a landfill.
United Kingdom	Yes	The prohibited wastes are those described in Article 5 3 of the Landfill Directive (1999/31/EC). They are disposed of either by incineration or an alternative recovery or disposal method

19. What steps have you taken to reduce the amount of biodegradable waste going to landfills?

TABLE 12	
Cyprus	As it is described in the strategic plan, one unit will be constructed for mechanical sorting and one unit for composting in each four districts of Cyprus.
Denmark (Storstrom County)	None, we are not the waste authority, the municipalities are the waste authorities and make the local guidelines for disposal of waste. Biodegradable waste is disposed of to incineration plants, though biodegradable waste from gardens and parks is normally composted in a composting-plant.
Denmark (Viborg County)	Biodegradable waste (from households and industries) is going to incineration plant, composting plant or biogas-plants
Germany (NRW)	In accordance with the Waste Disposal Regulation, for example, TOC should be less or equal than 3% and ignition loss less or equal 5% (dry substance mass).
Ireland	Place conditions in permits requiring pre-treatment of waste (only residual waste to landfill)
Italy (Lombardy)	First of all we're increasing the separate collecting of municipal waste; in Lombardy we have more than 40% of separate collecting so that the organic waste is removed in composting plants. If it is not possible separating the municipal waste, this is treated in special mechanical plants that separate organic from dry waste and product RDF. Part of the municipal waste is incinerated in incineration plants. Waste must be treated before disposal in landfill.
Poland	Segregation at source (containers for organic waste)

	Segregation at sorting plants.
Portugal	The targets established in the National Law for disposal in landfills(Decree n.º 152/2002 of 23 of May), determine the implementation of the National Strategy for the Biodegradable Waste, with the basic principles of: separate collection of the organic waste, construction of new installations for composting methods, optimisation of the composting facilities already existed, production of compost of high quality and minimization of disposal the biodegradable waste in landfills. The targets is the same as define in the Council Directive 1999/31/CE, such as: until January of 2006 – 75% of the total amount, by weight, of total produced in 1995; until January of 2009 – 50% of the total amount, by weight, of total produced in 1995; until January of 2016 – 35% of the total amount, by weight, of total produced in 1995.
Scotland	Each local council is to be given an annual allowance for the amount of municipal waste that they can send to landfill. The allowance will reduce year on year. In addition, Scotland's National Waste Plan sets out the intended future disposal options for municipal waste in different areas of the country. Applications for new waste facilities will be determined with reference to the National Waste Plan.
Slovakia	- Biodegradable waste shall be prohibited to dispose in the landfills since 1.1.2006, if it is a component of municipal waste (set by the Act No. 223/2001). - The municipality are obliged to reduce biodegradable waste transferred to landfills, by introducing a suitable separate waste collection system. - There was introduced The Waste Management Plan (plan) in to legal framework of waste management which lays down the objectives in waste management of the Slovak Republic, of a territorial unit, a part thereof or a waste generator and the measures for meeting the same in compliance with the Act. The obligatory part of a regional plan or district plan shall include measures for reducing biodegradable waste transferred to landfills, expressed as units of mass for initial and target year, with the aim of reducing waste quantities transferred to landfills. There were adopted targets concerning reduction of the amount of biodegradable waste going to landfills this way: by the end of 2005 to reach that 35 % of all generated municipality wastes shall by composted by the end of 2005 the quantity of biodegradable municipal waste disposal on landfills shall be reduced by 30 % of the total amount (by weight) of biodegradable municipal waste disposed on landfills in 2000.
Spain	In agreement to the Real Decree 1481/2001: Before July 16, 2003 , the State General Administration and the Autonomous regions Administrations will devise a joint program of actions to reduce the biodegradable residues destined to landfill. This program will include measures that permit to reach the objectives contemplated, particularly by means of recycled, composting and other forms of valorisation, like biogas production by means of anaerobic digestion. The program should assure that, as a minimum, the following objectives be reached: a) To more delay July 16, 2006, the total quantity (in weight) of biodegradable urban wastes destined to landfill will not exceed the 75% of the total quantity of biodegradable urban wastes generated in 1995. B) To more delay July 16, 2009, the total quantity (in weight) of biodegradable urban wastes destined to landfill will not exceed the 50% of the total quantity of biodegradable urban wastes generated in 1995. C) To more delay July 16, 2016 , the total quantity (in weight) of biodegradable urban wastes destined to landfill will not exceed the 35% of the total quantity of biodegradable urban wastes generated in 1995.
Sweden (Skane)	There is a tax that has to be paid for every ton of waste that is disposed of at landfill. This has reduced the amount of waste going to landfills.
The Netherlands (Limburg)	It is prohibited to dispose biodegradable waste. Biodegradable waste is composted or is used as a secondary bio fuel for energy recovery. Only residues from composting can be disposed in a landfill.
United Kingdom	Waste is subjected to pre-treatment to reduce the biodegradable component.

20. What measures are taken to reduce the production of methane gas in landfills?
21. What is required from operators to control the emission of gas?

TABLE 13	Reduction the production of methane gas	Controlling the emission of gas
Cyprus	There will be a plant for the recovery of energy in each centre.	Not yet decided.
Denmark (Storstrom County)	None. Since biodegradable waste has normally been burned in incineration plants since 1983 in the county, investigations have found, that this is not at problem.	
Denmark (Viborg County)	Since we hardly don't dispose biodegradable gas at landfills, there is no production of methane gas.	
Germany (NRW)	In accordance with the Waste Landfill Regulation, for example, degassing.	Monitoring of gas collection.
Ireland	Reduction in biodegradables to landfill	Containment & capping, gas collection, passive venting via carbon filters, active extraction to gas flare or generation plant. Monitoring. Requiring residence time of min 0.3 sec and burn temperature of min 1000^{o}C in flare unit.
Italy (Lombardy)	We reduce the organic part of the waste with the separated collecting and the mechanical treatment.	Every landfill in which is allowed to dispose waste with a part of organic material must realize a gas collecting plants with the combustion and production of energy. The collecting system is made of vertical wells every 30 mt in the landfill and a security system of vertical wells around the landfill area. Each well is automatically controlled by a PLC system.
Poland	Minimisation of organic waste deposited on landfills by its segregation.	Monitoring of methane, carbon dioxide and oxygen. Monitoring of landfill gas emission is carried out in representative areas of landfills, where this gas is collected, at the inlet to the treatment-and-use or neutralising installation.
Portugal	Reduce of the amount of MSW on landfills for treatment in eight composting plants already existing in Portugal.	The landfill gas must be collected and treated (for producing energy); if it's not possible, the gas must be flared.
Scotland	Reduction in the amount of biodegradable waste sent to landfill.	Gas must be collected from sites receiving biodegradable waste. Where possible the gas must be used for energy generation. Where there is insufficient gas to permit this, it can be flared
Slovakia	1. Measures are taken to reduce the amount of biodegradable waste landfilled. 2. The measures related to landfill operation. At the landfill site: - waste shall be deposited in layers 0.3	Landfill gas shall be collected from all landfills receiving biodegradable waste. Efficiency of the gas collection system must be checked regularly. A landfill site shall have a gas monitoring system. Gas monitoring must be representative for each section of the landfill. The frequency of sampling and analysis of potential gas emissions

	to 0.5 m thick, which are then compacted; the working layer after compacting shall be no more than 2.0 m thick, - waste shall be compacted no later than the day following its depositing, - municipal waste and biodegradable waste shall be covered by a suitable inert material (e.g. soil) before compacting.	and atmospheric pressure must by done monthly during operation phase of landfill. The frequency of sampling during after-care phase must be done every six months.
Spain	Reduction in biodegradables to landfill	In the landfills of RSU the gases control system can be passive or active. If the volume of gas generated is not important a system of passive extraction is done, the layer of drainage is the responsible for collecting the gases that leave to the exterior by means of a chimney. This layer of drainage has as function to conduct the gases generated by the organic matter of the residues to the outside. There are two possible technical solutions: extension of sheet of xeodren or layer of granular material. If the volume generated is important the landfills burn the gases, by means of a torch, before the emission to the exterior; not the layer of drainage exists, there is a network of pipes installed that collect the gas and carries it to the torch; it is possible take advantage of this gas to produce energy too.
Sweden (Skane)	As the disposal of biodegradable waste is prohibited, the production of methane gas should stop. The law requires operators of landfills where methane gas is produced to collect the gas and, if possible, use the gas for the production of energy.	Every landfill where biodegradable waste has been disposed of has to have a collection of landfill gas for as long as the gas is produced in such an amount that is possible to collect. If possible, the gas has to be used for production of energy. If that is not possible, the gas has to be flared.
The Netherlands (Limburg)	The disposal of biodegradable waste is prohibited since 1994.	There is a gas collection system. The gas is used for the production of energy. After 15 years after a landfill has closed, there isn't enough gas to collect. The gas collection system is then replaced by carbon filters for passive venting.
United Kingdom	Measures are taken to reduce the amount of biodegradable waste landfilled.	Operators are required to install systems to collect gas for recovery or disposal. The emphasis is placed on recovery, for example, use of gas to generate power. Monitoring systems are required to verify that gas is not migrating from the site.

22. Can you give an estimate of the percentage of municipal waste that is disposed of in landfills in your area? In your country?
23. Can you give an estimate of the percentage of industrial waste that is disposed of in landfills in your area? In your country?

TABLE 14	**percentage of disposed municipal waste**	**percentage of disposed industrial waste**
Cyprus	368.000 t/year (1993) (530.200 t/year (2007)-	70% of industrial wastes are disposed in landfills

	projection)	
Denmark (Storstrom County)	0 % since all municipal waste is burned in incineration plants	No data available
Denmark (Viborg County)	8%	7%
Germany (NRW)	2003: 75 % Incineration 5 % Mechanical-biological treatment 20% Disposal. Disposal of non-treated wastes with high organic carbon content is forbidden after 01.06.2005. This case applies basically to municipal wastes.	No data available
Ireland	Approximately 1.9Mton nationally	Approx 5Mt (most coming from 4 mining/mineral processing operations)
Italy (Lombardy)	less than 30% in 2004	30-40% (generally industrial inorganic sludge).
Poland	98 %	94 %
Portugal	Area of Lisbon 10% Portugal (Madeira and Azores included) 67%	In Portugal 30%.
Scotland	Approximately 90%	No data available. An increasing amount of this type of waste being recovered.
Slovakia	Approximately 89 %	Approximately 17 %
Spain	No data available	No data available
Sweden (Skane)	575 000 metric tons municipal waste was disposed of in 2003 in Sweden	2.360.000 metric tons of industrial waste was disposed of in 2003 in Sweden
The Netherlands (Limburg)	15%	40%
United Kingdom	>80%	>80%

WASTE PERMITTING AND ENFORCEMENT AT WASTE INCINERATION PLANTS

1. How many waste incineration plants are located in your area?
1a. How many of these waste incineration plants co-incinerate waste (like in cement kilns, steel or power plants; whose main purpose is energy generation or the production of material products)?
1b. How many of these plants incinerate hazardous waste?
1c. How many incineration plants are for 'mixed municipal' waste (waste from households as well as commercial, industrial and institutional waste which because of it's nature and composition is similar to waste from households)?

The questions below all refer to waste incineration plants without the purpose of energy generation or the production of material products.

2. How many of these plants have an integrated permit and are controlled in accordance to the Integrated Pollution Prevention and Control Directive (IPPC)?
3. How many incineration plants have a permit in accordance to the Directive on waste incineration (2000/76/EC)?
4. If not all waste incineration plants have an integrated permit as stated in the IPPC Directive, then when do you expect that this will be the case?
5. How many incineration plants have no environmental permit at all?
6. For how many plants was an environmental impact assessment study done before the permit was issued?

TABLE 1	**Total number of incineration plants**	**Co-incineration**	**Hazardous waste incineration**	**Mixed municipal waste incineration**	**Permit IPPC?**	**Permit 2000/76/EC?**	**EIA?**	**Deadline permit IPPC**
Cyprus	1	1 cement kilms-Vasiliko	0	0	None	None	None	two incinerators for the incineration of animal wastes Category 1,2,3 and one for the incineration of wastes Category 1,2, accordingly to Regulation 1774/2002/EC
Denmark (Storstrom County)	3	0	1 (5.000 ton/y)	2 (100.000 – 120.000 ton/y)	3	2	1	Not relevant
Denmark (Viborg County)	1	0	0	1	1	1	0	Not relevant
Germany (NRW)	39	21	2	16	All	All	All	Not relevant
Ireland	11	0	11	0	All	1/3	All	Not available

Italy (lomb.)	46	20	31	14	3	None[4]	All	October 2007
Poland	7	2	4	0	None	7	7	Before 30.09.2006
Portugal	3	2	0	1	None	2 in revision	1	Before 2007
Scotland	2	0	0	2	-	-	-	-
Slovakia	47	3	42	2	1[5]	All	5	Before 30-10-2007
Slovakia (Banska Bystrica County)	3	0	3	0	None	All	Not available	The operators of these installations (in our area) are not obliged to have IPPC permit.
Spain	4	3	0	1	None	1[6]	1	Before 10-2007
Sweden (Orebro)	3	2	1	1	1	1	All	-
The Netherlands (Limburg)	0	2	0	0	All	-	-	-
The Netherlands (Overijssel)	1	0	0	1	1	1	1	2012
United Kingdom	130	75						

7. Which Reference documents (BREF) do/did you apply to issue an incineration permit?
8. Which Best available technique (BAT) do/did you apply to issue this permit?

TABLE 2	**BREF**	**BAT**
Cyprus	IPPC Draft on BAT for Waste Incineration (March 2004)	
Denmark (Storstrom County)	draft versions of the BREF-note regarding waste incineration, conditions in the permit request that the waste company has to make a study of potential improvements when the final version of the BREF-note is available.	The two large incineration plants are combined power and district heating plants, the permit request that 95-99 % of the produced heat is distributed in the district heating system instead of being removed as excess heat
Denmark (Viborg County)	-	-
Germany (NRW)	German Decree for Waste Incineration (Abfallverbrennungsverordnung)	BAT in Common waste, water and waste gas… in connection with German waste act

[4] This Directive is not yet receipted in Italy (is going to be receipt in a few months), but we're applying all the most important conditions of the Directive. We have two different laws for municipal and not hazardous waste and for hazardous waste that contain most of the technical conditions of the Directive.

[5] plant for incineration of mixed municipal waste

[6] plant for incineration of RSU waste

Ireland	Draft 2 of the Incineration BREF. Prior to that National BAT and Directive.	
Italy (Lombardy)	We have different Italian technical guide lines for reducing air emission and for waste management. The Italian Government is going to issue a technical guidance line that is similar to the European BREF/Draft.	We apply all the 48 GENERIC BAT FOR WASTE INCINERATION of the 2 DRAFT and special BAT for domestic waste incineration plants and hazardous waste.
Poland	Not available	Not available
Portugal	The BREF of Waste Incineration.	-
Slovakia	Waste Incineration BREF	N
Spain	Draft reference document on best available techniques for the waste treatment industries.	
Sweden (Orebro)	The Environmental court is the license body and our task is to be an important referral body. The Reference document are used as a guidance document and emission limited value are always conditioned in a permit. In this case the plant have a technique that is beyond the Reference document, why no BREF or BAT was necessary to apply.	
The Netherlands (Overijssel	Draft BREF	Application should show that BAT has been applied. Application is then part of the permit.
United Kingdom	The draft BREF was taken into account when developing the Sector Guidance Note produced by the Environment Agency in August 2004 (S5.01)	BAT is assessed on a site-by-site basis as part of the application. The applicant must demonstrate to the Environment Agency that their proposals represent BAT

9. Do you (or your colleagues) encounter difficulties when issuing a permit for a waste incinerator?

TABLE 3	**Yes or No**	**Please, specify what kind of difficulties:**
Cyprus	Yes	NIMBY syndrome.
Denmark (Storstrom County)	Yes	Complex legislation, we found that some sort of national consensus of interpretation was needed, this has been established with meetings involving inspectors from all the counties, the Danish EPA has sadly been very passive on this issue.
Denmark (Viborg County)	Yes	We just revised the permit for the incineration plant. We wanted the plant to comply with the legislation concerning dioxin sooner than necessary. They tried to postpone it but finally accepted it.
Germany (NRW)	Yes	Protest from affected citizens
Ireland	Yes	Public concern about health.
Italy (Lombardy)	Yes	It is difficult for certain waste finding the border between remove waste (R1) and incineration (D10).
Poland	No	Voivoidship IEP does not issue permits.
Portugal	No	-
Slovakia	No	Not available

Spain	No	-
Sweden (Orebro)	Yes	The Waste legislation is very comprehensive and tricky which makes it hard to apply. It's often difficult to get enough knowledge about what effect and pollution, different kinds of waste creates when it's prohibited. That's makes it hard to apply other emissions limited value beside those who already are regulated in the legislation and also what kind of waste that are suitable to prohibit at the plant. This is not a big problem in Sweden, because we have networks between officers at our County Administrative Boards, that is a great support. The networks purpose is to exchange experience and know-ledge. The Swedish Environmental Protection Agency, is also a important sores for knowledge and function as a platform for the different networks.
The Netherlands (Overijssel)	Yes	It is a problem to get the applicants to give all the necessary information for issuing a permit. The public is often afraid of the effects of an incinerator.
United Kingdom	Yes	Poor or incomplete applications. Perceptions among the local population of the potential health effects of the installation.

10.Do you (or your colleagues) encounter difficulties in the enforcement of the permit-conditions for a waste incineration plant?

TABLE 4	**Yes or No**	**Please, specify what kind of difficulties:**
Cyprus	Yes	In the Strategic Plan, accordingly to hierarchy of the management of wastes, incineration is at the last preferable place, after reduction, reuse, recycle and recover If any of the plants is approved, the conditions stated in the permit will be accordingly to BATs, so no significant difficulty will be encountered.
Denmark (Storstrom County)	Yes	The plants themselves are complex installations, we found that you have to obtain a lot of experience with the function and operation of the plant in order to separate minor incidents from more severe that should be enforced. Since the plants are energy producing, a potential shut down of the plant ordered by the authority (the county) is not very realistic. For instance, the plant in Nykøbing F. produces 95 % of the heat for the district heating system in the city. Back up units can not produce the same amount of heat on a very cold winter day.
Denmark (Viborg County)	No	-
Germany (NRW)	No	-
Ireland	Yes	Efficacy of continuous monitoring.
Italy (Lombardy)	Yes	We don't have technical difficulties, but only political in the government of the territory (NIMBY effect) for municipal waste incineration plants; we have less difficulties for industrial plants in the same area of the industry that produces waste.
Poland	Yes	Checking the system of the exhaust gases monitoring and the register of incinerated waste.
Portugal	No	-
Slovakia	No	Not available
Spain	No	-
Sweden (Orebro)	Yes	A waste incineration plant is a very complicated and complex installation. It takes deep knowledge and experience to understand and to control the different part of a plant. To encounter this, the enforcement is focused on the operators self-monitoring system. The operator is obligated to have a self-monitoring system. The system shall make it possible to

		comply with all the rules in the Code, the ordinance, the regulations and licenses applicable to a specific activity. There are also possibilities to prescribe that someone else than the operator should carry out a study of the self-monitoring system or other things, for example technically complicated parts, as monitoring of the flue gases. That is a method that is often used as a tool in the enforcement.
The Netherlands (Overijssel)	Yes	Enforcement of an incineration requires a lot of knowledge about emissions and monitoring. Inspections often enhance a "paper-inbspection" and not so much an actual inspection of the emissions
United Kingdom	Yes	Ambiguity/enforceability of permit conditions.

11. Which difficulties does the operator of the installation encounter when trying to comply with the permit conditions? Can conditions easily be met?

TABLE 5	**Yes or No**	**Please, specify what kind of difficulties:**
Cyprus	Yes	To have the background to understand all these new technologies accordingly to BATs, to find money for the new installations and surveillance and improvement of the whole treatment plant, to find the right educated personnel.
Denmark (Storstrom County)	Yes	When the plant is in normal operation the permit conditions are easily met. The problems start when some vital part of the plant disfunctions, since the plants are operated 24 hours a day, 365 days a year, some kind of disfunction will occur.
Denmark (Viborg County)	No	It is often expensive to clean the smoke which is necessary to comply with the legislation
Germany (NRW)	No	-
Ireland	Yes	For merchant facilities the control of waste input for mixed waste streams is an issue. Permit cannot be issued if conditions cannot be met.
Italy (Lombardy)	No	We think that the operator has no difficulties because he knows before all the conditions of the permit and in the official meeting before the issuing of the permit he can discuss with us all the technical conditions.
Poland	Yes	Main problems are financial difficulties, additionally keeping up with emission conditions due to the changing composition of waste.
Portugal	Yes	In some cases, the parameters of the air emissions (such as CO, NOx and HCl) need some adjustments.
Slovakia	No	Not available
Spain	No	-
Sweden (Orebro)	Yes	The conditions require a self-monitoring system with high standard. Otherwise the operator cannot comply with the conditions in the permit. The operator often has problem with the emission limited value, especially carbon oxide, CO, that may force the plant to close down for shorter periods.
The Netherlands (Overijssel)	Yes	There conditions can easily be met if the proper technical means are available and there is a good control of the waste going in the incinerator.
United Kingdom	Yes	Sometimes they say the permit requirements are not clear and they do not know what they have to do the achieve compliance

12. What penalties can be given to operators of installations whom do not comply with the conditions in the permit?

TABLE 6	
Cyprus	As it is described in the Law for the management of solid and hazardous wastes (from 20.000- 2.000.000 Cyprus pounds).
Denmark (Storstrom County)	The operators can be reported to the police, which then can give the operators a fine.
Denmark (Viborg County)	-
Germany (NRW)	Money penalties, personal penalties, closing down of a plant.
Ireland	Fines up to €15M, revocation of permit, suspension of permit, orders for works to be carried out
Italy (Lombardy)	In Italy there are 3 different penalties that the Authority can give to the operator of the plants, first it's possible to write to the operator what he must do to comply to the condition of the permit in a certain time; if not the Authority stop the activity of the plant since the operator comply to the condition; if not the Authority cancels the permit and the installation must be closed. There are also money penalty and law restrictions for the operator.
Poland	Administrative fines, fines or an application for penalising to a court, a halt of installation.
Portugal	The fines and penalties are defined in the National Law.
Slovakia	To operators of installations whom do not comply with the conditions in the permit can be imposed fine up to 5.000.000,- Sk (app. 125.000 EUR), According the Act No. 223/2001 on waste.
Spain	A penalizing expedient to PMA has been opened in the year 2000 by breaching of the conditions of the authorization as hazardous waste manager. The amount of the sanction was 6.000 €. PMA does an energetic valorisation of residual oils.
Sweden (Orebro)	Should a licensee disregard any condition specified in a permit, the operative inspection and enforcement authority may enjoin him to rectify the matter. To strengthen the force of an injunction, the inspection authority may combine it with an administrative fine. Anyone infringing some specified regulations in the Environmental Code, regulations issued pursuant the Code or violation conditions in a permit might pay a fine or be sentenced to a maximum of two years imprisonment by a court decision.
The Netherlands (Overijssel)	Financial penalties can be given, but if necessary the plant can be shut down.
United Kingdom	The Environment Agency can serve Notices to require compliance with permit conditions. Failure to comply with such Notices can result in the suspension or revocation of the permit. If a permit holder is convicted in court of failing to comply with the requirements of the permit he can be fined.

13. What kind of conditions are applied to a permit to protect the soil?
14. What kind of conditions are applied to a permit to protect the groundwater?

TABLE 7	
Cyprus	As in BREF and Directive.
Denmark (Storstrom	Conditions that specify storage of waste produced at the incineration plant.

County)	
Denmark (Viborg County)	The conditions specify levels of the components in the smoke and wastewater. They have to monitor the smoke and wastewater for at lot of components and report if anything is wrong. Waste-water is lead to a wastewatertreatment plant. The waste is store in a large silo before it is lead to the incinerator. On a monthly basis they send us report
Germany (NRW)	In accordance to German law on Ambient Air Protection (Bundesimmissionsschutz Gesetz) and the German Decree for Waste Incineration (Abfallverbrennungsverordnung)
Ireland	Bunding, materials handling, monitoring, containment
Italy (Lombardy)	All the area of the incineration plant is closed by a net; every area used for moving waste is realized whit a surface sealing. The ground water is protected by the surface sealing and the collect of all process water separately from the rain water.
Poland	- organised system of wastewater discharging and treatment, - conditions regarding sites and handling of waste storage
Portugal	Same as the defined in the Directive of Waste Incineration(2000/76/EC) and the National Law Decree n.º 273/98 of 2 of September and specific legislation of protection of soil/water.
Slovakia	-
Spain	
Sweden (Orebro)	Depending of what kind of waste and chemicals the operators are handling, different protective measurements are applied. For example how the waste and chemicals are supposed to be stored, how the waste and chemicals are supposed to be handled/treated to reduce the risk of polluting the soil, requirements of the surface on which waste and chemicals are stored or handled etc. Besides the conditions the operator are obligated to systematically examine, identify and assess the environmental risks connected with the activity and take adequate corrective actions as necessary and actions in order to prevent recurrence.
The Netherlands (Overijssel)	For soil and groundwater there are the standard conditions as applied for most installations
United Kingdom	No emission from the Permitted installation shall be made to land. OR Emissions into or onto land from the emission point(s) specified in Table 2.2.10 shall only arise from the source(s) (and shall be emitted only to the soakaway) specified in that Table and, subject to the other conditions of this Permit, there shall be no other emissions to Land from the Permitted Installation. No emission from the Permitted Installation shall give rise to the introduction into groundwater of any substance in List I (as defined in the Groundwater Regulations 1998 (S.I. 1998 No. 2746)). No emission from within the Permitted Installation shall give rise to the introduction into groundwater of any substance in List II (as defined in the Groundwater Regulations 1998 (S.I. 1998 No. 2746)) so as to cause pollution (as defined in the Groundwater Regulations 1998 (S.I. 1998 No. 2746)). For substances other than those in List I or II (as defined in the Groundwater Regulations 1998 (SI 1998 No.2746)), the Operator shall use BAT to prevent or where that is not practicable to reduce emissions to groundwater from the Permitted Installation provided always that the techniques used by the Operator shall be no less effective than those described in the Application.

15. What kind of conditions are applied to a permit to protect the air?

TABLE 8	
Cyprus	The Department of Inspection of Labour is in charge for the protection of air and they will be responsible for the conditions in permits.

Denmark (Storstrom County)	Conditions that specify details of the operation of the plant – for instance the upstart of the furnace, conditions that request fluegas treatment and specify limits for the pollution content in the fluegas and conditions that request a continuous monitoring system to monitor the pollution content of the fluegas.
Denmark (Viborg County)	The conditions specify levels of the components in the smoke and wastewater. They have to monitor the smoke and wastewater for at lot of components and report if anything is wrong. Waste-water is lead to a wastewatertreatment plant. The waste is store in a large silo before it is lead to the incinerator. On a monthly basis they send us reports
Germany (NRW)	In accordance to German law on Ambient Air Protection (Bundesimmissionsschutz Gesetz) and the German Decree for Waste Incineration (Abfallverbrennungsverordnung)
Ireland	Abatement, monitoring, process control
Italy (Lombardy)	All waste is discharged in special area that is protected and the primary air for combustion is collected from that area. Every emission are collected
Poland	- conditions regarding the amount and quality of emission, - exploiting and handling the equipment for exhaust gases treatment in a proper state - monitoring of exhaust gases quality
Portugal	Same as the defined in the Directive of Waste Incineration(2000/76/EC) and the National Law Decree n.º 273/98 of 2 of September and specific legislation of protection of air emissions.
Slovakia	-
Spain	
Sweden (Orebro)	A lot of emission limited value are prescribed in our legislation. Besides those demands other emissions can be restricted in a condition, if it is necessary in regard to what kind of waste is incinerated at the plant. Different types of conditions that regulate the operator's internal control can also be prescribed, for example supervision, monitoring, documentation etc. The operators have to identify risk for fire and eliminate the risk, when waste is pre-treated or/and stored.
The Netherlands (Overijssel)	The emission levels as defined by law (directives following from European directives)
United Kingdom	Emissions to air from the emission points in Table 2.2.1 shall only arise from the source(s) specified in that Table. The limits for emissions to air for the parameter(s) and emission point(s) set out in Table 2.2.2 shall not be exceeded. Total emissions to air from emission point(s) set out in Table 2.2.1 in any year of a substance listed in Table 2.2.3 should not exceed the relevant limit in that Table. The Operator shall use BAT so as to prevent or where that is not practicable to reduce fugitive emissions of substances to air from the Permitted Installation in particular from: • storage areas • buildings • pipes, valves and other transfer systems • open surfaces provided always that the techniques used by the Operator shall be no less effective than those described in the Application, where relevant.

16. What kind of conditions are applied to a permit to protect surface water?

TABLE 9	
Cyprus	As in BREF and Directive.
Denmark (Storstrom	Conditions that specify storage of waste produced at the incineration plant, if the plant produces waste water there will be conditions that request waste water treatment and specify limits for the maximal

County)	pollution content in the waste water.
Denmark (Viborg County)	The conditions specify levels of the components in the smoke and wastewater. They have to monitor the smoke and wastewater for at lot of components and report if anything is wrong. Waste-water is lead to a wastewatertreatment plant. The waste is store in a large silo before it is lead to the incinerator. On a monthly basis they send us report
Germany (NRW)	In accordance to German law on Ambient Air Protection (Bundesimmissionsschutz Gesetz) and the German Decree for Waste Incineration (Abfallverbrennungsverordnung)
Ireland	Abatement, treatment, Bunding, materials handling, containment, monitoring
Italy (Lombardy)	The ground water is protected by the surface sealing and the collect of all process water separately from the rain water.
Poland	- organised system of wastewater discharging and treatment, - conditions regarding sites and handling of waste storage
Portugal	Same as the defined in the Directive of Waste Incineration(2000/76/EC) and the National Law Decree n.º 273/98 of 2 of September and specific legislation of protection of soil.
Slovakia	-
Spain	
Sweden (Orebro)	Water treatment and emission limited values are conditioned
The Netherlands (Overijssel)	No special conditions, other than what might be considered standard.
United Kingdom	No emission from the Permitted Installation shall be made to water except via the Operator's on-site effluent treatment plant as specified in this Permit Emissions to water from the emission point(s) specified in Table 2.2.4 shall only arise from the source(s) specified in that Table The limits for the emissions to water for the parameter(s) and emission point(s) set out in Table 2.2.5 shall not be exceeded. Where a substance is specified in Table 2.2.5 but no limit is set for it, the concentration of such substance in emissions to water from the relevant emission point shall be no greater than the background concentration Total emissions to water in any year of a substance listed in Table 2.2.6 shall not exceed the relevant limit in that Table The operator shall use BAT so as to prevent or where that is not practicable to reduce fugitive emissions of substances to water (other than Groundwater) and sewer from the Permitted Installation in particular from: • all structures under or over ground • surfacing • bunding • storage areas provided always that the techniques used by the Operator shall be no less effective than those described in the Application, where relevant. There shall be no release to water that would cause a breach of an EQS established by the UK Government to implement the Dangerous Substances Directive 76/464/EEC.

17. What kind of conditions are applied to a permit to protect the risks for human health?

TABLE 10	
Cyprus	As in BREF and Directive.
Denmark (Storstrom	Conditions that specify that the air used for incineration has to come from the plants waste silo thus creating a continuous low pressure, conditions that specify the maximal noise level in the surrounding areas and

County)	conditions that specify limits for the pollution content in the fluegas.
Denmark (Viborg County)	The conditions specify levels of the components in the smoke and wastewater. They have to monitor the smoke and wastewater for at lot of components and report if anything is wrong. Waste-water is lead to a wastewatertreatment plant. The waste is store in a large silo before it is lead to the incinerator. On a monthly basis they send us reports
Germany (NRW)	In accordance to German law on Ambient Air Protection (Bundesimmissionsschutz Gesetz) and the German Decree for Waste Incineration (Abfallverbrennungsverordnung)
Ireland	Emission limits set to Directive standards. Impact assessment done to all relevant national and international occupational and ambient health standards.
Italy (Lombardy)	There is a special law for the protection of the operators that includes the obligatory of information of the human risk in working with waste. There is no contact with waste in any part of the plant (storage is closed and the moving of wastes is automatic ecc.
Poland	Handling the process in accordance with the required technical conditions
Portugal	Same as the defined in the Directive of Waste Incineration(2000/76/EC) and the National Law Decree n.º 273/98 of 2 of September.
Slovakia	-
Spain	
Sweden (Orebro)	The emission limited values are for the benefit of both the environment and human health. Besides that conditions regarding noise pollution, odour, dust emission and other adverse effects are applied.
The Netherlands (Overijssel)	Emission level conditions and conditions concerning fire protection
United Kingdom	No specific conditions are applied

18. How often (per year) does an inspector carry out an integrated inspection (as described in the IPPC Directive) of an incineration plant?

TABLE 11	
Cyprus	Not applicable yet but after permitting, probably 6 times a year for each plant.
Denmark (Storstrom County)	1 – 3 inspections pr. year.
Denmark (Viborg County)	1 time a year at the plant. Every month we get reports from analyses of smoke, wastewater etc.
Germany (NRW)	Yes, depending on the type of the plant.
Ireland	Up to 4 times per year, plus annual/biennial a detailed audit. Also monitoring and sampling visits twice a year. Specialist independent Dioxin monitoring at regular intervals.
Italy (Lombardy)	We have started issuing only few integrated permits and we have decided to plan the integrated inspections in 2006. Now we have more than two inspections per year to the incineration plants.
Poland	At least once a year
Portugal	At least once in a year.
Slovakia	In generally reconsideration and updating of permit conditions according IPPC directive must be done once in 8 years at least.
Spain	All the establishments subject to the Law 16/2002 of IPPC and all the groups of activities potentially

	pollutants of the atmosphere belonging to the group A (according to the Decree 833/75 the incineration of industrial residues and the urban wastes processing plants, with capacity over 150 Tm. /day, belong to this group), have a priority of 1 in the level of action, what means that the minimum frequency to carry out the inspections will be of 1-2 years. Naturally inspections with a greater frequency can be performed and will be planned in the General Inspection Plan of the year.
Sweden (Orebro)	Three to seven times a year
The Netherlands (Overijssel)	4 times a year
United Kingdom	Very few sites are yet permitted under the IPPC Directive

19. Does your legislation prohibit the disposal of certain waste materials in incinerators?
20. If the answer is yes, please state which waste materials are prohibited and how they are then disposed of.

TABLE 12	Yes or No	Please, specify which waste materials this concerns and how they are then disposed of
Cyprus	Yes	As in the Directive 2000/76/EC e.g. radioactive wastes. The Department of Inspection of Labour is responsible for the implementation of the Law and they will have all the relevant informations
Denmark (Storstrom County)	Yes	Radioactive waste
Denmark (Viborg County)	Yes	Hazardous waste (only allowed on special plants) PVC, wood treated with certain chemicals to make it persistant has to be disposed on landfills Electronic waste has to be stripped down and the pieces are going to reuse/ recycling, landfills and incinerator
Germany (NRW)	Yes	Hazardous waste has to disposed of in special permitted incinerators, most of which are rotary kilns.
Ireland	No	We have no merchant incinerators in Ireland where such limitations would apply. The incinerators located on the IPPC industrial plants are limited to accepting their own waste
Italy (Lombardy)	Yes	Only waste that is possible to remove as material collected separately. (composting waste, etc.)
Poland	Yes	Waste oils. They should be regenerated first, which is understood as each process of base oils production by refining waste oils, in particular by removing pollutants, products of oxidising and additives contained in waste oils.If the regeneration of waste oils is not possible because of their pollution, they should be recovered in other ways, including thermic recovery.
Portugal	No	However, the permits given to the incinerators defined prohibitions of certain waste materials, according with the National Law for Waste Management. For example, for MSW incinerator is prohibit the elimination of glass, carcasses of animals, scrap metal, clinical waste, sludge, and all the hazardous waste defined by the List of Waste(Council Directive n. 75/442/EC).
Slovakia	No	Not applicable
Spain	No	-
Sweden (Orebro)	Yes	Waste electrical and electronic equipment that aren't pre-treated, is not allowed to be disposed of in an incinerator plant. After it's pre-treated and separated into the different kinds

		of materials, it's allowed to dispose of it, for example, in an incineration plant.
The Netherlands (Overijssel)	Yes	All waste that can be reused or recycled may not be incinerated.
United Kingdom	No	-

21. Can you give an estimate of the percentage of mixed municipal waste that is disposed of in a waste incineration plant in your area? In your country?

TABLE 13	**percentage of disposed municipal waste**
Cyprus	-
Denmark (Storstrom County)	The county: 100 %, Denmark: nearly 100%.
Denmark (Viborg County)	About 60%
Germany (NRW)	The 16 incineration plants for mixed municipal waste have a total capacity of 5,3 Million Tonnes per year.
Ireland	None
Italy (Lombardy)	In Lombardy almost the 30%
Poland	In my area – 0% In my country ->0,1%
Portugal	Area of Lisbon 49% Portugal(Madeira and Azores included) 21%
Scotland	2.7% in Scotland.
Slovakia	Approximately 5 % of municipal wastes are being incinerated in the waste incineration plants in Slovakia.
Spain	-
Sweden (Orebro)	About 50 % in our area
The Netherlands (Overijssel)	100 % of the Municipal waste of Overijssel is incinerated 100 % of the municipal waste of The Netherlands is incinerated
United Kingdom	<10%

4.3 Recycling and reuse of waste at waste installations (landfills and incineration plants).

In this chapter we would like to know what is required of waste installation (landfills and incineration plants) regarding recycling and reuse of waste materials.

1. Do you include recycling- and reuse-conditions to a permit of a waste installation?
   If the answer is yes: proceed to question number 2.
   If the answer is no: proceed to question number 8.
2. Please, specify what is required in such conditions? For what kinds of waste?

TABLE 1	Yes or No	Please, specify what is required in such conditions? For what kinds of waste?
Cyprus	Yes	We will include conditions on recycling and reuse, as in Brefs
Denmark (Storstrom County)	Yes	Incineration plants: Conditions that specify a maximum level of the content of biodegradable matter in the clinkers in order to facilitate the reuse of clinkers for road construction etc.
Denmark (Viborg County)	Yes	In Denmark the local authorities make regulations on how to dispose waste. In a permit we demand that these regulations are followed
Germany (NRW)	No	The main control is the German Recycling Economy and Waste Law
Ireland	Yes	See Condition 2 on attached permits (one for a landfill and one for a pharmaceutical plant with an incinerator (IPPC)).
Poland	Yes	- kind and amount of waste to be recovered per year, - site and permissible conditions of recovery, - additional conditions of recovery depending on the kind of waste, in particular if the waste is hazardous or if there is a need to protect human life and health or environment, - sites and handling of waste storage
Portugal	Yes	For the waste produced in the installations, is required an appropriate separation and a right storage before the final destination, and procedures according the legislation applicable. For example, waste oils, paper or plastics.
Scotland	No	not for landfills
Slovakia	No	-
Spain	No	-
Sweden (Orebro)	No	No, not usually. In Sweden we have taxes for waste disposed of in landfills. It's also prohibited to dispose waste suitable for treatment in a waste incineration plant and biodegradable waste. Those conditions make it unnecessary to include recycling- and reuse-condition in a permit. But there can be conditions that regulate what type of waste that's suitable to reuse or recycle.
The Netherlands (Overijssel)	Yes	The waste installations all have a recycling installation. Waste (especially industrial waste) is then separated further and only non-recyclable residu is incinerated or (in the worst case) dumped in a landfill.
United Kingdom	Yes	Only for waste produced at the installation. 'Waste produced at the Permitted Installation shall be recycled or recovered unless technically

		and/or economically impossible'.

3. Is there a difference in conditions regarding recycling and reuse, for incineration plants and for landfills? Please explain.
4. Can operators easily meet the permit conditions regarding recycling and reuse?

TABLE 2	**difference in conditions for incineration plants and for landfills?**	**Can operators easily meet the permit conditions regarding recycling and reuse?**
Cyprus	Not yet known, no permit is issued yet	Possibly because the conditions will be accordingly to BREFS.
Denmark (Storstrom County)	No	Yes, normally
Ireland		It is not possible to issue a licence with conditions that are unenforceable. The waste recycling/reduction area is a difficult area to condition in detail. Therefore our preferred way is to deal with this issue via environmental improvement programmes with targets and objectives set by the operator and agreed by us (refer condition 2 of the attached permits).
Poland	Determining the conditions is based on the same regulation but they depend on the kind of activity and installation.	Generally yes.
Portugal	-	-
The Netherlands (Overijssel)	No difference, incinerator and landfill are located on the same premises	Conditions can easily be met because the recyclable waste materials will provide money when sold to the next person.
United Kingdom	No	No

5. How are recycling and reuse conditions enforced?
6. Which difficulties does an inspector encounter regarding these matters?

TABLE 3	**recycling and reuse conditions enforced**	**difficulties does an inspector encounter**
Cyprus	-	-
Denmark (Storstrom County)	In the same way as all other conditions	The same issues as with other enforcement
Ireland	Usually via environmental management programmes (Condition 2 of permits attached). And some specific conditions like Condition 11.11 on Permit 153-01 attached.	Knowing what is reasonable and practical for an industry to achieve. Most industrial operators will know far more about their processes and operations (and thus where efficiencies are possible), than will the regulator.
Poland	Enforcement is connected with comparing the factual state with the conditions stated in the permit.	Difficulty in verifying the documentation.
Portugal	A right selection to obtain good waste	Define a clear classification of the wastes and provide a

	materials, try to guarantee the right disposal, no contaminants in the materials.	right selection of the waste materials.
The Netherlands (Overijssel)	By checking the books and by checking the waste before it is incinerated or dumped	When recyclable waste materials do not have a positive value, the operator will want to dispose of them in a cheaper way. Usually this means dumping it in a landfill.
United Kingdom	By checking operator records.	As these requirements are new, enforcement has not yet been tried. We anticipate that poor record keeping by operators may present difficulties.

8. What does your legislation state on recycling and reuse of industrial waste?

TABLE 4	
Cyprus	The solid and hazardous wastes law describes in general, for municipal and industrial and other categories of wastes the management of them. For recycling wastes, it is necessary to have a permit. Reusing wastes will be achieved after public awareness.
Denmark (Storstrom County)	There are national objectives which are implemented in the municipalities waste plans
Ireland	These objectives are stitched into the definition of BAT in national legislation. BAT has to be applied to all waste and IPPC installations. See underlined in extract from EPA Act 1992 & 2003, below. prevent or eliminate or, where that is not practicable, generally to reduce an emission; (i) the use of low-waste technology, (ii) the use of less hazardous substances, (iii) the furthering of recovery and recycling of substances generated and used in the process and of waste There are also requirements for operators when they apply for permits to include details of waste reduction/prevention measures. There are also statutory requirements for Municipal Authorities to prepare regional waste plans that deal with the promotion and provision of waste recovery infrastructure.
Poland	According to the law, waste should be first recovered/recycled, if recovery/recycling is impossible because of technological/financial reasons, waste should be disposed of in accordance with environmental protection requirements and waste management plans.
Portugal	The National Law, Decree n.º 239/97 of 9 of September(transposed the Council Directive 75/442/EC), determines the obligation of the producers of the industrial waste, to give them the right destination and provide the recycling.
The Netherlands (Overijssel)	Waste must first be reused, if not possible then possibilities for recycling should be viewed. If this is not possible, then incineration may be considered. Only if all the other options are not possible the waste may be dumped in a landfill.
United Kingdom	The following is an extract from our legislation: (3) The additional general principles referred to in paragraph (1) in relation to a permit authorising the operation of a Part A installation or a Part A mobile plant are that the installation or mobile plant should be operated in such a way that – (a) waste production is avoided in accordance with Council Directive 75/442/EEC on waste; and where waste is produced, it is recovered or, where that is technically and economically impossible, it is disposed of

	while avoiding or reducing any impact on the environment

8. What are the developments concerning reuse and recycling of waste that you foresee in your country in the near future?

TABLE 5	
Cyprus	People will be informed about their main role in keeping the environment clean and to protect their health. They will be careful before throwing away any material in their garbage. They will try to repair them and reuse it and if they cannot, they will collect them and transfer them in particular places for recycling. Government will have to enforce all the new legislation and to reach specific targets at specific dates. New installations for the treatment of wastes will be constructed and operate.
Denmark (Storstrom County)	The same policy as used in the past, the national objectives for reuse of different types of waste are raised some more
Denmark (Viborg County)	On a constant basis we are trying to find ways to reuse and recycle waste. In the future I think we will concentrate on quality (hazardous waste, batteries etc.) instead of quantity (large amount of non-hazardous waste)
Germany (NRW)	From the year 1995 to 2003 the recycling rate climbed up from 29 % to over 50 %. The main reason for this successful development was the separate collection and reuse of organic waste.
Ireland	Establishment of bio-waste anaerobic digester hubs. Lots of small district based public recycling/bring centres. Development of a national glass and paper recycling facility (currently all exported)
Italy (Lombardy)	There is a Regional law and a regional waste plan that is fixing the target of remove material and energy: before 2005 • 40% of the waste produced (in weight) must be remove and more than 30% as recycling or reused • Reduction of domestic waste that is disposal in landfill (20% less than in 2000) • Remove more than 40% of the waste produced in incineration plants before 2010 • 60% of the waste produced (in weight) must be remove and more than 40% as recycling or reused • Remove more than 60% of the waste produced in incineration plants
Poland	Maximising the amount of waste recovered/recycyled, in particular packaging waste, waste oils, batteries, tyres, cars.
Portugal	Improvement of the separate waste materials, development of campaigns for the public.
Scotland	Reuse and recycling are likely to increase due to the following factors: restrictions on the amount of municipal waste that can be sent to landfill; increasing cost of landfill; requirement for treatment of wastes prior to landfill.
Slovakia	DIPC have not relevant data related to this issue but the tendency is to reuse and recycle as much waste as possible. For example from January 1, 2010 every municipality is obliged to provide separation of the glass waste, paper waste, plastic waste, metal waste and biodegradable waste
Spain	-
Sweden (Orebro)	The prohibition of disposal of waste suitable for treatment in a waste incineration plant and biodegradable waste, already has promoted reuse and recycling, and probably will continue to do so for some years ahead. The hardened demands for the landfills, that follows by the Council Directive on landfill of waste (1999/31/EC of 26 April 1999) and the taxes for waste prohibit in landfills, will promote the development for reuse and recycling.
The Netherlands (Overijssel)	Percentage of materials that has to be recycled will increase.
United	Implementation of the Landfill Directive, article 5 (2) targets. This requires that the amount of biodegradable

Kingdom	municipal waste (BMW) being disposed of to landfill will be reduced as follows: • by 2010 to reduce the amount of BMW going to landfill to 75% of that produced in 1995 • by 2013 to reduce the amount of BMW going to landfill to 50% of the 1995 figure • by 2020 to reduce the amount of BMW going to landfill to 35% of the 1995 figure Implementation of Waste Electrical and Electronic Equipment (WEEE) Directive. A review of the Governments 'Waste Strategy 2000' is expected to commence during 2005

9. What are your targets concerning recycling and reuse?

TABLE 6	
Cyprus	There are targets for reducing biodegradable wastes in landfills (2010- 75%, 2012- 50%, 2016- 35%). For packaging wastes we have to recover 50-65% in total, 25-45% recycle in total and for each material recycle 15% until December of 2005. For reuse no target is yet decided.
Denmark (Storstrom County)	National objectives/targets for the period 2005 – 2008 are: Recycling and reuse of waste: 65 % Incineration of waste: 26 % Waste to landfills: 9 %
Denmark (Viborg County)	On a constant basis we are trying to find ways to reuse and recycle waste. In the future I think we will concentrate on quality (hazardous waste, batteries etc.) instead of quantity (large amount of non-hazardous waste)
Germany	Optimisation of the separate collection of paper, glass, plastics, organic waste.
Ireland	See national strategy web site attached, and in particular the policy pages where targets are included in the documents cited. http://www.raceagainstwaste.com/ http://raceagainstwaste.ie/learn/irish_policy/
Italy (Lombardy)	I think that we can arrive to remove more than 60% -70% of waste in the near future in Lombardy Region. In Italy I hope to arrive at 30%-40%.
Poland	Reaching the levels of recovery/recycling every kind of waste required by the Polish and European law
Portugal	The targets defined in the National Law for this specifically waste materials: used tyres, used EEE, used packaging and ELV.
Scotland	To recycle, or compost, 25% of municipal waste by 2006.
Slovakia (Banska Bystrica County)	- reduction of the biodegradable waste transferred to landfills (2010- 75%, 2013- 50%, 2020- 35%) – reduction refered to the total amount (by weight) of biodegradable municipal waste generated in the initial year 1995; -to recycle, or compost, 35% of municipal waste by 2005 in the field of packaging wastes: (recycling 2005-42%, 2007-52%), (recover 2005-50%, 2007-58%) measure of recycling resp. recovery refered to the total amount (by weight) of packaging wastes;
Spain	-
Sweden (Orebro)	The Government ant the Parliament have adopted 15 national long-term environmental quality objectives and intermediate targets for improvement of the Swedish environment. Those concerning reuse and recycling are the following: The quantity of waste disposed of to landfill, excluding mining waste, will be reduced by at least 50 % by 2005 compared with 1994, at the same time as the total quantity of waste generated does not increase.
The Netherlands	70 % recycling of waste.
United Kingdom	• to recover value from 45% of municipal waste by 2010, at least 30% through recycling or composting • to recover value from two thirds of municipal waste by 2015, at least half of that through recycling and composting, and to go beyond this in the longer term

9. Can you mention developments concerning recycling or reuse you would like to share with us?

TABLE 7	
Cyprus	There are some recycling companies that recycle plastic, metals and glass and they produce again product for the market, in particular for plastic with the method of extrusion, pellets are produced, from glass waste, new lamps are produced, metal is melted down, igots are produced and this sell in other companies for them to use in their production. Used Oils after they are used, are collected and transferred in an installation that cleans all the heavy metals and gives it to the cement kilns to burn it for the production of manufacturing procedure.
Denmark (Storstrom County)	-
Denmark (Viborg County)	-
Germany (NRW)	-
Ireland	Setting up of a National waste prevention team in the Agency and development of a work programme for same. http://www.epa.ie/TechnicalGuidanceandAdvice/NationalWastePreventionProgramme/ Also sponsorship of Cleaner Production projects in industry. See links http://www.epa.ie/EnvironmentalResearch/CleanerProduction/
Poland	-
Portugal	The development and implementation of the integrated management systems for - tyres, batteries, ELV, waste oils and packaging
U.K.Scotland	Wastes sent to landfill are subject to a tax to encourage separation, recycling and reuse.
Slovakia	-
Spain	-
Sweden (Orebro)	One problem in Sweden is that the waste legislation is difficult to put into practice and the environmental authorities can sometimes apply the waste legislation in different ways. That makes the operators unsure and that fact can sometimes counteract the reuse and recycling. To prevent that we have networks between officers at our County Administrative Boards, the networks purpose is to exchange experience and knowledge. The Swedish Environmental Protection Agency, also publish guidelines of how the legislation is suppose to put in practice.
The Netherlands (Overijssel)	-
United Kingdom	Implementation of a revised protocol for the burning of substitute fuels in cement and lime kilns.

11. What is done to encourage the separation of waste?

TABLE 8	
Cyprus	An Awareness program for the separation of packaging waste is being prepared using the media: T.V, radios, lectures, leaflets, to inform people how to separate their wastes in the houses and place them in the correct recycle bin.
Denmark (Storstrom County)	-
Denmark (Viborg County)	Making it easy to people to get rid of paper, glass, batteries by putting op containers close to shopping-malls, schools and other places, where people go on a regular basis. If you can reduce the waste in the bin, you pay less to get rid of the waste.
Germany (NRW)	-
Ireland	High bin charges and gate feed (taxes) on waste for disposal. Weight based charging. Intended to promote recovery.
Italy (Lombardy)	In Lombardy we have more than 40% of separately collection o domestic waste. We issued several technical rules in waste management so that industry must separately different kind of waste (liquid, solid, ferrous, paper, sludge, ecc..
Poland	- A financial mechanism was launched – if the operators do not reach the levels of recovery/recycling, they must pay additional fees - Environmental fees/taxes were increased for disposing waste on landfills
Portugal	The increase of campaigns for the public, for a better separation of municipal waste, the implementation of pick-up municipal waste.
U.K. Scotland	Landfills operating under a permit in accordance to the Council Directive on landfill of waste can only accept waste subject to prior treatment. This will generally include the separation of waste. Wastes sent to landfill are subject to a tax to encourage separation, recycling and reuse. Conflicting with this are the Hazardous Waste Directive and European Waste Catalogue which can discourage separation of some wastes.
Slovakia	The Recycling Fund (RF) was set up in the Slovak Republic as a non-state special purpose fund. Municipality can get financial support from the RF. Amount of financial subvention depends on the amount of waste, which was separated.
Spain	-
Sweden (Orebro)	Besides the prohibition and taxes, that's mentioned before, we have legislation that regulate how and when waste is supposed to be separated.
The Netherlands (Overijssel)	Financial support for new techniques, high costs for the conventional way of disposing of waste.
United Kingdom	Implementing the requirements of the WEEE directive and the Landfill directive. General guidance to business on waste management and recycling.

4.4 Enforcement at waste installations

1. What is the competence of an environmental inspector?

TABLE 1	
Cyprus	According to the law he/she must examine if the conditions in the permit are followed, if any improvement is noticed after the last visit, to focus in all the environmental aspects that might have adverse impacts (soil, water, air, noise, wastes, energy e.t.c), to make an integrated inspection . If some problems occurs in fulfilling the conditions the inspector must report it and set a certain period limit for the installation to fix any problem. If no action is taken, penalty will be given.
Denmark (Storstrom County)	The environmental inspector has a high degree of competence, the inspector issues permits to the plant, inspects the plant and enforces violations of the conditions, for instance rapport the plant to the police. The inspector also has access to all parts of the plant.
Denmark (Viborg County)	-
Germany (NRW)	Engineer.
Ireland	There are a number of core competencies that an Inspector would be required to have such as working knowledge of applicable legislation and a knowledge of internal inspection/auditing procedures. Inspectors all have a degree in a related field (science or engineering) and many would have Masters and/or Doctorate. There are a vast range of competencies/expertise across inspectors such as geologists, biologists, chemists, microbiology, geography, water engineering, agricultural specialists, air specialists, etc.. It is this multi-disciplinary team approach that tends to be adopted.
Italy (Lomb)	He must control the respect of all condition of the permit.
Poland	A. During environmental inspections inspectors can do the following: - enter with assistant workers, experts and essential equipment a) for 24 hours: - the area of property, building or part of area/building where there is an economic activity, - transport equipment. b) from 6 to 22 – other areas and sites. B. take samples, carry out essential research or other activities in order to ascertain the state of environment in the light of environmental regulations and conditions stated in the environmental permit. C. demand a halt of installation or machines, including transportation equipment in a range essential for taking samples or carrying out research and measurement. D. evaluate used technologies and techniques. E. demand written and oral explanations and interviewing people to ascertain facts. F. demand documentation and data connected with the inspection.
Portugal	The competence of a environmental inspector is to verify the compliance of the waste installations/factories, according with the environmental legislation.
Scotland	The competence of inspectors varies and the sites that they are allowed to inspect will depend on the level of their experience.
Slovakia	- to control how legal entities and individuals – entrepreneurs comply with the act on wastes and obligations resulting from decisions issued under the act

	- environmental inspector as a person executing state supervision has right to enter the land and operating premises, structures and installations, inspect operating records and documents, perform necessary examinations as well as take samples, make photo documents and video documents and provide necessary papers, explanations and true and complete information related to waste management.
Spain	The function of the environmental inspectors covers the prior control and the vigilance of the correct fulfilment of the preventive instruments and of the legal prescriptions for the environmental preservation, with the purpose to prove, if is the case, the infractions and the damages that were produced, as well as compile sufficient proofs of them; and, in general, the performance of the control and vigilance of any type of activity that were susceptible to affect negatively to the environment in the autonomous region. The officials that develop the environmental inspection enjoy in the exercise of their functions of the consideration of agents of the authority, being authorized to gain access, without previous notification and after be identified, to the installations in which they develop their activities regulated by the legislation. In their actions they could urge of agencies and institutions the necessary collaboration for the fulfilment of the functions legally entrusted.
Sweden (Skane)	An environmental inspector has a widespread competence and can, as a last resort, shut down an installation. An inspector is entitled to have access to a waste installation and to carry out site visits. The operator is obliged to submit information to an inspector, on request.
The Netherlands (Overijssel)	Inspector is allowed (with or without police) to inspect an installation and to inspect the administration. He may enter any room within the premises of the installation he wishes to inspect. He is allowed to take any samples or make copies of things which he feels necessary to complete his inspection.
United Kingdom	Usually educated to degree standard, a newly appointed officer will undergo six months of induction training that involves in-depth training and work shadowing to meet minimum competency requirements that are recorded in a development log

2. What training/schooling does an inspector for waste installations have?

TABLE 2	
Cyprus	To be trained to inspect these particular waste installations, to know the EC legislation, the BATs, to know all the relative functions of a unit.
Denmark (Storstrom County)	The environmental inspector has no official education, he training is primarily based on working together with colleges and his own experience
Denmark (Viborg County)	Often he/she has a bachelor or master degree in environmental engineering
Germany (NRW)	Education and training in accordance with a specialization as inspector.
Ireland	Inspectors would be encouraged to join an professional body (e.g. IEI, CIWM, ..) that would provide ongoing professional training regarding waste issues. In addition there is ongoing internal training provided in the EPA and specific Inspector training needs are identified on an annual basis by means of the staff Performance Management and Development System. Typically the EPA would provide seminars on items such as the Landfill Directive, Landfill Lining Systems, Air Modelling, Waste Water Treatement, Giving Evidence, and external courses are provided on technical report writing, management, etc.
Italy (Lombardy)	Usually before starting to make environmental control in waste plants the inspector follow training in waste law, technical waste management processes, standard condition in permit and administrative proceeding. After the information plan he follow senior inspector to make experiences.
Poland	Each inspector is given a basic theoretical training of evironmental law and regulations and a practical

	training – taking part in inspections with an experinced inspector
Portugal	First, a degree in engineering, preferentially environmental or chemical, and have periodical training courses concerning solid waste management.
U.K. Scotland	SEPA has recently introduced a scheme for in-house training of inspectors during which they work with staff covering a range of environmental issues (including inspection of waste facilities) over a 2 year period. Specific training courses are also provided.
Slovakia	For an environmental inspector, an individual may be appointed who has: - a master degree in the respective technical studies or natural science studies and no less than four years of practical background in the respective field, - participated in professional training provided for by an agency delegated by the Ministry of life environment - passed the examination.
Spain	Every new inspector has to pass a period of training where is used to accompany veteran inspectors in the development of the inspecting work with the objective to observe its performance and the management of the tools of inspection (protocol, minutes, check-list…)
Sweden (Skane)	There are no formal requirements. All inspectors have a University degree.
The Netherlands (Overijssel)	An inspector will have a completed study in Environment and after this special training for inspections.
United Kingdom	An officer will need to shadow experienced officers for some time across a range of facility types before carrying out unaccompanied inspections. They will have received specific training in the Agency's 'Operator Performance and Risk Appraisal' scheme (OPRA) for assessing compliance at waste facilities.

3. What does the inspector do when an installation is not complying with the conditions of the permit? Could you describe the steps that are taken to get the installation to comply?

TABLE 3	
Cyprus	If some problems occur in fulfilling the conditions the inspector must report it and set a certain period limit for the installation to fix any problem. If no action is taken, penalty will be given.
Denmark (Storstrom County)	If we discover a violation of a condition we asses how serious the violations is. Small/short violations that has no negative impact on the environment will be noted, but often not enforced. More serious violations will first be enforced by at legal order to comply with the condition. The legal order has normally a deadline. I new inspection shows that the company complies the enforcement ends. If the inspector finds that the company does not observe the legal order, the inspector rapports the company to the police. The police then takes the company to the local court, where the company if found guilty then receives a find.
Denmark (Viborg County)	First we appeal to the operator / owner to comply with the conditions. Most of the time it is with success and we often have a good dialogue. I they still don't comply we can impress the conditions or give them an order. Before giving an order and sometimes impress the conditions we first have to notify the owner/ or operator and let them give their opinion. Finally we can report it to the police, it is very rare.
Germany (NRW)	Advice, hear the case, decide about consequences.
Ireland	Typically non-compliances with the permit will be noted as part of an audit/inspection of the facility and may be reported as a non-compliance or observation. Normally the licensee would be given a strict timeframe to achieve compliance with the relevant conditions by means of a "Notification of Non-Compliance" (NONC). The proportionality of the non-compliance is considered and in some cases only one incidence of non-compliance may lead to legal action (e.g. fish kill, waste types, etc). If the installation fails to achieve compliance additional measures may commenced resulting in legal action been taken. Generally legal action would not be seen as the first course of action and notifications, meetings and repeated

	inspections would be undertaken to encourage compliance.
Italy (Lombardy)	The inspector must write to the competent Authority and to the Criminal Bench. Italian waste law fixed tree steps: • The competent Authority write to the installation and fix a period for get the installation to comply; • After that period if the installation persist in no-compliance the Authority stop the activity of the installation and fix a period for get the installation to comply. • At the end of the period if the installation persist in no-compliance the Authority revokes the permit.
Poland	The inspector can do the following: - issue a post-inspection order or instruct the operator of installation, - fine the operator of installation or apply to a court for penalising the operator, - issue a decision in which an administrative fine is stated (in case of not complying with environmental standards), - issue a decision in which a date of eliminating the infringement(s) is stated. In case of further infringement or if there is a danger to the environment or human life and health, the inspector can halt the installation or pass the case to a prosecutor.
Portugal	First, and after carrying out the inspections(with site visit) will make a report of the assessment of the installation, and an evaluation to the compliance. If, are actions like sanctions, fines and penalties and same times criminal sanctions.
U.K. Scotland	The action taken depends on the severity of the offence and the resulting impact. Options available to an inspector include; an informal warning, formal written warning, notice requiring compliance by a specified date, suspension of the sites Permit, and reporting the incident to the prosecuting authority.
Slovakia	Inspector in waste management - imposes necessary corrective measures needed for elimination of misconducts determined by the inspection, - imposes fines.
Spain	If deficiencies are observed during the inspection and these do not suppose an environmental imminent or significant risk, or the firm has been able to facilitate all the documentation required by the inspector, will proceed to remit a writing to the company reporting these facts and giving it a limit of time to rectify them. Subsequently a verification inspection is used to do to verify the correction of the deficiencies observed. If of the inquiries carried out by the inspection, the possible existence of a crime or offence related to the environment was deduced, the administrative organism will remit immediately the actions to the competent jurisdictional organism, accompanied of technical or legal reports considered opportune In the exercise of the functions of inspection, inquiry or investigation, the environmental inspection will formulate, if is the case, a petition reasoned for the initiation of the corresponding sanctioning procedure, directed to the competent sectorial organism. Once the minutes have been carried out, this motivated petition should specify, if it is possible, to the person or presumed responsible people; the conducts or facts that could constitute administrative infraction and its classification; as well as the place, the continued date or periods of time in which the facts were produced. The formulation of the motivated petition does not force to the competent sectorial organism to initiate the sanctioning procedure, though should communicate to the organism that formulated the motives why, if is the case, does not proceed the initiation of the procedure.
Sweden (Skane)	First the inspector explains the situation, often at a meeting with the operator. The next step is to issue an injunction telling the operator what steps he or she should take in order to be able to comply with the conditions of the permit. If the operator still doesn't comply the inspector can combine the injunction with a fine or a current fine. The fine is set at the amount the steps to comply with the permit would cost. In Sweden the law obligates the inspector to file a report to the public prosecutor in case an installation doesn't comply with the conditions of the permit.
The Netherlands	Three steps will usually be taken: first a warning. After second inspection: a fine. If matters do not improve, the installation may be closed down. At the same time police will prosecute also (and give a fine).

United Kingdom	The severity of non-compliance will be established in accordance with the Environment Agency's Compliance Classification Scheme. This will be used to dictate the appropriate enforcement response. In the case of minor infringements a Site Warning is likely to be issued or a Warning Letter sent. In the case of more significant breaches, or repeat minor offences, consideration would be given to both the issue of Notices to force compliance and/or formal legal proceedings that could lead to Formal Caution or prosecution.

4. Is enforcement embedded in an enforcement strategy?
5. If so, can you explain the steps in this strategy?

TABLE 4	Strategy?	If so, can you explain the steps in this strategy?
Cyprus	Yes	It depends on the project and an installation. In general the strategy describes the costs for each new installation or action, set time schedule and the actions that will be taken. E.g 1)For landfills construction and operation of 4 landfills 1/2004-6/2006 2)finding the number, size, period of operation et.c for each uncontrolled dumping place 3/2004- 3/2005 3) rehabilitation of places, after care 1/2006- 4) collection of data about quality, quantity of municipal wastes 1/2004-12/2005
Denmark (Storstrom County)	Yes	By the Danish act for environmental protection
Denmark (Viborg County)	Yes	First we appeal to the operator / owner to comply with the conditions. Most of the time it is with success and we often have a good dialogue. I they still don't comply we can impress the conditions or give them an order. Before giving an order and sometimes impress the conditions we first have to notify the owner/ or operator and let them give their opinion. Finally we can report it to the police, it is very rare
Germany (NRW)	Yes	German act.
Ireland	Yes	Office of Environmental Enforcement "Enforcement Policy".
Italy (Lombardy)	Yes	There are standard technical enforcement applied to every kind of waste plants. Naturally each permits contain special technical enforcement that depend of the environmental territorial characteristics. The strategy consist in fixing the same rules and operative condition for every owners of plants.
Poland	Yes	It is a strategy of gradating the infringements. If the infringement is ascertained for the first time, generally, a post-inspection order and instructions are issued. If the operator continues not complying with the law or conditions of the permit, the consequences are more strict.
Portugal	Yes	Continuous assessment of the installation with many inspections for ensure that the operator follow-up.
U.K. Scotland	Yes	The strategy states that SEPA will take the action that is deemed appropriate to the seriousness of the offence. For Persistent offences the action taken will be stepped up towards the ultimate penalties of suspension of the Permit and/or reporting the incident to the prosecuting authority. The strategy requires that operators are notified of SEPA's intention to take any action beyond issuing of a warning and given the opportunity to make representation.
Slovakia	Yes	The enforcement is embedded in legal environmental framework. In the case that installation is not complying with the conditions of the permit or failing to meet requirements from legal framework inspector follows appropriate steps pursuant to

		Act.
Spain	Yes	The environmental inspection has as objective: protect the natural resources; try to decrease the environmental effects until reaching acceptable levels by the receiver surroundings, always that this was technically and economically viable; control and watch on a permanent way to guarantee that these levels are reached and kept; guarantee, if is the case, the repair of the damage caused. The operating technique that permits to develop the competences the regulation assigns to the environmental inspection is established By means of the Environmental Inspection General Plan to obtain the objectives previously marked. The instrumental objectives of the General Plan are: endow to the inspection of the necessary material media; optimize the resources assigned; promote the adequate formation of the inspecting personnel; establish adequate methods for the programming and organization of the inspections; establish normalized procedures directed to facilitate and unify the inspecting activities, as well as to verify the effectiveness of the system established; establish a permanent environmental inspection, with an open character and available during all the validity of the Plan.
Sweden (Skane)	Yes	Every year we revise the strategy. The number of inspections and visits to the landfill is set down. The number of days each landfill will require for check-up and scrutiny of reports, follow up etcetera is estimated.
The Netherlands (Overijssel)	yes	3 steps: warning, threatening with fine, applying the fine and if nothing else works: closure.
United Kingdom	Yes	The Environment Agency has a published Enforcement and Prosecution Policy that provides tight guidelines on the appropriate enforcement response for all offences. All recorded breaches of permit must result in an enforcement outcome (no further action; warning; formal caution or prosecution) as outlined in 3 above. Such outcomes are reviewed by managers at monthly Enforcement Panels to ensure consistency and will include consideration of public interest factors and proportionality.

6. Does the police accompany an inspector during the inspections?
7. Which sanctions and competences does your legislation allow you to enforce compliance?

TABLE 5	**Police?**	**Sanctions and competences**
Cyprus	Not necessary	Penalties described in the law of Solid and Hazardous Wastes will be given. (£20.000-2.000.000 Cyprus pounds)
Denmark (Storstrom County)	Not normally	We can give the company a legal order to comply to the conditions. I some cases, when we receive new information about the environmental aspects of the company, we can give the company a legal order to comply to new conditions. In serious cases, when there is an imminent risk for negative impact on the environment, we can give the company a legal order to stop operation of the plant or part of the plant.
Denmark (Viborg County)	If necessary	We can take action to make the installation comply and afterwards make the installation pay.
Germany (NRW)	No	Money penalties, personal penalties, closing down of a plant.
Ireland	Not usually	• Serve legal notices

		• Audit environmental performance of local authorities • Fines • Suspension of permit • Revocation of permit
Italy (Lombardy)	Sometimes, but not often. Inspector is recognised as a police inspector.	The inspector must write to the competent Authority and to the Criminal Bench. Italian waste law fixed tree steps: • The competent Authority write to the installation and fix a period for get the installation to comply; • After that period if the installation persist in no-compliance the Authority stop the activity of the installation and fix a period for get the installation to comply. • At the end of the period if the installation persist in no-compliance the Authority revokes the permit.
Poland	not often in practice	Administrative sanctions: fines, decisions stating a halt of installation or stating a date of eliminating the infringements, Penal sanctions: fines, applications to a court for penalising the operator or passing the case to a prosecutor.
Portugal	not common	For example, close the installation, suspension of the authorisation or the permit, not allowed to have subsidy, deprivation of the right for the public competitions, lost for the State of the operator objects.
U.K. Scotland	Rarely	The action taken depends on the severity of the offence and the resulting impact. Options available to an inspector include; an informal warning, formal written warning, notice requiring compliance by a specified date, suspension of the sites Permit, and reporting the incident to the prosecuting authority.
Slovakia	No	Our legislation allow to impose : - corrective measures, - fines. Should an operator again violate the obligation within one year from the effect of the decision on imposing a fine under the Act on Waste, or fail to comply with a corrective measure, the same will be imposed another fine up to twice the upper limit for fines stipulated by the Act on Waste.
Spain	No	The classification of the sanctions and their amount vary according to the sectorial legislation that we can apply. In the case of activities affected by the Law of IPPC they would be: In the case of very serious infraction: Fine since 200.001 up to 2.000.000 €. In the case of serious infraction: Fine since 20.001 up to 200.000 €. In the case of light infraction: Fine up to 20.000 €
Sweden (Skane)	No, not necessary	An injunction can be combined with a fine. There is also an administrative fine, an environmental sanction charge, that can be issued for certain non-compliances. An inspector is in some cases obligated to file a report to the public prosecutor.
The Netherlands (Overijssel)	At the second inspection	Warning, fines, closure or repairing the damage at the cost of the operator.
United Kingdom	Very rarely	If negotiation and warnings fail to bring about compliance, the Agency can serve Notices to require compliance with permit conditions. Failure to comply with such Notices can result in the suspension or revocation of the permit. If a permit holder is convicted of relevant offences he risks being deemed no longer competent to hold any permit.

8. Which steps are taken when an installation persists in non-compliance?

TABLE 6	
Cyprus	Penalties described in the law of Solid and Hazardous Wastes will be given.
Denmark (Storstrom County)	We rapport the company to the police, see point 3.
Denmark (Viborg County)	First we appeal to the operator / owner to comply with the conditions. Most of the time it is with success and we often have a good dialogue. I they still don't comply we can impress the conditions or give them an order. Before giving an order and sometimes impress the conditions we first have to notify the owner/ or operator and let them give their opinion. Finally we can report it to the police, it is very rare. (q.3)
Germany (NRW)	Closing down of a plant
Ireland	Usually legal enforcement action initiated with circuit or district court
Italy (Lombardy)	The inspector must write to the competent Authority and to the Criminal Bench. Italian waste law fixed tree steps: • The competent Authority write to the installation and fix a period for get the installation to comply; • After that period if the installation persist in no-compliance the Authority stop the activity of the installation and fix a period for get the installation to comply. • At the end of the period if the installation persist in no-compliance the Authority revokes the permit (q.3).
Poland	An application to the authority responsible for issuing the permit for the withdrawal of it or stopping the activity causing the infringement of law.
Portugal	If an installation persists in non-compliance it's decided to alert the operator if the legal obligations are non-compliance, it occurs in a environmental crime and it's given a deadline for the compliance of the administrative order with a legal command. In case of non-compliance of this legal command, goes to the Public Prosecution Service.
U.K. Scotland	For Persistent offences the action taken will be stepped up towards the ultimate penalties of suspension of the Permit and/or reporting the incident to the prosecuting authority.
Slovakia	Regional Environmental Authority (not inspector in waste management) is entitled, until the impediment has been removed, to forbid operations waste handling installation that fails to comply with the obligations laid down by the Act on Waste or its implementing regulations and where a grave damage of the environment or a grave environmental injury may result there from.
Spain	When sanctioning procedure has been initiated, and the firm persist in not comply with the legislation, the competent organism to impose the sanction could agree, among others, some of the following provisional measures: • Correction, security or control measures to avoid the continuity in the production of the risk or of the damage. • Presealed of apparatuses or machinery. • Temporary, partial or total closure, of the installations. • Stop of the installations. • Temporary or final stoppage of the authorization for the performance of the activity. • Publication, through the opportune media, of the imposed sanctions, once these have acquired firmness in administrative way or, in their case, jurisdictional, as well as the names, surnames or denomination or social reason of the people physical or legal responsible and the kind and nature of the infractions. When the offender would not comply the obligation of reinstatement or restoration, the competent organ will be able to agree the imposition of coercive fines.
Sweden (Skane)	First the inspector explains the situation, often at a meeting with the operator. The next step is to issue an injunction telling the operator what steps he or she should take in order to be able to comply with the

	conditions of the permit. If the operator still doesn't comply the inspector can combine the injunction with a fine or a current fine. The fine is set at the amount the steps to comply with the permit would cost. In Sweden the law obligates the inspector to file a report to the public prosecutor in case an installation doesn't comply with the conditions of the permit (q. 3).
The Netherlands	Permit may be revoked if it is clear that the installation cannot (and will not) comply with the conditions. Closure will then be the next step since the installation will not have a permit.
United Kingdom	Persistent non-compliance would lead to prosecution and/or suspension of the permit in most cases.

9. Do you (or your colleagues) encounter problems when enforcing environmental laws?

TABLE 7	Yes or No	Please, specify what kind of problems:
Cyprus	Yes	We have to examine the EIA, find all the relevant details for the specific installation, know in detail the Brefs, go for inspection to the place of the future plan, present it in a committee. Then this committee makes her comments to the competent Authority for the Housing and Planning Permit. If the permit is given, the installation will have to make an application for the management of solid and Hazardous Waste and another for the management of liquid wastes, at the Environment Service. If gaseous wastes are produced an application must be made at the Department of Inspection of Labour. Then another inspection of the place is necessary before the permit is issued. The permit must be also prepared from the same competent authority that does the inspection.
Denmark (Storstrom County)	Yes	Our contact to the companies is based on dialog, often we try to avoid a direct confrontation with the company because enforcement requires a lot of resources and does not always gives the wanted result. We issue approximately 20 legal orders pr. year to about 140 companies. We rapport only 1 or 2 companies to the police pr. year. We have found that the interest from police in these cases normally is low, which means it can take years before the local court treats the violation.
Denmark (Viborg County)	No	The companies are understanding and usually we have a good dialogue.
Germany (NRW)	No	-
Ireland	Yes	• Gathering of evidence to prove case • Confirmation of public complaints with site visits/observations • Varied interpretation of legislation • Division of environmental enforcement amongst various bodies • Slow progress in public bodies/local authorities • Lack of expertise at operating sites • Claims of lack of funding • Lack of proportionality in terms of court fines v's offence
Poland	Yes	Incoherence of regulations/rules and unawareness of law among operators of installations.
Portugal	-	-
UK Scotland	Yes	Too little resource. Long time taken to process cases through Courts.
Slovakia	Yes	Not acquaintance with obligations from the Acts, forgetting to comply with some obligations, arrogancy of responsible persons from controlled company, etc.
Spain	Yes	An important problem in the development of the inspection is presented because of the difficulties to reflect in the minutes facts objectively verified by the inspector and with a minimum probative value so that the legal services can defend judicially the imposed sanctions by a sanctioning expedient. Discrepancies among the criteria applied by the

		inspection in the performance of its function and those applied by the legal services exist, and they can affect significantly to the inspection protocol.
Sweden (Skane)		There have been a lot of changes in the legislation concerning waste and landfills in the last few years. The changes have been made quickly and the operators haven't had enough time to prepare for the changes. Sometimes the operators need to change the permit in order to fulfil the demands of the legislation. The process takes about a year and the changes can't be made until it is too late. The interpretation of the legislation varies between different authorities and operators which causes problems.
The Netherlands (Overijssel)		Legislation is sometimes vague and contradictory. It is necessary for an inspector to be a good communicator so that problems might be resolved. Operators can get very angry when they need to invest in environmental aspects.
United Kingdom	Yes	Grey areas in interpretation of legislation; shortage of resources to adequately regulate; limitations of powers and access to quick intelligence; inadequate penalties imposed in the Courts.

10. Can you describe a case where enforcement of a waste installation was carried out successfully?

TABLE 8	
Cyprus	New installations are being designed and their approval is under discussion, so there is not yet enforcement of a waste installation.
Denmark (Storstrom County)	In 2000 we started a common project with the operators of the waste incineration plants in order to minimize the emission of CO in the fluegas. For some years we found, that the plants always had problems with compliance with the conditions for CO in the fluegas, when the plant was started or shut down. The result of the project was a new procedure to start or shut down the plant. Trials with the new procedure showed, that plants now was able to comply with the conditions for emission of CO in the fluegas.
Denmark (Viborg County)	Right now I have following case. Down-stream a landfill we have found Cl- in the ground-water. The operator of the landfill asks us to give them an order to locate the leakage and to fix it. An order is making it easier for the operator to get the money. Actually the took action fast and had started, before they got the final order. I feel that we have a very good dialogue and everybody wants to stop the pollution and are doing the best they can.
Germany (NRW)	-
Ireland	Yes. There are a number of waste facilities that have improved operational issues as a response to Non-compliance enforcement notices issued by the regulator and in some cases the enforcement was brought a step further into legal court action and even by the time of the court case the issues at the facility would have been resolved.
Poland	The liquidation of rotatory landfill of hazardous waste in a factory producing electronic equipment in Żychlin. On the landfill there were waste chemicals, galvanic waste and waste VOC's, which were the remainder of old technologies used in the factory. As a result of action taken by The Voivodship Inspectorate of Environmental Protection in Łódź, the underground containers of those chemicals were neutralised by the use of NaClO, and then buried.
Portugal	The intervention of the Inspectorate was determined in the modification/adaptation of two installations of waste treatment plants, for a correct attribution of the permits; the close of 40 illegal clinical incinerators.

UK.Scotland	Suspension of a landfill Permit due to the migration of foul odours from the site to a nearby village. The Permit was suspended until work was completed on upgrading the site to deal with the problem.
Slovakia	Based on the evaluation of our inspection activities in app. 50% of inspections (landfills and waste incineration plants) complying with the law or permit conditions was found out.
Spain	The day 07/09/04 was performed an officio inspection to verify the adaptation of the 2ª phase of the deposit of security of the thermoelectric plant of Cerceda environmental complex where flying ashes, dust of kettle, solid residues of gases processing and active coal used originating in the gases processing, all them containing dangerous substances, are placed. The inspection concluded that the works carried out, except hidden vices, correspond with the project presented. During the development of it and as can be verified in the photographic report that contains, the inspectors proceeded to verify the significant aspects of the project that were in sight: upper waterproofing of the deposit base (in the base could be appreciated the kettle dross fund, part of the geotextil that is adding progressively according to the filled and the layer of gravel on the top), waterproofing in slopes (the two sheets of PEAD were partly appreciated, the geotextils, the Enkadrain network and the sheet of bentonita), the drainage network for perimeter ditches in that phase, arrival points to decantation ponds of the primary drainage networks, etc. Due to the impossibility to verify in situ specific aspects of the project, inspectors proceeded to request to the firm a work end certificate where the Work Director assumes the responsibility that the performance of works was adjusted to the conditions prescribed in the project. Besides the welding quality certificates of the PEAD sheets were requested.
Sweden (Skane)	-
The Netherlands (Limburg)	There was a fire in the landfill. The operator failed to inform us and he was fined for this. The operator protested against the fine because he felt he only needed to warn the fire department. The lawsuit about this fine is still under the court. We believe we will win this case. But this has led to better reports of the operator. Now, everytime something happens, they call us and send us a fax with the information.
United Kingdom	An operator of a waste transfer station was prosecuted (three times) for continually exceeding the quantity limits of his licence.

11. Can you describe a case where the enforcement did not lead to success?

TABLE 9	
Cyprus	-
Denmark (Storstrom County)	-
Denmark (Viborg County)	-
Germany (NRW)	-
Ireland	If it was not initially successful then enforcement actions are ongoing.
Poland	A factory in Kutno was inspected on 20 May and 9 June 2004. During the inspection a lot of non-conformance with environmental regulations and permits was ascertained, in particular: storing an excessive amount of waste which was 3 or 4 times more than the amount allowed by the permit, storing some kinds of waste (including hazardous waste) which were not allowed by the permit, passing some waste to enterprises which did not have permits to deal with such waste, using the equipment for the production of alternative fuels without the permit for its exploitation.

	During the inspection a representative of the company was fined. As a result of non-conformance with the permits, The Voivodship Inspectorate of Environmental Protection in Łodź applied to the environmental regulator (Wojewoda) for ordering the company to cease not complying with the permits. That non-conformance was not stopped and the installation was closed.
Portugal	The continuous work in the control and management of the construction waste, sometimes is difficult to achievement, because of the countless number of illegal operators working in this system.
Scotland	Prosecution of a waste producer for deposit of hazardous waste at a non-hazardous landfill. The case failed because of a technical issue relating to mishandling of a sample of the waste.
Slovakia	Based on the evaluation of our inspection activities in app. 50% of inspections (landfills and waste incineration plants) not complying with the law or permit conditions was found out.
Spain	-
Sweden (Skane)	Last year, at an unannounced inspection, my colleague and I discovered that a small landfill disposed of biodegradable waste, even though this is prohibited in Swedish law. We reported this to the public prosecutor and a police investigation started. Later the prosecutor decided to drop the charges because she thought that the law is not clear when it comes to decide whether disposing of biodegradable waste is a crime or not in the sense of the law. This case, together with a few more in other counties has now lead to the result that the Swedish Environmental Protection Agency is now about to introduce a new environmental sanction charge for the disposal of biodegradable waste. We contacted the operator of the landfill, which is a municipality, and told them that the disposal of biodegradable waste is prohibited, which they claimed not to be aware of. The operator promised to stop the disposal immediatly. At another inspection a few months later we found out that biodegradable waste was still disposed of at the landfill. We are now about to issue an injunction combined with a current fine. We are not yet successful but hope this last measure will make the operator comply with the law.
The Netherlands (Overijssel)	We often feel waste materials have been disposed in a wrong matter, but it is usually not possible to gather enough evidence to prove this.
United Kingdom	None spring to mind though we have often felt some of the small fines imposed have fallen short of 'success'.

ANNEX 5 Presentation: European Waste Policy

Mrs Anna Karamat from the European Commission gave a presentation on the European Waste Policy.
She explained that the Community Waste Strategy and the 6th Environmental Action Plan state guidelines, objectives and instruments for waste management.
There is a guideline for Waste Management Hierarchy to be considered when dealing with waste:

- priority to waste prevention
- promotion of recovery
- optimization and minimization of disposal

There is also a guideline for Producer responsibility
And a guideline for the control of Waste Shipment.

The Waste Management Hierarchy states that reuse and prevention should come first, followed by energy recovery and material recycling and then by incineration without energy recovery. The last option should be landfill.
The Waste Management Policy is described in the following legislative framework:
Waste Framework Directive, Directive on hazardous waste and Regulation of shipment waste.
Waste Treatment is stated in the following directives: Incineration of Waste, IPPC + BREF's and Landfill of Waste.
Specific directives for the disposal of specified wastes are those concerning:
Waste oils, Sewage sludge, Batteries, Packaging, PCB's, End of Vehicles, Electrical & Electronic Waste.

The Landfill Directive

The Landfill Directive states guidelines for three types of landfills: for hazardous waste, for non-hazardous waste and for inert waste. The directive states that all waste should be treated before land filling and gives a description of certain wastes that may not be disposed of in a landfill (e.g. tyres).
Reduction targets for the land filling of biodegradable waste (based on data of 1995) are :

- 25 % by 2006
- 50 % by 2009
- 65 % by 2016

Permitting requirements for landfills.

- Addition to directive 75/442 and 96/61
- All requirements of LFD fulfilled
- Coherence with waste management plan
- Financial guarantee

Adaptation of existing landfills:

- Conditioning plans for all landfills by 16 July 2002
- Decision of authority as soon as possible
- Adaptation completed by July 2009 at the latest
- Shorter deadlines for hazardous waste

Waste acceptance criteria:

- Council decision 2003/33 which entered into force on 16 of July 2004
- All waste must be characterised

- Limit values must be met by 16 July 2005 at the latest
- CEN sampling and test methods must be used (listed in the decision)

The Incineration Directive

Scope of the directive:

- Incineration and co-incineration
- Hazardous and non-hazardous waste
- Excluded: certain biomass waste, animal carcasses to be used (listed in decision)

Permitting:

- Addition to WFD and IPPC (BREF)
- List of waste that may be treated
- Waste delivery and reception
- Operating conditions
- Emission limit values
- Incineration residues

Operating conditions:

- 850 degrees, 2 seconds for incineration and co-incineration plants (1100 degrees for some hazardous wastes)
- Automatic system to prevent waste feed when temperature or emission requirements are not met
- Auxiliary burner for incineration plant
- Any heat generated must be recovered as far as practicable

Emission limit values:

- air, water
- incineration, co-incineration
- existing plants (pre-2002) must meet ELV's by 28 December 2005
- some derogations in Directive, TP for some new Member States

Specific Waste Streams

Packaging and Packaging Waste Targets

Old directive stated that by 30th of June 2001:

- 50 – 65 % packaging waste should be recovered and
- 25-45% packaging waste should be recycled with minimum of 15% for each packaging material

Revision of this directive in 2004 states that by 31st of December 2008:

- Minimum of 60% of packaging waste should be recovered
- 55-80% of packaging waste should be recycled
- Minimum recycling targets are: 60% for glass, 60% for paper/cardboard, 50% metals, 25% plastics and 15% wood.

End of Life Vehicle Directive:

Reuse and recovery by 1st of January 2006 should be 85% recovery and 80% reuse/recycling;
By 1st of January 2015: 95% recovery and 85% reuse/recycling.
Re-examination of these targets will take place by 31st of December 2005

WEEE Directive

By 31st of December 2006:

- large household appliances should have a 80% recovery and 75% reuse/recycling
- Small appliances, tools and toys should have a 70% recovery and 50% reuse/recycling
- IT, telecoms and consumer equipment should have 75% recovery and 65% reuse/recycling
- Gas discharge lamps should have 80% reuse/recycling.

Planned initiatives

- Thematic strategy on resources
- Thematic strategy on prevention and recycling: - communication, prevention plans, standards for recycling and Amendment of waste Framework Directive, Hazardous Waste Directive, Waste Oils Directive
- Mining waste
- Amendment on batteries and shipment

ANNEX 6 Workshop Landfills for non-hazardous waste

Parallel workshops Landfills

The aim of this workshop is to compare and discuss with each other the conditions you would normally apply to a permit for a **landfill for non-hazardous waste**.

Case:
You are a permit maker.
A waste processing company in your country, has plans to set up a new landfill for non-hazardous waste in the countryside. The company applies for an environmental permit. You are asked to issue this permit.
What conditions will you apply to this permit to protect the environment?
Try to describe these conditions in such a way that an inspector knows what you mean and he/she is able to enforce them.

The result of this workshop was a list of conditions the participants would apply to the waste permit. The list of course is not complete, but provided enough material for a lively discussion.
The following topics were mentioned:

- Groundwater protection
- Surface water management
- Types/quantities of waste
- Leachate control
- Landfill engineering
- Traffic management
- Operational standards
- Odour control
- Financial provision
- Closure/aftercare
- Environmental monitoring (ELV's)
- Dust
- Training/education
- Reporting
- Waste acceptance criteria
- Site boundary
- Nuisance control (birds/vermin/insects)
- Accidents and emergencies
- Construction quality assurance
- Liner standards
- Gas monitoring, control and infrastructure.

More specifically the next conditions were formulated:

- This permit is issued to ABC ltd. and authorises the disposal of non-hazardous waste on land at site A shown on plan 1.
- The total quantity of waste disposed of shall not exceed xx tons (amount should be specified)
- Unless otherwise agreed in writing landfill containment engineering shall be as specified in Annex 1 of the directive.
- No waste shall be placed in any new cell until the construction specification of that cell has been agreed.
- All waste arriving at the site shall be fully documented.
- Waste shall be weighed and inspected prior to acceptance.
- Waste shall only be accepted between the hours of 08.00 – 18.00.
- There shall be no discharge of list 1 substances to groundwater.
- The site shall only accept the following types of waste (define by EWC code).
- The site shall not accept waste with a total organic content (TOC) greater than 5%

Parallel workshop Landfills – 2

Case:

You are an inspector now.
Your colleague will issue a new permit for a landfill for non-hazardous waste.
The conditions he will apply to the permit are shown to you.
Look at the conditions and give your colleague feedback on them.
Are the conditions enforceable?
What problems do you foresee in the enforcement?
What problems do you foresee for the company?
What conditions would you like to change?

While studying the conditions, the group agreed that in general, permits in all the Member States outline the same type of conditions (as also required in the IPPC directive). The differences are found in the specification of each condition. Where certain Member States tend to work with performance standards, other MS prefer specific conditions. It was argued that performance standards gave more room to the owner of the installation to make changes in the installation without having to apply for a new permit. It makes a permit flexible. The conditions that were specified in the workshop provided enough material for lively discussions about the enforceability of them. In general, the group stated that for inspectors, it is preferable that conditions state exactly what is demanded of the permit holder. References to annexes or to directives in a condition make it less clear for the inspector. Especially in Annex 1 the sentence 'is equivalent to' leads to discussion. The more specified the permit, the more easily it is for the inspector and the permit.. The group agreed that it is preferable that directives, and other references in a permit be included to the permit (perhaps even as an annex). Key criteria should be in the permit and cross references should be avoided.

Some conditions were considered `not enforceable´, due to the fact that this could not be inspected.
Such a condition was for example the one that states:
'The site shall not accept waste with a total organic content (TOC) greater than 5%'.

The group decided that this type of condition is very difficult to enforce, since the permit does not state how the permit holder should determine the amount of TOC, nor does it state that this should be administrated. An inspector will probably not determine this while inspecting the site. Moreover when you deal with contaminated soil, it has at least 20% TOC. This condition should not be used as such.

While discussing the amount of waste to be disposed of in the landfill, the question was raised if the amount should be specified in weight or in content. Since a landfill is not determined by the weight of the waste, but by the content of it, it was agreed that content would be a better description.

A discussion was also held on the ECW codes: is it better to give all the ECW codes that the permit holder is allowed to accept, or only give a description of the waste? In Lombardy (Italy) a landfill can be given more than 400 ECW codes in the permit. The inspections are carried out in an administrative way (waste register control) because the inspection of all these codes at the site itself would take too much time. In Denmark there are difficulties with the codes, especially when the waste is mixed. Thus is the waste described in the permit uncoded. In the Landfill Directive nothing is said about the use of codes; most important is classification and description of exceptions. The classification of hazardous, non-hazardous and inert waste is easier to enforce. Sweden however needs the codes for statistics, and so the codes can be used for the permit as well. In the Netherlands only the codes are specified for what may not be accepted.
The discussion continued with the question what a permitter must do when a landfill accepts non-hazardous waste that has not been included in the list, and there is no environmental risk. In Denmark the operator has to phone the enforcer when he/she is in doubt and has to take a sample before he/she can accept the waste. The permit has to be changed or an amendment to the permit has to be made. To avoid this problem, in the UK they categorize waste by the chapter headings of the ECW. The conclusion of the discussion was that only the waste that can not be accepted, should be specified with codes.

The condition of construction quality assurance was an easy one. You check the work that has been done with the drawing the operator has given. It is detailed and enforceable.

The discussion of leachate control is concentrated on a permit, used in Ireland: 'The leachate levels in the waste shall not exceed a level of 1.0 m over the top of the liner at the base of the landfill'. What is missed is a specified monitoring point, which is why the condition as prescribed is not enforceable. The condition that states that leachate should be brought back in the landfill leads to the discussion whether or not it is prohibited in the Directive. In Ireland the leachate is brought back because otherwise the waste will dry out and become instable. That is why recirculation is allowed in Ireland. This condition is considered as enforceable.

ANNEX 7 Financial security

Ian Brindley
Environmental Agency
United Kingdom

Article 8 of the Landfill Directive (1999/31/EC) requires that:
`Member States shall take measures in order that:

(a) the competent authority does not issue a landfill permit unless it is satisfied that: ….

… (IV) Adequate provisions, by way of financial security or any other equivalent, on the basis of modalities to be decided by Member States, has been or will be made by the applicant prior to the commencement of disposal operations to ensure that the obligations (including after-care provisions) arising under the permit issued under the provisions of this Directive are discharged and that the closure procedures required by Article 13 are followed. This security or its equivalent shall be kept as long as required by maintenance and after-care operation of the site in accordance with article 13 (d). Member States may declare, at their own opinion that this point does not apply to landfills for inert waste.´

Article 13 requires that:
`Member States shall take measures in order that, in accordance, where appropriate with the permit:

(c) after the landfill has been definitely closed, the operator shall be responsible for its maintenance, monitoring and control in the aftercare phase for as long as may be required by the competent authority, taking into account the time during which the landfill could present hazards.

(d) for as long as the competent authority considers that a landfill is likely to cause a hazard to the environment an without prejudice to any Community or national legislation as regards liability of the waste holder, the operator shall be responsible for monitoring and analysing landfill gas and leachate from the site and the groundwater regime in the vicinity of the site in accordance with Annex III.´

Situation in the UK

The Environment Agency (as competent authority of England and Wales) is reviewing its approach to the implementation of this requirement. The representative of the United Kingdom focussed on exchanging information on how other Member States have tackled or plan to tackle this issue to ensure that closure and aftercare of the landfill sites is undertaken and funded.
In England and Wales provisions are made on a site by site basis. The following types of financial securities have been agreed with applicants:

- bonds, provided by 3rd parties
- cash deposits
- guarantees/underwriting by municipalities

Most common form of provision

Bonds, provided by a 3rd party are the most widely used arrangements, though cash deposits have also been made for a significant minority of sites. A few sites owned or controlled by municipalities are covered by guarantees.
Funds should be payable to the regulator if the operator defaults on his obligations. Cash deposits are also accessible to the operator with the agreement of the regulator.
Provisions are calculated and agreed on a site by site basis. Where a particular operator has more than one landfill site the provisions may be made in a form that covers all of the sites (e.g. cash deposits may be agreed to cover the obligations of several sites and this is held in one account to reduce banking charges).

Calculating the magnitude of the provision

The magnitude of the provisions is calculated on a site specific basis, determining what the obligations of the permit will be and calculating the predicted costs (e.g. an `environmental monitoring´ obligation would depend upon the number of sampling points, frequency and duration of sampling and cost of analysis and interpretation).
A contingency element is required for unplanned events that may require additional monitoring or remediation works. For bonds, costs are generally assessed at their present value and size of provision periodically reviewed to take account of inflation. Discounting to net present values can be allowed for cash deposits where there is a demonstrable real rate of return. The value of provisions varies depending on waste types and size of site. Total budgets of 1.6 to 8 million euros are common for hazardous and non/hazardous sites.

Duration of the aftercare

Where an operator can demonstrate that a particular site will cease to be a hazard to the environment after a specific period (through modelling) then provisions are made for that duration, which would be at least 30 years. Typically, for hazardous and non-hazardous sites, provision is made for at least 60 years of aftercare.

What proportion of operational landfill sites have financial provision?
In England and Wales some 30 landfill permits have been granted of which it is expected that they will still be in operation in 2007. All of those re-permitted have financial securities. Other sites are currently accepting waste while preparing to close, so some 20 % of currently operational site have financial securities.

ANNEX 8 Co-processing of waste in cement kilns

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1. INTRODUCTION

The cement industry is net-shaped connected to the environment. The production process requires energy and this causes to emissions. Information on energy consumption including secondary fuels in the cement industry is relatively well known. Fossil fuels (e.g. coal, oil or natural gas) are the predominant fuels used in the cement industries. However, low-grade fuels such as petrol coke and waste derived fuels (traditionally waste oils, spent solvent, waste tyres) have been increasingly utilised in the recent years. More recently, the cement industry have also co-incinerated animal meals and animal fats.
The key environmental issues associated with cement production in the licensing procedure are air pollution and the efficient use of energy. The requirements differ for each plant and these must be examined and defined as a part of the licensing procedure in accordance with the Federal Immission Protection Act. This act states that environmental compatibility of an utilisation process should be assessed mainly on the basis of the expected emissions, the energy utilisation, and the effect on the environment. The emission limits are laid down in the technical instructions on air quality - TA Luft 2002 (German Clean Air Standards). If waste fuels are used in the clinker burning process as well as normal fuels, then regulation by the ordinance on incineration plants burning waste and similar substances -17th BImSchV (Ordinance of the Federal Environmental Impact Act) also supply.

2. INCINERATION OF WASTE FUELS

Hazardous waste incineration is an engineered process that employs thermal oxidation at high temperature (normally 900 °C or higher) to destroy the organic fraction of waste. Minimum temperatures required for incineration range from 875 °C for incineration of municipal garbage to 1.400 °C for incineration of more stable organic compounds such as PCB, dioxin, and residues from polyvinyl halogenated production. Residence time at the high temperature must be at least 2 seconds. Producing cement clinker in cement kilns also involves high temperature burning. Liquid waste can be introduced into cement kilns using conventional oil burners; solid waste in the form of granulated material or powder can be fired like coal dust. In comparison with other types of hazardous waste incinerators, cement kilns possess several characteristics, which make them an efficient technology for destroying highly toxic and stable organic wastes.
Combustion gas temperatures and residence times in cement kilns exceed those of commercial hazardous waste incinerators. These high combustion temperatures and long residence times, along with the strong turbulence encountered in cement kilns, assure the complete destruction of even the most stable organic compounds. Burning of cement clinker requires a material temperature of 1.400 – 1.500 °C; consequently the flame temperature must be even higher in order to obtain heat transmission from flame to material. In the

case of short kilns like preheated kilns and precalciner kilns the gas temperature in the burning zone is about 2.000 °C, at mid-kiln it is about 1.700 °C, and at the kiln exit it is about 1.100 °C. The gas retention time is about 5 seconds.
The large size of kilns and the quantity of heated material present results in high thermal stability. In other words, temperatures within kilns change very slowly. Thus, even if a cement kiln is forced into an emergency shut-down resulting from a loss of primary fuel or a severe malfunction, all hazardous waste in the kiln will be completely destroyed, provided automatic cut-offs prevent further injection of wastes. Cement kilns operate under alkaline conditions. Therefore, virtually all chlorine entering a kiln is neutralized of form sodium chloride, potassium chloride, and calcium chloride, all relatively non-toxic substances. Consequently, emissions of hydrogen chloride, a strongly acidic compound, are significantly lower than emissions from commercial hazardous waste incinerators.

3. ENERGY ASPECTS BY BURNING CEMENT CLINKER

The production of Portland cement clinker is energy-intensive. Theoretically an average of 1.75 MJ of thermal energy is needed to burn 1kg Portland cement clinker. The actual requirement for thermal energy in modern plants is approximately 2.9 to 3.2 MJ/kg (BREFF 2001, CEMBUREAU 1997) depending form the process till 4 MJ/kg.

The production of cement involves four steps:

1. Preparation of a material mixture;
2. Thermal formation of clinker in the cement kiln;
3. Clinker cooling;
4. Grinding and mixing with additives to the cement quality required.

Most installations, use the dry process, which -for dry raw materials- is the most economical in terms of energy consumption. In Germany the cement clinker is burnt exclusively by dry process. As is shown by the plant layout in Fig. 1, the main components of a plant of this type are the preheater, calciner, rotary kiln and clinker cooler.

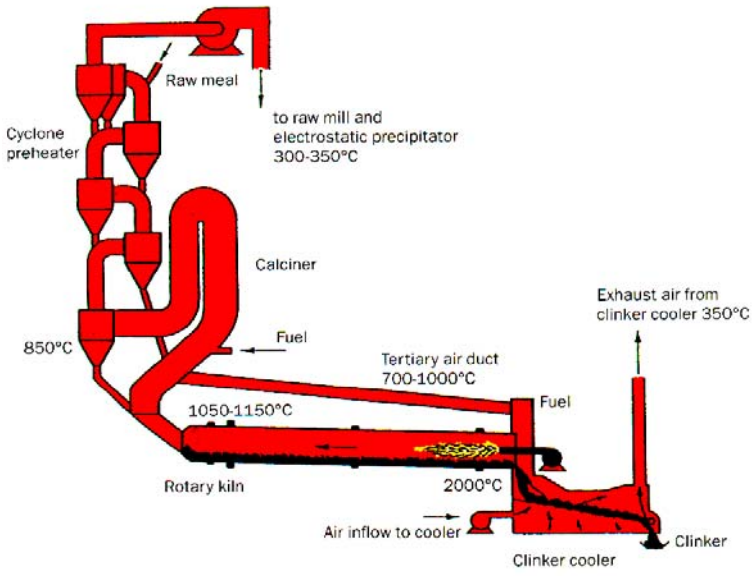
The conversion of the raw materials into clinker involves various processes at the following temperature ranges:

below 550°C:	preheating, drying and dehydratation;
550 to 900°C:	decarbonisation of $CaCO_3$ into CaO and CO_2; Decarbonisation is an endothermic reaction. A flue gas temperature exceeding 1000°C is required.
900 to 1300°C:	first recrystallisation or calcination reactions;
1300 to 1450°C:	sintering and clinkerisation. Sintering is an endothermic reaction. A flame temperature of 1800°C is required.

In a typical dry process, preheating and decarbonisation take place in a series of cyclones. The dry material enters at the top of the upper cyclone and moves downwards through the cascade into the furnace. The hot flue gases from the kiln flow counter-currently. The cyclones provide a good heat and mass transfer, thereby enhancing the energy efficiency and flue gas cleaning.
Fuel energy is use in cement production mostly to burn the cement clinker. Electrical energy is used principally to drive the extensive grinding equipment and to operate the kiln systems.
There are some energy saving and energy recovery techniques for the main process in the cement industry, principally for the clinker burning process.
The heat recovery takes place by preheating the combustion air in the cooler while at same time cooling the clinker, and by using exhaust the gas energy after the rotary kiln for calcining and preheating the raw meal in the calciner and preheater
In a substitution of normal fuels by replacement fuels (waste materials), the first question which usually occurs relates to effect of the replacement fuels on the process conditions of the particular process. Particular attention has to be paid to the effects of using replacement fuels on process temperatures, exhaust gas masses, harmful substances and their levels, and specific energy expenditure, or efficiency for energy. Only then is it possible to discuss the possibilities of optimizing the process regime, e.g. recovery or by interconnected operation, for the conditions which have been altered by the substitution. The evaluation of a fuel is therefore depending not only on the nature of the fuel itself but to a considerable extent also on the mode of operation of the plant and on the heat recovery.

In the burning process in the rotary kiln sufficiently high material temperatures of ~ 1450 °C have to reach for conversion of the clinker phases. In practise, fuels with an average net calorific value of at least $h_{u,m}$ 20 – 22 MJ/kg are normally used in a main firing system. Preheating the air to 950 °C or more is therefore a very effective measure for recovering heat and reducing energy expenditure.
In the calciner the temperature of the kiln exhaust gas falls from about 1200 °C to the calcinig temperature of about 850 °C (equilibrium temperature). To maintain to the endothermic calcination reaction at this comparatively low temperature level, compared with the burning process, it is also possible to use here fuels of lower calorific value.

Fig. 1: Plant layout



The fuel can be fed to the kiln at the following points:

1. Via the main burner;
2. At the transition chamber at the rotary kiln inlet via a feed chute (large pieces of fuel);
3. At the riser pipe via secondary fuel burners;
4. At the precalciner via precalciner burners;
5. At the precalciner via a feed chute (large pieces of fuel);

A preheater / calciner kiln system uses cyclones to preheat the raw materials, and an additional vessel, a calciner, which up to 60 % of the total fuel to be burned in a secondary , lower temperature combustion zone. The addition of energy in the calciner increases the degree of calcination from 30 to 40 % typical in a preheater kiln to 85 to 97 %. Calcination begins at a temperature of about 815°C, and it is substantially completed at about 955°C.

Flue gases

The cement kiln is provided with 1, 2 or 3 stacks, depending on the process configuration. The main stack is always present.

The main releases from the production of cement are releases to air from the kiln system. These derive from the physical and chemical reactions involving the raw materials and the combustion of fuels. The main constituents of the exit gases from a cement kiln are nitrogen from the combustion air; CO_2 from calcination of $CaCO_3$ and combustion of fuel; water vapour from the combustion process and from the raw materials; and excess oxygen.

In all kiln systems the solid material moves counter currently to the hot combustion gases. This counter current flow affects the release of pollutants, since it acts as a built-in circulating fluidised bed. Many components that result from the combustion of the fuel or from the transformation of the raw material into clinker remain in the gas phase only until they are absorbed by, or condensed on, the raw material flowing counter currently.

The adsorptive capacity of the material varies with its physical and chemical state. This in turn depends on its position within the kiln system. For instance material leaving the calcination stage of a kiln process has a high calcium oxide content and therefore has a high absorptive capacity for acid species, such as HCl, HF and SO_2.

Part of the installations is equipped with a bypass and a bypass stack. A bypass is necessary when the chlorine content in the feed (raw material and fuel) is high. The presence of chlorine is a critical factor in the thermal process. Chlorine may react with calcium, giving $CaCl_2$ that ends up in the clinker. However, most of it binds to sodium or potassium which leads to the formation of NaCl and KCl respectively. These latter salts sublimate in the calcination zone and recrystalliz in the decarbonisation zone, which results in an internal chloride cycle. As the chloride concentration rises, salt crusts may precipitate in the installation. This may lead to blockages, for example on the cyclone pipes, resulting in a kiln shutdown.

The bypass is installed in the zone where the salt accumulation occurs. Part of the flue gas is removed here. Before emission the gas is dedusted by an electro precipitator or bag filter.

A third stack emits the air used for rapid cooling of the clinker. The gas is dedusted before emission into the atmosphere. This heated air may also be used as combustion air, which gives a more energy-efficient process.

In general the following energy information in the application is important

- total energy balance
- assessment of energy efficiency
- energy consumption
- energy saving plan
- description on energy use

4. Required Waste information in the application

The selection of rich calorific valuable residual materials and the processing of household- and commercial - refuse to rich calorific valuable substitute fuels naturally depend upon with permit has given to each individual Cement plant. The following questions concerning the waste fuel are important:

- which residual are used and out of which process do the waste materials come from ?
- which pollutants do the waste contain ?
- the data of the used waste (calorific value, water content, heavy metals, chlorine content, PCB, etc.).
- is the statements reliability durably guaranteed ?
- is a constant quality within a certain spectrum possible ?
- what is the expected emissions (PCB, Dioxin/Furan, heavy metals) ?
- how is the enrichment of harmful substances in clinker or cement ?

A cement plant has to enclose the following documents when using waste fuels:

- a suitability proof of the processing plant, that it is recognized as a specialized waste disposal plant for the processing of residual materials of production
- proof, that the processing plant is suitable for this kind of processing and
- Documentation / Declaration of every single inorganic and organic substance of the wastes and the finished mixture of secondary waste fuels.

The following trace elements which are contained in the used materials for cement kiln are limited to median value and maximum value in the Table 2. The level for calorific- value in waste fuel from manufacturing processes is 20 ±2 MJ/kg, the calorific value content for the high calorific part of municipal waste is fixed at 16 MJ/kg.
Key parameter is the quality of the substituted fossil fuel. A low difference in burden of pollutants between conventional fuel and waste fuel strengthens the advantage of co-incineration. To compare scenario between "with and without waste fuel" it is advised to define an average fossil fuel content of heavy metals and use it for benchmarking.
It can be used for direct comparison of different types of waste fuel qualities or even serve as basis for the development of a material specific standard. The standard could be defined as an average content of heavy metals and maximum content in the high calorific waste fuel.

	Median Value [ppm]	Maximum Value [ppm]
Cadmium	4	9
Thallium	1	2
Mercury	0,6	1,2

Antimony	25	60
Arsenic	5	13
Cobalt	6	12
Nickel	25 (50-80)*	50 (100-160)*
Selenium	3	5
Tellurium	3	5
Lead	70 (100-190)*	200 (300-400)*
Chromium	40 (60-125)*	120 (120-250)*
Copper	100 (120-350*	300 (300-500)*
Vanadium	10	25
Manganese	50 (100-250)*	100 (300-500)*
Tin	10	40
Beryllium	0,5	2

* Exception limits for Ni, Pb, Cr, Mn, Cu by high calorific part of municipal waste

Table 2: Limits for heavy metals

5. Monitoring Combustion

The main requirements for uniform kiln operation and constant operating conditions when using waste materials and waste oil. From this it follows that::

- the burning process has to be monitored continuously using modern process control technology,
- Waste materials require constantly fixed inspections on arrival and comprehensive preliminary homogenisation.
- Liquid media are sampled continuously through trickle tubes for quality control,
- the main parameters for analysis of the waste materials (calorific value, chemical composition, etc.) must be put into the process control system on a continuous basis,
- regulations of primary energy have to follow in reliance on secondary fuel data,
- the feed lance must be designed so that the waste fuel is injected centrally and is ignited at the flame front of the main fuel,
- The control units must allow the waste fuel to be supplied independently of the main fuel,
- waste fuels may only be supplied during normal continuous operation within the rated output range.

The description of a safety chain and safety regulations is necessary for supervising a firm combustion to recognize defects immediately and to avoid uncontrolled combustions of secondary fuels with suitable contact systems. The parameters of the " safety chain", listed below, should be linked to one another by a computer-controlled logic system so that their effect on kiln operations and on emissions can be ascertained and the operation could be shut down at predetermined limits as a function of the degree of deviation from the set point value or the plant stoppage time, e.g.:

- Gas temperature less than 900 ° C at kiln inlet,
- Temperature of material at kiln outlet less than 1250°C,
- CO- level above a value to be established by trial (Vol.%),

- Inadmissible control deviations in the set point/actual value comparison for the primary and secondary fuel feed,
- Raw-meal feed of less than 75 % of the max. possible quantity,
- Negative pressure before the exhaust gas fan below the value required at rated output,
- Permissible O_2 level lower than inspection measurements require,
- Permissible NO_x level above 500 mg/m³,
- Failure of burner,
- Dust level above permissible limit.

6. Monitoring - Emissions

A distinction is made between continuous measurements and individual measurement. A further distinction is made between first-time and repeat measurements, function tests and calibrations, and measurement for special reasons, e.g. to determine the emissions of exhaust gas components which are not continuously monitored.
The measurement-relevant parameters to be considered in measurement planning derive from regulatory requirements, e.g. the operating permit, information from the technical supervisory body responsible for the plant and from on-site inspection.
All emission measurement results are reported in g/m³, mg/m³, ng/m³ as the mass of the emitted components related to exhaust gas volume at standard temperature and pressure conditions (273 K, 1013 hPa), after deduction of the water vapour content. Typical kiln exhaust gas volumes expressed as m3/tonne of clinker (dry gas, 273 K, 1013 hPa). O_2-content is normally 10 %.

To accurately quantify the emissions, continuous measurements are recommended for the following parameters:

- exhaust volume (can be calculated but is regarded by some to be complicated),
- temperature,
- Total dust,
- Hg (Mercury and its compounds)
- CO (Carbon monoxide),
- O_2 volume concentration
- NOx (Nitrogen oxides)
- SO_2 (Sulphur oxides)

Regular periodical monitoring is appropriate to carry out for the following substances:

- metals, semi-metals and their compounds,
- TOC (Organic substances)
- HCl (Hydrogen Cloride),
- HF (Hydrogen Fluoride)
- PCDD/Fs (Dioxins and Furans)

Measurements of the following substances may be required occasionally under special operating conditions:

- BTX (benzene, toluene, xylene),
- PACs (polycyclic aromatic hydrocarbons), and
- other organic pollutants (for example chlorobenzenes, PCB (polychlorinated

biphenyls) including coplanar congeners, chloronaphthalenes, etc.).

Emission ranges

The use various secondary fuels is always accompanies by extensive emissions measure-ment. The most important results from these measurement are summarized in table 1. The emission ranges within which kilns operate depend largely on the nature of the raw materials, the fuels, the age and design of the plant, and also on the requirements laid down by the permitting authority.

Components [mg/m³]	**Emission value:** from - to	**Limit in permits** in Germany
Dust	1 – 15	14 - 20
HCl	0,3 – 5	10
HF	0,1 – 2,0	1
SO2	100 – 400	350 - 400
NOx	300 – 600	500 - 800
Hg	0,005 - 0,03	0,03 - 0,05
Cd + Tl	< 0,001	0,05
∑ Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Sn.	< 0,002	0,05
PCDD + PCDF (TE) [ng/m³]	0,001 - 0,01	0,05 - 0,1

Table 1: Emission in the exhaust gas from cement kiln

TA Luft 2002 (Technical instructions on air quality)	**Emssion limits** [mg/m³]	
	daily average value	half hour value
Total dust		
HCL	20	40
HF	30	60
NOx	3	6
SO_2	500	1000
Hg + Tl (Class I)	350	700
Pb + Co+ Ni + Se +Te (Class II)	0,05	-
Sb + Cr + CN + F + Cu + Mn + V + Sn (Class III)	0,5	-
As + Benzo(a)pyren + Cd + Co + Cr (VI)	1	-
	0,05	-
PCDD and PCDF	0,1 ng I-TE/m³	

Table 2: German clean air standards (TA Luft 2002)

17. BImSchV (limits for Cement kilns, for burning waste fuel antil 60% energie substitute)	Emission limits [mg/m³]	
	daily average value	half hour value
Total dust	20	40
HCL	10	60
HF	1	4
NOx	500	1000
SO_2	50*	200*
CO	50*	100*
Total organic C	10*	20*
Cd + Tl	0,05	-
Hg	0,03	0,05
Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V	0,5	-
PCDD and PCDF	0,1 ng I-TE/m³	

*exception possible in individual case

Table 3: Limits in the ordinance on incineration Waste – 17.BImSchV

The technical standard of the co incineration plants is one of the most sensitive parameter. Settling rather low standards concerning co-incineration in cement plants would lead to modified picture. But for cement plants that generally meet the targets given by the EU-Waste Incineration Directive 2000/76/EG from 04.12.2000 (table 4) or in Germany the Ordinance on Incineration Waste - 17. BImSchV .

Moreover, an emission limit for CO may be defined; exemptions from the emission limit for SO2 and organically bonded total carbon may be authorized by competent authorities if existing organically bonded total carbon and the SO2 do not originate the incineration of waste.

EU Directive 2000/76/EG from 04.12.2000	**Total emssion limit** (daily average value in mg/m³)
Total dust	30
HCL	10
HF	1
NOx for existing plants	800
NOx for new plants	500
SO_2	50*
TOC	10*
Cd + Tl	0,05
Hg	0,05
Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V	0,5
PCDD and PCDF	0,1 ng I-TE/m³

Table 4: European requirements for emission limits for cement plants

7. CONCLUSION

Existing measuring results concerning the use of 50 - 75 % alternative combustibles and wastes (calorific value from 18 - 25 MJ/kg) have proved that the pollutants will be burnt safely if the liquids are screened and the solid waste-derived fuels (for example polychlorinated hydrocarbons) are spread in the gas flow. With regard to the emissions of chlorinated compounds such as PCB and dioxin, the exhaust values of the cement rotary kilns can only be achieved in other burning processes by the means of large-scale after-cleaning equipments.

For the assessment of waste utilisation which is harmless and in compliance with the regulations it is necessary to take into consideration the Ordinance on Incineration Plants Burning Waste and similar Substances (17. BImSchV) provided that residues materials are used based on the EU Directive 2000/76/EC on the incineration of waste of 4 December 2000, German Clean Air Standards -TA Luft 2002 and the Recycling and waste Act.

This means that in the authorization application all wastes, or groups of wastes which can be grouped together, must always be specified individually with the relevant point of generation and analysis values as well as the calorific values. This requirement is particularly important when "synthetic fuels" are blended from various wastes outside the cement work.

Evaluation based on the criteria of anticipated emissions, conservation of resources, energy balance and build-up of pollutants requires a comparative examination of the environmental effects of the individual waste.

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ANNEX 9 Vehicle dismantling and recycling in The Netherlands

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1. Introduction

Every year, end of life vehicles generate between 8 and 9 million tons of waste in the Community which should be managed correctly. In 1997, the European Commission adopted a Proposal for a Directive which aims at making vehicle dismantling and recycling more environmentally friendly, sets clear quantified targets for reuse, recycling and recovery of vehicles and their components and pushes producers to manufacture new vehicles also with a view to their recyclability. This resulted in Directive 2000/53/EC, also known as the End-of-life Directive on the 18th of September 2000. The directive was implemented in Dutch legislation in the End-of-life Vehicles Decree on the 21st of April 2002.

The Environmental Management Act states that all end-of-life facilities that are somehow involved in dismantling activities, must have an environmental permit. The licensing authority is the provincial government in which the site is situated.

2. Waste disposal fee and the ARN

A waste disposal fee of 45 euro is obligatory on first registration of every new car with four or more wheels and with a gross weight that does not exceed 3,500 kg.

The money is forwarded to the Auto & Recycling Foundation (ARN) who operates in close collaboration with the Dutch Cycle and Car Importers Association. The responsibilities of the manufacturers and importers are met through their participation in the ARN. The ARN is responsible for the complete chain of recycling of vehicles.

The ARN has 265 car dismantling installations under contract. Together, they are responsible for 89% of the total amount of end-of-life vehicles in The Netherlands. ARN uses the money of the Waste disposal fee to pay the dismantling installations for their work. Payment is settled on a basis of kilograms (car batteries, lights, glass and tyres), litres (e.g. oil and coolants) and pieces (e.g. lpg tanks).

3. Targets

European targets for the recycling of end-of-life vehicles are 85% per 1st of January 2006 and 95% per 1st of January 2015. The Dutch targets are 85% (80% material reuse and 5% energy recovery) per 1st of January 2003 and 95% per 1st of January 2007.

4. Dismantling facilities

Compared to other European countries, the dismantling facilities in The Netherlands are relatively small. The number of facilities has been increasing in the past few years, even though this was not expected when the

Decree was issued. It is becoming clear that the reuse of car parts is becoming core business for most of the dismantling facilities.

The environmental conditions are protection of the soil with an impermeable surface, no nuisance by noise and a wastewater treatment with a segregation for oil and sludge. The dismantling time is limited; hazardous waste has to be removed within ten days, Out of all the conditions that the dismantling facilities have to meet, the protection of the soil is de toughest one. Law requires an impermeable surface which is costly and difficult to maintain in good shape. Another problem in the permitting is the acoustic level that is allowed. Often dismantling activities cause high levels of sound.

5. SEDA installation

ARN-contractors were offered the use of a specific drainage installation for the removal of hazardous waste fluids, a so-called SEDA installation. The installation consists of a compressor with several underground storage tanks for fuels, oils, coolants, breaking fluid and windscreen washer. By using the installation, the dismantling of a vehicle is faster, and the extraction of fluids is better. The only problem is the high costs of the installation for small facilities.

6. Problems in meeting the targets

Meeting the targets for 2007 will be a difficult task, because for certain components there are no recycling possibilities (e.g. rear lights and indicators). The energy recovery or reuse of shredder waste is not as high as the 5% target. Problems are also foreseen at the installations that have not joined the ARN (11% of the end-of-life vehicles end up there).

7. Solutions

Targets can be made if solutions are found for the mechanical separation of rubber stripes, bumpers, PUR foam, hub caps, rear lights, radiator grilles, safety belts, coconut fibre in the seats and window shields. Shredder intake should be controlled better and shredder facilities should be certificated. Finally, cooperation with other European partners might lead to development of recycling of smaller waste flows.

ANNEX 10 Reuse and recycling of waste materials

Parallel workshops Recycling and reuse of waste

Recycling and reuse of waste is getting more attention each year. New technologies are developing and more and more types of waste can be reused or recycled. Therefore, the amount of waste disposed of in a landfill or in an incinerator reduces.

Case:
Try to make up as long a list as possible with waste materials that (you know) are reusable or recyclable.

In a short brainstorming session, the following waste materials were summed up. The list led to interesting discussions on the types of waste that are being reused or recycled in the different Member States.

Glass (sheet glass and bottles)
Tetra-pack
Paper/cardboard
Metals
Electronic waste
Tyres
Lead-acid batteries
Corks
Diapers
Bumpers
Refrigerators
Used oils
Concrete and bottom ash
PET
C + D
HDPE / LLDPE
PVC
Waste fats and oils
Wood / timber
Food waste
Garden waste
Organic waste
Plastics
Textiles
Computers
Toner cartridges
Solvents
Photographic waste
Acids
Construction waste
Sand
Industrial sludge (in the UK a furniture company uses it to make the furniture more heavy)
Snow (to get cold out of it in summer)

COLOPHON

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