

EFIEA Workshop on Improving Waste Policy Through Integrated Environmental Assessment

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Workshop Proceedings



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We would like to thank the Steering Group members for their valuable input into the workshop, and in particular to Dominic Hogg for his many contributions on the day. Most of all we would like to thank all of the participants in the workshop. Each of them contributed actively to a lively and stimulating event. Particular thanks are due to those who contributed and presented the papers around which the discussion was based, and those who volunteered to act as chairs, rapporteurs and respondents to help structure and interpret the wide-ranging and complex discussions.

These proceedings are based mainly on the contemporaneous notes of the authors. In the interests of transparency and comprehensibility we have attributed most of the discussion points to the individual participants at the workshop. In doing so we have necessarily interpreted the statements which were made, and doubtless misinterpreted them, or failed to do them full justice, in some cases. It has not been practical to circulate these proceedings for comment to all those who participated, and therefore we apologise to those concerned for any inadvertent misinterpretations which have been included as a result, or indeed for any omissions. We consider that these proceedings overall give a full and accurate reflection of the event, but, as ever, remain responsible for any errors.

Executive Summary

Integrated environmental assessment clearly represents an opportunity to look at the issue of waste in a more holistic manner, including the advantages it presents in helping to make the issues and trade offs of policy options more transparent, and helping to identify areas where it is possible to get real environmental benefits at a low cost, for example. As the EEA (1999) states, *'The challenge of increasing waste quantities cannot be solved in a sustainable way by efficient waste management and recycling alone. There is an urgent need for integration of waste management into a strategy for sustainable development, where waste prevention, reduction of resource depletion and energy consumption and minimisation of emissions at the source is given high priority. Waste must be analysed and handled as an integrated part of total material flow through the society.'* However, as the presentations demonstrate, the use of IEA also raises a number of important issues and questions, such as the quality of data available, the use of different methodological tools, and how to quantify certain environmental costs and benefits.

The main outcomes from the workshop are:

- There are different 'toolboxes' for policy assessment – there is no single 'right' method.
- The Commission's extended impact assessments have had several benefits.
- Even with perfect methodologies the validity of assessments are constrained by the underlying science.
- Intrinsic uncertainties of some aspects of science are not well appreciated.
- Scientists and assessors have to be honest about what we know, what we don't know, and the level of certainty.
- Different approaches/assessments are needed for different timescales.
- The more strategic and further in time you are looking ahead, the less emphasis should be placed on quantitative information.
- Potential to create a 'super tool' that would combine existing economic value added/cost effectiveness analysis/cost benefit analysis approaches but more realistic to aim for a sequential or combined use of existing tools.
- The transition concept as an IA method would provide an integrated systems' analysis approach to waste policy and a framework for experimenting with new or mixed forms of governance.
- Implementation of SEA for waste plans and programmes could bring additional benefits to waste policy.
- There is a need for further research into the combination of assessment tools for different scenarios (based on level and timescale).

1 Background

1.1 Introduction

The advancement of EU waste policy is one of the highest priorities on the EU environmental agenda. The development of a Thematic Strategy on the prevention and recycling of waste is one of the key drivers taking this forward, but at the same time there is a wider debate about the definition of waste, the EU waste hierarchy, and the implementation of EU legislation. These proceedings report on a workshop held in Brussels on 6 and 7 December 2004 to consider the application of Integrated Environmental Assessment (IEA) to the development of waste policy. The workshop was organised by the Institute for European Environmental Policy (IEEP) under the auspices of the European Forum on Integrated Environmental Assessment (EFIEA). It was one of a series organised under EFIEA to examine the scope and use of integrated environmental assessments. The aim of this workshop was to explore the analytical issues underlying policy development, both at the EU level and within Member States, in particular the role that integrated environmental assessment does, and could, play in policy development.

IEA is an approach that brings together different disciplines to allow a more holistic assessment of environmental issues. Several definitions exist, amongst which is that used by the European Environment Agency (EEA):

'The interdisciplinary process of identification, analysis and appraisal of all relevant natural and human processes and their interactions which determine both the current and future state of environmental quality, and resources, on appropriate spatial and temporal scales, thus facilitating the framing and implementation of policies and strategies'

To some extent, researchers have been looking at the integrated environmental assessment of waste policy for some time. However, this has generally been in the form of other approaches, such as life cycle analysis, cost-benefit analysis, environmental accounting, strategic environmental assessment, etc, rather than being defined as IEA as such. In particular, a lot of work has focused on looking at the environmental impact of the different treatment and disposal options, and life cycle analyses of different products. A survey of various analytical tools has been made in various publications, including the scoping paper for EFIEA, which is annexed to these proceedings for reference. The introduction of the European Commission's extended impact assessment procedure has highlighted the need for good quality environmental assessment, not only to inform policy development, but, importantly, to ensure that environmental impacts receive the same attention as economic and social considerations. The workshop therefore examined the role of IA and considered some of the opportunities and limitations on its practical utility.

1.2 The European Forum on Integrated Environmental Assessment (EFIEA)

The European Forum on Integrated Environmental Assessment (EFIEA) is an initiative to improve the current practice of IEA. It was established as a concerted action in early 1998, after preparations through a series of meetings organised by DG Research of the European Commission. The first phase was completed in early 2001, and the second phase will run until Spring 2005. The scoping paper and workshop on Improving Waste Policy through Integrated Environmental Assessment was part of the programme of work in the second phase.

EFIEA is a network of some 50 European research groups, policy advisors, stakeholders, and decision makers. The aim of the network is to enable the practise of IEA to develop by a cross-fertilisation of the various approaches practised in this field and building an IEA community.

The specific aims of EFIEA are:

- to improve the scientific quality of IEA;
- to strengthen the interaction between environmental science and policy-making; and
- to establish a peer community on IEA.

1.3 The Institute for European Environmental Policy

The Institute for European Environmental Policy (IEEP) is a leading centre for the analysis and development of environmental and related policies in Europe. An independent, not for profit organisation, the Institute has offices in London and Brussels. IEEP brings a non-partisan analytical perspective to policy questions, engaging in both pressing short-term questions and long-term strategic studies.

IEEP focuses primarily on European Union (EU) environmental and sustainable development policies, and relevant aspects of other policies such as agriculture, transport, rural and regional development and fisheries. It is also actively engaged in the development of policy at a national level in Europe. The Institute seeks both to raise awareness of the policies that shape the European environment and to advance policy-making along sustainable paths. IEEP undertakes research and analysis and provide consultancy and information services, working both independently and on commissioned projects. Its partners and audience range from international and European institutions to local government, non-governmental organisations (NGOs), industry and others who contribute to the policy debate. It has regular contact with the full range of policy actors.

IEEP operates in a network with like-minded institutes in Europe. The interdisciplinary team of staff includes lawyers and natural and social scientists with experience of working in a wide range of European countries. It collaborates closely with a network of associates in universities, other specialist institutes and consultancy organisations across the continent. The London office of IEEP was founded in 1980, the Brussels office in 2001.

2. The Workshop

A Steering Group was formed in 2004 to provide expert input into the development of the workshop, in particular to decide on what issues the workshop should seek to address. The members were selected to draw on expertise from the waste and integrated assessment research communities, and from people with experience of waste management issues in practice. The Steering Group met in April 2004 to discuss the theme of the workshop and provide input into its practical arrangements. After this, the group liaised via email to finalise the details, and some were present to provide input into the workshop itself.

The workshop was held over one and a half days and was divided into three main sessions (see Annex 1 for the programme). **Patrick ten Brink** of IEEP formally opened the workshop, providing a brief introduction, including an outline of IEA and EFIEA. Presentations were provided by expert speakers, followed by an opportunity for questions and general comments. At the end of each day Working Groups were held to discuss issues raised in the previous session(s), and rapporteurs provided feedback to the full plenary. The presentations, plenary discussions and working group summaries are set out in Sections 3 to 5.

3. Session 1

Introduction to Integrated Environmental Assessment (IEA) and its Application to Waste Policy

3.1 Presentation by Thomas Bernheim: IA as a tool – the European Commission's Impact Assessment Procedure

Thomas Bernheim, from the Sustainable Development and Economic Analysis Unit in DG Environment, gave a presentation on the European Commission's Impact Assessment Procedure. IA can be viewed as a tool for making policy more transparent, and helping decision makers.

The Commission established an internal system of integrated impact assessment for all its major proposals in a 2002 Communication, and the system became operational on a trial basis in 2003. The system was designed to provide policy-makers with clear analysis, in advance, of the likely effects of Community measures, to enable them to improve the coherence between different policy priorities, and to identify win-win options - or failing that, to clarify exactly what trade-offs between competing objectives would have to be made. The new IA system brought together in a single integrated system a number of separate procedures for impact assessment.

The reasons for such an assessment are that it delivers in the following areas:

- Promotes coherence and a cross-sectoral approach;
- Integration;
- Transparency;
- Evidence based;
- Proportional – match the depth of analysis to the significance of impacts.
- Early coordination.

The Commission asks five ‘common sense’ questions in all IAs:

1. What is the problem?

Why is it a problem? What causes it? How will the problem develop? Who are the key players? Consider subsidiarity and proportionality

2. What are the objectives?

Are the objectives consistent with other objectives? What are the overall goals of policy? What are the immediate objectives and deliverables? Are the objectives specific, measurable and realistic?

3. What are the options to achieve the desired goals?

What are the policy options? What are the regulatory/non-regulatory options? What are the design parameters?

4. What are the impacts?

What are the impacts on the economy, environment and society? Why do these impacts occur and who is affected? There is a need to identify the most important impacts and undertake a more advanced analysis of these issues. Impacts are expressed in qualitative, quantitative and, if possible, monetary terms. They also consider compliance and the distribution of impacts.

5. Which is the best option?

There are different ‘toolboxes’ for policy assessment – there is no single ‘right’ method. These include: cost benefit analysis (CBA); cost effectiveness analysis; multi-criteria analysis (using weighting according to the importance of different issues); etc. They try to establish the different trade offs associated with different policy options.

The first year of undertaking extended impact assessments was very much a ‘learning by doing’ exercise, and since its introduction the Commission’s work on EIA has developed. Thomas explained how the EIAs to date have had a number of benefits, including:

- It has increased inter service co-operation;
- It increases evidence based policy making;
- It has widened consultation;

- It is increasing policy coherence and integration;
- It does increase thinking outside the box; and
- It does help adjust proposals.

However, it is recognised that the environmental aspects of non-DG Environment policies have only been weakly analysed in many instances.

The Commission is trying to improve the EIA procedure. Future developments include the training of staff to enhance the capacity and skills for impact assessment, and the sharing of best practice between DGs and across sectors. The new Impact Assessment guidelines give enhanced consideration to sustainable development and the Lisbon objectives.

From 2005 all work programme proposals automatically undergo extended impact assessments. There is also an inter-institutional agreement encouraging the European Parliament, Council of Ministers and European Commission to consider the impacts of amendments.

3.2 Presentation by Dr Dominic Hogg: IEA Tools and Waste Policy - an Overview

IEA is a complex system at the EU level, even if one is only looking at one waste stream as an example. The important thing is for impact assessment to inform policy.

Dominic Hogg highlighted the role of science in the assessment procedure. He pointed out that science rarely delivers certain knowledge concerning the relationship between human activities and specific outcomes. So, even with perfect methodologies, the validity of assessments are constrained by the underlying science. Cost benefit analyses (CBA) and life cycle assessment (LCA), for example, are heavily conditioned by assumptions, and assessors are often not completely honest or are ignorant about the quality of the science they make use of. In addition the intrinsic uncertainties of some aspects of science are not well appreciated. Honesty is essential in the IA process - scientists and assessors have to be honest about what we know, what we do not know, and the level of certainty. We have to understand the limits of our own understanding.

Dominic raised three questions:

1. How integrated should we be thinking?

Ideally there should be a completely integrated model looking more broadly than just at the environmental impacts.

2. What do we mean by 'assessment'?

Qualitative, quantitative or both? There are also process issues such as how do you involve people and when? For example, involvement could be at the beginning to influence the process at the start, or at the end to get views. It is generally better to involve people sooner rather than later, but it depends on whether decisions are at a local, national or EU level.

3. Assessing what?

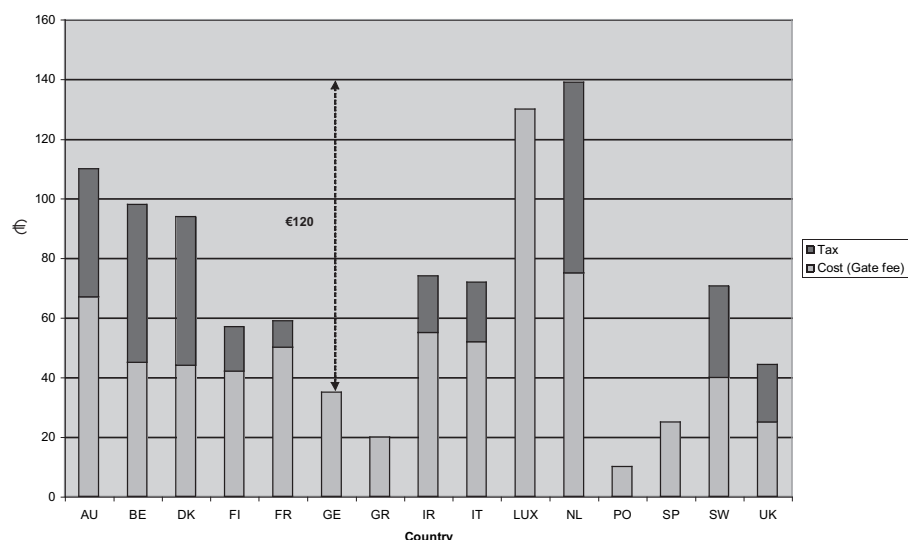
Where are we going? The more strategic and further in time you are looking ahead, the less emphasis that should be placed on the quantitative. It is not possible to use static analysis to inform the 'place' we want to be.

There are many different approaches used in environmental assessment. However, most of the literature relating to waste tends to focus on CBA and LCA. Dominic then provided a critique of these two assessment tools.

Life cycle analysis – There are significant constraints to this tool. In theory, he explained, it can cover all the flows of materials and pollutants, and it can illustrate the range of potential impacts. But, unless there is an inventory for all parts of the system, one is likely to bias the assessment to where there are data. It is also a static assessment, with no sensitivity to time or concentrations. The argument that LCA should be done at a local level collapses here. The discount rates we choose affect the levels we predict in the future, for example, landfill emissions occur over time; whereas with incineration emissions occur immediately. There is a need to take into account the fact that events are not static. Weightings are almost universally regarded as not credible. There is no assessment of disamenity or habitat loss, and no mechanisms for trade-offs. Dominic welcomed the IFEU assessment which did not give you the answer, but presented a visual picture of potential impacts.

Cost benefit analysis - If you are able to convert impacts to monetary terms, a strength of this tool is that it provides a mechanism for trade-offs. You are able to capture disamenity and habitat effects, although they are rarely included. A weakness however is that the science is uncertain and the methodology used is subject to debate, and economists are not good at recognising this. Costs are variable and are not always well understood. What is truly external? It is also important to be careful not to double count. For example, there is huge variation in the cost of landfill, and underlying this is the variation in the level of taxation applied (see table 1). The EU-25 have radically different relative costs of labour etc, so it is not possible to apply a CBA methodology developed within the EU-15 to the new Member States, for example.

Table 1: Variations in the level of landfill taxes in EU Member States (circa 2000)



Overall, analyses vary enormously in quality:

- assumptions are critical but sometimes not transparent;
- data are not always readily available;
- some manipulate assumptions – scoping to deliver the desired outcomes; and
- a tendency in waste to focus on treatment systems rather than collection.

The question of ‘what is best’ is very difficult, so there are wide variations in the result, for example between the Commission, NGOs and industry.

Dominic considered that good tools to assessment of waste issues need to address the following issues:

- Short term/long term time horizon
- Single process or complex system?
- What is the political context?
- Local/regional/national/EU level?
- Role of citizens (local/NGOs)
- Understanding the dynamics in strategic policy, eg Lisbon agenda.
- Dialectical reasoning/understanding
- Coherence across policy, eg distinction between the objectives of energy and waste and resources.

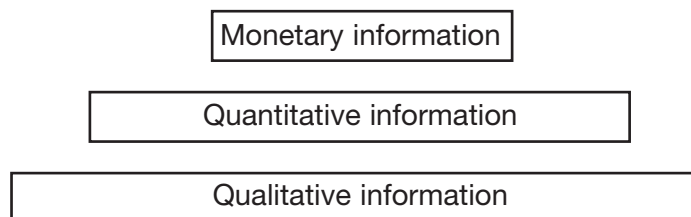
He suggested that one could map the tool used to the type of process being dealt with. However, none of these are relevant for long-term analysis – *what can we use for the long term?*

Dominic concluded by reiterating what he considered to be the main issues:

- The weighting of qualitative versus quantitative information.
- The level at which assessments are carried out.
- Timescales.

3.3 Responses to the presentations

Patrick ten Brink made a number of points in relation to the opening presentations. With assessments there is a pyramid of information, starting at the bottom with all of the qualitative information. Above this, there is a smaller layer of the information which can be quantified; and above this an even smaller layer the information which, of the quantitative information available, can be monetised.



The best understanding is at the bottom layer. By focusing on only that information which is monetised, one is only using a small amount of the knowledge available. The focus on impacts that are quantifiable in monetary terms also needs to bear in mind that economic costs are often static.

Also in relation to presentation one, it is good to see a reference to compliance. IAs to date assume compliance, but that is often not the case.

Thomas Bernheim commented that it is easier to estimate costs rather than benefits. It is not correct just to base a CBA on costs, however, as one has to look at other impacts and those that cannot be quantified. The Commission encourages the units to go as far as possible towards monetising, but one has to make sure that one always go back and look at the bigger picture and other data.

4. Working Group 1

How ‘Integrated’ can Assessments be for Waste Policy Management Purposes?

At the end of day one the plenary was divided into groups A and B for the discussions in Working Group 1. Both groups discussed the same question - *How ‘Integrated’ can Assessments be for Waste Policy Management Purposes?* Feedback from the Working Groups was provided on the morning of day two.

4.1 Feedback from Group A

Chair: Andrew Farmer

Rapporteur: Claire Monkhouse

The Working Group started by thinking about the issue of ‘knowing what we know, knowing what we don’t know, but not knowing what we don’t know’. There is also a need to make a distinction between what is quantifiable and what is not, and of that, what can be monetised.

The different levels at which IA can be applied were considered. For example, one participant gave the example of how it is difficult to apply a high level strategy (EU/national) at a regional level. Problems arise due to a lack of good quality data at the regional level, differences in opinion at the regional level on the best approaches, and difficulties of implementing scientific methodologies in practice at a smaller level.

The group considered the problem of data at the EU level. Issues raised included the difficulties and differences in quantifying waste generation, variability in how data are collected, and even how ‘waste’ is defined. This makes it difficult to get a clear picture of the situation at the EU level as the inconsistencies are aggregated.

Finally, the group considered the importance of the political aspect of decision making, irrespective of how much we talk about improving tools. It considered that the role of the scientific community was not to give a 'number' or 'answer' – the latter is the job of politicians. There is a need to look outside of models and balance decisions with things that are non-quantifiable, for example the participative approach. Consultation was considered to be important, irrespective of what type of analysis is being used. This should take place early in the policy development process, and there is a need for policy makers to have an open mind. It was noted that a participatory approach could result in decisions that are counter to what a tool would show, and the need to balance information in reaching the right decision.

4.2 Feedback from Group B

Chair: Ben Shaw

Rapporteur: Peter Hjerp

The working groups represented a microcosm of the debate that is, or will be, involved in the development of waste policy, and indicated the range of perspectives that will typically be brought to the debate. These are not necessarily in conflict but it highlighted that different groups will have different expectations and interests in the process and its outcome, which need to be managed carefully in terms of level and timing of involvement.

The group broadly agreed with Thomas Bernheim's 'common sense questions' for policy appraisal which were given in the first session, namely: What is the problem? What are your objectives? What are the policy options? What impacts do they have? Which is the best way forward? However, while the principles are useful the actual practice is more tricky.

The group considered the range of different assessment methodologies including sustainability impact assessment, strategic environmental assessment and environmental impact assessment and the hierarchy these form from large to small scale applications. The tools that could be used to inform these approaches were also considered including: LCA, CBA, input/output analysis, sectoral analysis, environmental risk assessment, substance analysis, safety and risk assessment. A start was made on matching assessment approaches to assessment tools, but time prevented a full consideration of the approaches and most appropriate tools for conducting these. However, some useful general points emerged from the discussion:

- **The process used for IEA is important** - An IEA requires more than the commissioning of one or a series of different assessment methodologies. The process within which these tools are used is just as important. The assumptions used in the process need to be made explicit. It must be clear when and why different people are, and can be, involved in the process. One aim of IEA was suggested as being the process of making accountable, transparent and repeatable evaluation of policy decisions.

- **Issues around problem setting** - The processes by which policy problems are agreed was considered possibly to be problematic. How are problems identified and agreed as shared objectives of policy? Is this a technical process or a political process and how are resources allocated to it? And when should different stakeholders be involved in the process of agreeing these?
- **Toolbox approach** - Following the exercise of linking assessment methodologies and tools to inform them it was felt that a toolbox of assessment tools could be useful. The intention of this would be to make policy-makers aware of the range of tools available and also their strengths and weaknesses. One important tool that it was felt was not given enough attention in discussion was the role of scenarios. These are an important tool for developing future policy options but lots of issues are raised by how they are undertaken.

The problems with some of the models used by experts was also highlighted. Not only are some models not easily understandable by non-experts but there may not even be a consensus amongst experts as to how the models work and should be used.

- **Timescales** - The timescale for which the assessment is being used will have big implications for the tools used and this is often the cause of conflict in policy debate. A simplistic characterisation of the debate portrays government and industry working to short-term timescales, as they have to deal with the waste produced by the economy now. However, NGOs and academics are thinking about much longer timescale transformation processes. But this is not always made explicit in policy debates meaning different sectors talk across one another as they have different objectives in mind.

Other issues highlighted as important were:

- How does IEA cover all three pillars of sustainable development?
- Relationship of assessment methodologies to political process?

So in answer to the workshop question '*How integrated can assessment be?*' potentially they could be very integrated. However, practically it will be a challenge as waste and resources is a complicated agenda in technical, policy and political terms. The development and application of the IEA approach could be potentially helpful as it could make explicit many of the assumptions that underlie policy development, at a range of levels from the European to local.

4.3 Responses to the Working Group feedback

Claire Monkhouse chaired the second day of the workshop. She commented that it was interesting that many common points were raised by both Working Groups, for example on

the need for transparency in the earlier stages of the decision making process, so there is more understanding about why certain decisions are made; and on the importance of stakeholder participation. Both groups talked about a 'toolbox' and the need for clearer understanding of the different approaches. Both also outlined the challenge of the interaction between assessment processes and political processes.

Niels Dengsoe, speaking from the supply side of tools, made a comment that if you are basing policy on science, it is not always going to be transparent and easy for everyone to understand. In some cases the assessments have become so complicated that not even those involved in the assessments can fully understand them.

Dominic Hogg asked the question whether we are back to square one? What is it that we cannot quantify or put a monetary value on – what is it that we do not currently include and that could make a difference?

5 Session 2

Using IEA to Inform Waste Policy Development

5.1 Presentation by Niels Dengsoe - The Integration of Life Cycle Assessment and Economic Analysis to Inform Waste Policy

Niels Dengsoe, from the National Environmental Research Institute (NERI) in Denmark, gave a presentation looking at the integration of life cycle assessment and economic analyses to inform waste policy. Niels started his presentation with a few comments on the aspects of quantitative/qualitative information. He felt that most of the issues can be quantified and that sometimes a decision is needed, not just more research.

He used the ExternE (Externalities of Energy) project as an example of an LCA done for a whole system. The ExternE project started in 1991 as the European part of a collaboration with US Department of Energy in the "EC/US Fuel Cycles Study". Successful collaboration at that time produced a workable methodology for detailed quantification of the external costs of fuel cycles. The guiding principles in the development of the ExternE methodology were transparency, consistency comprehensiveness.

The Commission's 'Benefit Tables' (BETA) have derived from the method developed in ExternE. BETA is used by the Danish Ministry for the Environment for the estimation of externalities.

Then Niels looked at the similarities/differences between cost benefit analysis (CBA), cost effectiveness analysis (CEA) and life cycle analysis (LCA).

The nature of these tools could be highlighted by the following questions:

- LCA - What is best for the environment?
- CEA - What is the cheapest way of doing it?
- CBA - Is it worth doing?

In comparing these tools Niels first looked at the definition of boundaries in the analysis. The LCA is based on the ISO 14000 standards but CBA has no clear rules. In terms of boundaries it is not evident what counts when calculating costs and benefits. For instance in Denmark CBA covers the externalities from emissions only within its national borders.

Cost benefit analysis deals with discounting whereas life-cycle assessment does not. As an example the Danish Ministry for the Environment uses a discount rate of between one and five percent, with the norm being three percent (the Commission uses four percent). The uncertainties surrounding the outcomes are then addressed by using sensitivity analysis by changing key parameters and seeing how it affects the outcomes. If one does not agree on CBA, one can use Cost Effectiveness Analysis.

There is also potential to create a 'super tool' that would combine the LCA-EVA (Economic Value Added)/CEA/CBA approach. The limitations of such an approach would be the costs (time and money), uncertainties and the complexity. Therefore it is more realistic to aim for a sequential or combined use of existing tools. For example it would be possible to start with LCA and then continue with CBA.

Overall, Neils concluded:

- IA can not replace the decision making process, it is just a tool to inform.
- There is possibly a need for a sustainability assessment tool
- The issue of different rates of discounting needs to be addressed.

5.2 Presentation by Derk Loorbach: Transitions in Waste Policies in the Netherlands and Flanders

Derk Loorbach, from the Dutch Research Institute For Transitions (DRIFT), Erasmus University, Rotterdam, looked into the institutional/societal aspects of waste policy based on the transition concept. The transition concept is a tool for analysing the system dynamics, which are influenced by complexities. These complexities define the framework within which policies develop and are divided into three levels:

- Societal complexity (risk society, internationalisation, technological development, economic and political integration)
- New type of problems (multi-level and multi-actor problems - mobility, energy supply, use of natural resources, education, health care)
- Complexity of governance (ambiguous goals, various stakes and interests).

Therefore a complex policy issue, such as waste policy, tends to be perceived as a complex system of different interacting components. In order to analyse this system three levels are used; the macro-level, the meso-level and the micro-level.

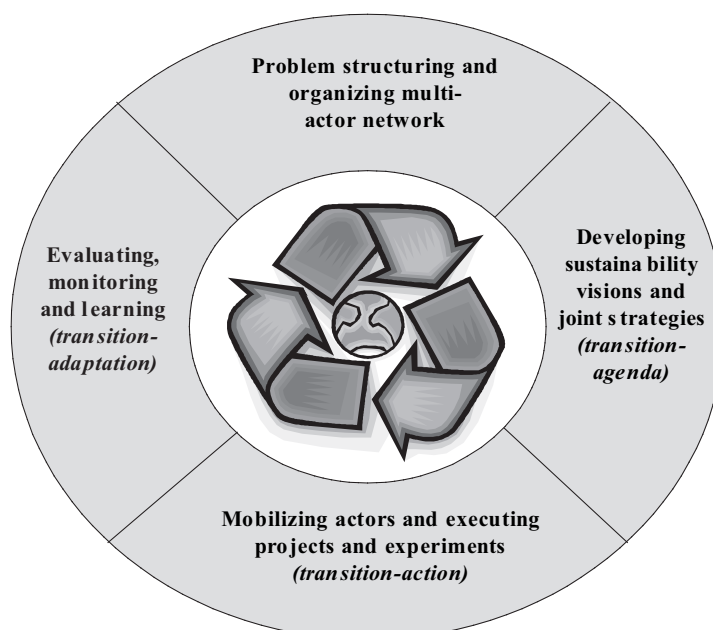
The 'highest' level is the macro-level, which covers political trends/landscapes, which are quite stable and difficult to change. This macro level is in interaction with the 'lower' meso-level, covering the regime structures and institutions and can be influenced. The meso-level in turn interacts with the 'lowest' micro-level, which consists of niches and individuals. Therefore the societal development moves from the pre-development of the micro-level to the stabilisation of the macro-level with most of the societal change happening within the meso-level.

The transition concept as an IA-method consists of:

- Integration in three dimensions
 - multi phase (long-term v short term)
 - multi-level (different levels of scale)
 - transition management (different disciplines)
- Application on societal systems (interaction between theory and practice)
- Explicitly linked to normative goal-setting (link to traditional IA themes)
- Participatory approach (construction of reality and objectivity within system boundaries and problem structuring).

The transition management process is shown by figure 1. It describes the cyclical/interactive nature of the process, starting from structuring the problem ('transition arena') to the evaluation and learning ('transition adaption') and feeding back again to the transition arena.

Figure 1: Transition management process



Derk used the situation in the Netherlands and Flanders from 1970 until now as an example of waste transition. The primary drivers behind the transition were identified as economic growth, environmental awareness and technological progress. Derk also presented a table showing the development of waste policy in the Netherlands on a macro, meso and micro level in relation to the 'system state' and 'events', starting from the 70s. Table 2 shows how the perception of waste changed on a meso level from waste being waste, to waste being a problem, to waste being money and finally, to waste being a resource. It also shows how the preferred waste management options have changed during time.



System state 1970	'70s events	System state 1980	'80s events	System state 1990	'90s events	System state '00
 Trends and surprises	<ul style="list-style-type: none"> - Oil crisis - Growing environmental awareness - Economic growth 		<ul style="list-style-type: none"> - Leaking landfills - Chernobyl - Likkebaert (Dioxine scandal) - Acid rain 		<ul style="list-style-type: none"> - Rio Summit - Johannesburg summit - Liberalisation - Ict (logistics) 	
 National environmental events	<ul style="list-style-type: none"> - Limits to growth - DGMH (DGM, after 1982) - Foundation for Nature & Environment (SNM) - Landelijk Milieu Overleg - Lansinksladder 		<ul style="list-style-type: none"> - Ministry of VROM established - RIVM founded - <i>Our Common Future</i> - <i>Zorgen voor Morgen</i> - First National Environmental Policy Plan 		<ul style="list-style-type: none"> - National Environmental Policy Plan 2, 3, 4 (NMP2 -4) - Environmental Management Act (Wet Milieubeheer) 	
<ul style="list-style-type: none"> - waste is waste 1. landfilling 2. re-use - private transporters - local 	<ul style="list-style-type: none"> - Surface Water Pollution Act - Emergency Memorandum on Environmental Hygiene - Stichting Verpakking and Milieu (SVM) - Air Pollution Act - <i>Avalstofwet</i> (1976) 	<ul style="list-style-type: none"> - waste is a problem 1. landfilling 2. re-use 3. prevention 4. incineration - government transporters - regional 	<ul style="list-style-type: none"> - Joint Declaration and Code of Conduct on Drink Containers - Motie Lansink becomes law - Code of Conduct PET bottles - Prevention and Recycling of Waste Materials Memorandum - Guidelines for Incineration 	<ul style="list-style-type: none"> - Waste is money 1. Re-use 2. Landfilling 3. incineration 4. prevention - Private transporters - Enforcement by waste authorities - national 	<ul style="list-style-type: none"> - Aval Overleg Orgaan (AOO) - Packaging Covenant - Vereniging van Afvalwerkers (VAV) - Advies comm. toekorg. afvalwstruct. - Pack. Covenant II - Removal Contribution - LAP - GIBA/GIHA 	<ul style="list-style-type: none"> - Waste is resource 1. Re-use 3. Incineration 4. Prevention 5. Landfilling - Public transporters - (international)
	<ul style="list-style-type: none"> - Recycling initiatives - development of incineration technology? 		<ul style="list-style-type: none"> - Recycling experiments - Public awareness campaigns - GIBA/GIHA experiments - Filters for incineration 		<ul style="list-style-type: none"> - Diffiar projects 	

Table 2: Multi-level Mapping of the transition in the Dutch Waste sector

When looking into the future of waste policy Derk identified the following areas, which are likely to influence the waste policy agenda:

- Dynamics towards European market with evolutionary convergence of national systems;
- Sustainability, moving from waste to resource policies;
- Policy integration; and
- Need for innovation agenda and strategy.

Derk concluded that the societal complexity requires new forms of analysis and governance. The transition concept as an IA method would provide an integrated systems analysis approach to waste policy and a framework for experimenting with new or mixed forms of governance.

5.2 Responses to the presentations

Dominic Hogg asked a question regarding timescales and the uncertainty associated with the future, and the fact that we have a static vision. **Derk Loorbach** responded by explaining that the transition concept is about structuring the debate, not trying to quantify everything in minute detail, but problem structuring and vision analysis. It is a more qualitative approach.

Gudrun Wasserman added that qualitative input is important when looking at the longer term, as a way of developing the 'story lines' and modelling can then be used to explore different scenarios.

Derk Loorbach responded by saying that you cannot do CBA of a 'vision' as there are so many options, but in between there are many transition pathways, and you can do CBA at those levels. These also need to be linked to progress and changed accordingly. For example, in agriculture change is triggered by problems such as animal health, water management issues etc. Transition management would try to prevent crises occurring.

6 Session 3

Latest Developments - Applying Extended Impact Assessment to EU Waste Policy

6.1 Presentation by Christopher Allen: Progress in the Extended Impact Assessment of the Thematic Strategy on the Prevention and Recycling of Waste

Christopher Allen, from DG Environment, outlined the current state of the extended impact assessment of the Thematic Strategy on the Prevention and Recycling of Waste. So far there have been five expert meetings, three Member State meetings and two stakeholder feedback meetings. The outcome of the 12-week extended impact assessment consultation attracted 90 contributions from industry (European organisations, national organisations and individual companies), environmental and social NGOs, local and regional authorities and individuals. The consultation provided useful input despite some being quite subjective and having a strong focus on economic aspects. He also highlighted the need to connect the technical with the political.

The Commission Working Paper SEC(2004)1377 describes the extended impact assessment approach for major policy proposals and a number of principles based on transparency and proportionality, and concentrating on the main impacts and the three pillars of sustainability. The aim of the new concept of the roadmaps is to connect the technical with the political.

Christopher also described the current policy context influencing the Thematic Strategy:

- Resources strategy – focus on environmental impacts, rather than resource scarcity.
- Integrated Product Policy (IPP) – check that waste actions are not creating environmental issues elsewhere in the life cycle.
- Sustainable Development Strategy – reduce waste without hindering growth.
- General waste policies – focus on implementation, and the four planks of the waste Thematic Strategy.

Christopher presented the following diagram of the material flows in EU-15 in terms of resource use and waste.

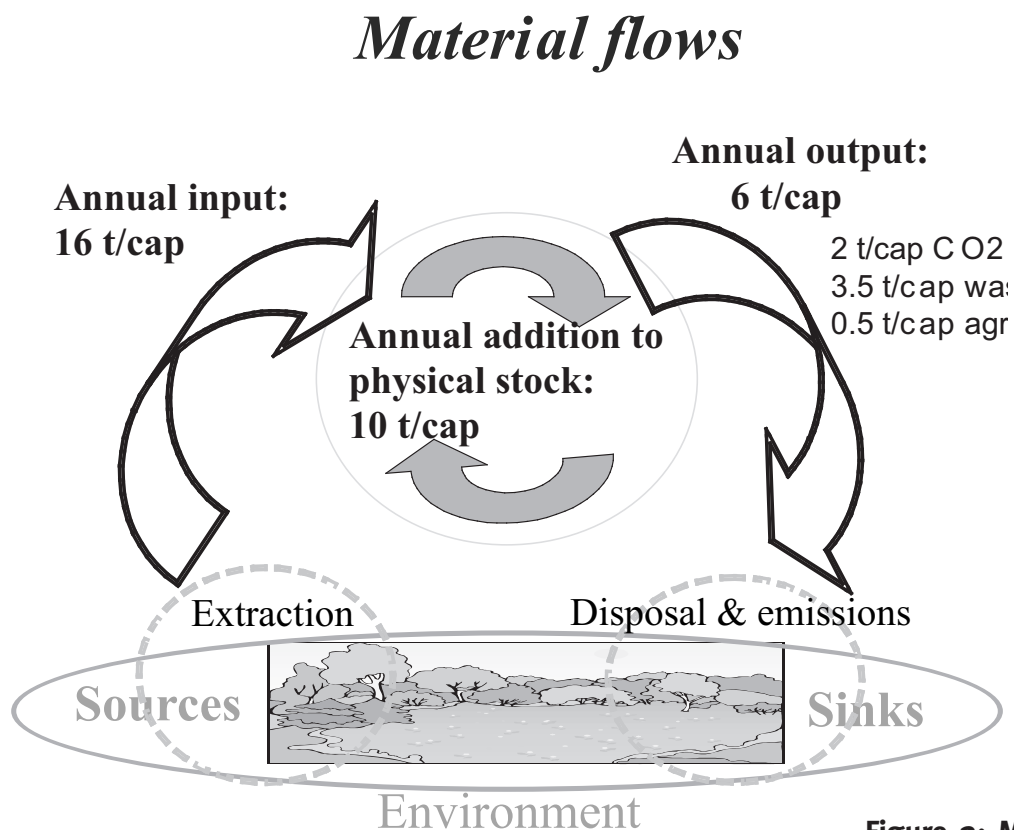


Figure 2: Material flows in the EU-15

The main issues that the Strategy will tackle are:

- The opportunities available to reduce waste through prevention and recycling;
- The overall environmental impacts of the use of resources;
- The undesirable environmental and internal market impacts associated with the environmental standards of waste treatment activities; and
- The potentially undesirable economic, environmental and social impacts of the current complex regulatory environment set by Community waste law.

The overall objective is to have a European waste policy target, in a proportionate manner, by firmly basing it on life cycle thinking. Christopher also wondered how the implementation of the Strategic Environmental Assessment (SEA) Directive will influence waste plans and the potential of SEA to 'pull up' LCAs.

Christopher was also interested to find out what type of parameters cannot be measured and issues surrounding the quality of data.

6.2 Responses to the presentation

Derk Loorback asked about the role of prevention in the thematic strategy. Christopher pointed out that there are political constraints involved and it is quite difficult to know if one ought to concentrate on waste or prevention but there would be cooperation with the Thematic Strategy on resource use.

Jiri Hrebicek mentioned that the EEA Topic Centre has been working on waste prevention indicators.

Dominic Hogg raised his concerns of using LCA in the Thematic Strategy when the timescale of the strategy is so far in the future.

Niels Dengsoe was also of the opinion that LCA is not a suitable tool for an assessment covering all 25 Member States.

7 Working Group 2

Opportunities and Barriers in Applying IEA to Waste Policy

The plenary was divided into two groups for Working Group two. The Working Groups were changed from the previous day to encourage more diversity in discussions and facilitate networking with a different group of people. The Working Groups both addressed the following questions:

- What are the opportunities and barriers in applying IEA to waste policy?
- What can we not quantify? What are we not measuring? Would it change the results if we were quantifying everything?
- How can we 'measure', stimulate, organise innovation dynamics

7.1 Feedback from Group A

Chair: Derk Loorbach

Rapporteur: Claire Monkhouse

The key points of the discussion were:

1. LCA/Assessment methods are historically biased as they are based on historic data. A critical issue is how this affects the taking into account of innovation dynamics, strategies, visions, etc. and taking 'spill-overs' into account.
2. There are many uncertainties and these need to be made explicit for any assessment tool. Data and assessments are not the solution.
3. Time dimension – do we need different tools and processes to tackle short term, medium term and long term policy questions? How can these be linked up?
4. Potential for predetermining outcomes – based on who does the assessment and what their perspective is, who it is funded by, who is on any Steering Group, etc. This needs to be acknowledged.
5. Transparency – there is a need for transparency at all levels, for the assessments themselves and in the decision making process.

Overall, there is a need for transparency, experimentation, learning and development.

7.2 Feedback from Group B

Chair: Andrew Farmer

Rapporteur: Peter Hjerp

Much of the discussions were linked to the Thematic Strategy - what parameters ought to be included and what cannot be measured. There was a consensus that secondary impacts of waste policy can be difficult to measure, such as on biodiversity. In addition the assessment tools used for evaluating biodiversity do not work well.

There were also hopes that SEA would provide a framework for future development of waste plans and programmes. Some saw the lack of objectives within the SEA procedure and its procedural nature as a problem and were hoping that the SEA procedure would have more specific requirements. However it was also recognised that the procedural aspect of SEA makes it easy to combine with more specific assessment tools as well as adapting well to different institutional frameworks.

The role of prevention was linked to education and cultural issues. It was noted that in Sweden, for example, most of the emphasis is on recycling/prevention.

8 Workshop Summary and Conclusions

Dominic Hogg summarised what he considered to be a very interesting day and a half, during which we tried to examine how policy makers arrive at the objectives that are set, and thought about how much we can rely on tools or judgement when developing policy.

He made an interesting comparison to ancient Greece, where they would not have had all the tools we have today, but progressed on the basis of applying a degree of wisdom. More recently there has been a danger of moving to a situation where everything has to be quantified to be taken into consideration, and losing the use of wisdom in decision making. He felt happy that the workshop had indicated that this is now not the case, and that wisdom is coming back – tools are not all that there is and it is acknowledged that not everything is quantifiable. The challenge is how all the information is presented to policy makers.

The dynamics of time is an important question. The tenure of politicians mitigates against taking a longer-term view; whereas at a local level waste management contracts can be over long time periods, for example 25 years in the case of the UK. It has been commented that there is a need to take different approaches to the different time scales, recognising the merits and shortfalls of the different tools.

There has been wide agreement on the fact that stakeholders need to be involved in the decision making process, and the earlier this happens the better.

Finally, of relevance to EFIEA, is the question of looking at how science can inform policy better. One can have the same data but it is possible for different people to put a different ‘spin’ on them. The scientific community is not homogenous. There is a challenge in how you deal with these different perspectives.

Participants gave positive feedback about the workshop, and felt that there had been very interesting presentations and discussions within the Working Groups, and more informally during breaks. There was support for the group convening at some point in the future, to take forward the progress made at the workshop, and to build on the new networks that have been created. There was also support for a revision of the original IEEP scoping paper, and for it to be updated on a regular basis so that it remains a useful source of information on impact assessment and waste policy.

Annex 1

Workshop Programme



Improving Waste Policy Through Integrated Assessment

Scotland House, Brussels
6 - 7 December 2004

Programme

Day One

13.15-13.45 **Registration**

13.45-14.00 **Welcome and Introduction to Workshop**
Patrick ten Brink
IEEP

Session 1: ***Introduction to Integrated Environmental Assessment (IEA) and its Application to Waste Policy***

14.00-14.30 **IA as an assessment tool - the European Commission's Impact Assessment Procedure**
Thomas Bernheim
DG Environment

14.30-15.00 **IEA Tools and Waste Policy- an Overview**
Dr Dominic Hogg
Eunomia Research & Consulting Ltd, UK

15.00-15.15 **Questions and Answers**

15.15 –15.30 **Introduction to Working Groups**

15.30-15.45 **Coffee**

15.45-17.15 **Working Groups: How 'Integrated' can Assessments be for Waste Policy Management Purposes?**

Day Two

9.30-10.00 **Welcome and Feedback from the Working Groups**

Claire Monkhouse
IEEP

Session 2: ***Using IEA to Inform Waste Policy Development***

10.00-10.30 **The Integration of Life Cycle Assessment and Economic Analysis to Inform Waste Policy**

Niels Dengsoe
National Environmental Research Institute (NERI), Denmark

10.30-11.00 **Transitions in Waste Policies in the Netherlands and Flanders**

Derk Loorbach
Dutch Research Institute For Transitions (DRIFT), Erasmus University, Rotterdam

11.15-11.30 **Questions and Answers**

11.30-11.45 **Coffee**

Session 3: ***Latest Developments - Applying Extended Impact Assessment to EU Waste Policy***

11.45-12.15 **Progress in the Extended Impact Assessment of the Thematic Strategy on the Prevention and Recycling of Waste**

Christopher Allen
DG Environment

12.15-12.35 **Questions and Answers**

12.35-12.45 **Introduction to Working Groups**

12.45-13.45 **Lunch**

13.45-15.15 **Working Groups: Opportunities and Barriers in Applying IEA to Waste Policy**

15.15-15.30 **Coffee**

15.30-16.00 **Feedback from the Working Groups**

16.00-16.30 **Summary and Conclusions**

Annex 2

Attendees

Christopher Allen	DG Environment
Neil Allison	DEFRA
Thomas Bernheim	DG Environment
Kirsten Berry	ERM
Intars Cakars	Latvian Ministry of Environment
Grazia Cioci	EEB
Clare Coghill	Parliamentary Sustainable Waste Group, UK
Karina De Beule	Flemish Waste Agency, Ovam
Emilia Den Boer	Technische Universität Darmstadt
Niels Dengsoe	NERI and Aarhus University
Andrew Farmer	IEEP
Jurgen Giegrich	IFEU
Peter Hjerp	IEEP
Dominic Hogg	Eunomia Research and Consulting
Jiri Hrebicek	NRC Czech Republic
Maria Kekki	IEEP
Derk Loorbach	ICIS
Simon Lundeborg	Swedish EPA
Pendo Maro	EEB
Claire Monkhouse	IEEP
Jose Potting	Netherlands
Suvi Runsten	Finnish Environment Institute
Ben Shaw	Green Alliance
Wolfgang Stark	GUA
Walter Tempst	Flemish Waste Agency, Ovam
Patrick ten Brink	IEEP
Gudrun Wasserman	University of Natural Resources, Vienna

Annex 3

Steering Group members

Dr Peter Beyer

Attorney/Senior Researcher

Ecologic - Institute for International and European Environmental Policy, Germany

Dr Andrew Farmer

Senior Fellow, IEEP

Dr Dominic Hogg,

Director

Eunomia Research & Consulting Ltd, UK

Birgit Munck-Kampmann

Director

European Topic Centre on Waste and Material Flows

Stephan Moll

Research Fellow

Division for Material Flows and Structural Change at the Wuppertal Institute for Climate, Environment and Energy

Graham Tombs

Head of Waste, Recycling and Environment

Essex County Council

Member of the Board of Directors of ASSURE (Association for Sustainable Use and Recovery of Resources in Europe); Policy advisor to the UK LGA

Annex 4

Applying Integrated Environmental Assessment to EU Waste Policy

A Scoping Paper for the European Forum on Integrated Environmental Assessment (EFIEA)

Claire Monkhouse & Andrew Farmer

May 2003

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1. Introduction

The purpose of the paper is to identify in what ways integrated environmental assessment (IEA) might be usefully applied to inform the future development of waste policy. In so doing it assesses the current situation in EU waste policy, looking at issues associated with waste generation, existing legislation and initiatives, and the strategic policy questions being raised.

It brings together current thinking on waste management, drawing on the experience of various actors within Member States and at the EU level. In particular, input was sought from a number of institutions known to be working in this area, such as: the European Environment Agency Topic Centre on Waste (EEA/TCW); National Environment Ministries; the European Environment Bureau (EEB); Green Alliance; the Finnish Environment Institute (SYKE); Eunomia Research & Consulting Ltd; Friends of the Earth; Waste Watch; Umweltbundesamt, Berlin; the Center for Energy and Environmental Studies (IVEM, Netherlands); the Wuppertal Institute, KPMG; the National Centre for Business and Sustainability (UK); and of course the European Commission. This list wide-ranging but probably incomplete, as undoubtedly many more individuals and institutions within Member States, Candidate Countries and elsewhere, are working on some aspect of waste policy. Several reports and comments were received, for which the author is grateful, a literature search was undertaken, and interviews were conducted with Otto Linher (European Commission) and Roberto Ferrigno (Policy Director, EEB). Nigel Haigh is also thanked for his useful comments on this paper.

In order to establish whether IEA may have a role to play in developing future EU waste policy, it is first of all necessary to look at the issue in more detail. The paper therefore begins in section two by raising the problems associated with waste generation and disposal. In section three, this is placed within the context of existing EU policy and the limitations of this are highlighted. An overview of current developments is also provided. The discussion on integrated environmental assessment begins in section four, by providing an overview of IEA. Section five presents a summary of current research and looks at the extent to which this approach has already been applied to waste policy. In section six the opportunities for applying IEA to future policy developments is explored, and this is followed by suggestions of what the next steps could be.

The paper is one of four papers recently commissioned under the second phase of the European Forum for Integrated Environmental Assessment (EFIEA).

2. Why is there a need to look at waste policy?

2.1 Waste generation in the EU

The EU generates approximately 1300 million tonnes of waste per year¹. Construction and demolition make up more than half of this total, with municipal, mining and waste from other sources contributing about one sixth of the total each. It was estimated that in 1995 waste generation amounted to 3.5 tonnes of solid waste (excluding agricultural waste) per capita, and this figure is set to increase (EEA, 1999). According to the EEA (1999²), between 1990 and 1995 total waste generation in the EU and EFTA increased by almost 10%, while economic growth was approximately 6.5%.

Despite limitations in data, the EEA (1999) has predicted that most waste streams would increase over the next decade, so much so that by 2010 the generation of paper and cardboard, glass and plastic waste will increase by between forty to sixty percent compared to 1990 levels. Sewage sludge, electrical and electronic waste and end of life vehicles are other waste streams where substantial increases are expected.

The hazardous content of waste is also a problem as products become more sophisticated and technologically intensive. It is estimated that EEA member countries generate around 36 million tonnes of hazardous waste per year (OECD, 1997³). However, any figures are not totally clear due to differences in the definition of hazardous waste in Member States. This situation should be improved by the introduction of the hazardous waste list in the European Waste Catalogue, which establishes common classifications for hazardous waste in the EU, and the new waste statistics Regulation (2150/2002).

At the same time, the negative externalities of existing waste treatment options are being realised (see table 1), and there is a continued desire to divert waste away from landfill. According to the waste hierarchy, landfill is the least preferred waste disposal option, but it still remains the most common form of disposal. Two-thirds of total European municipal waste is landfilled, and the amount continues to increase despite rising levels of recycling and other more preferable options, due to the volume of waste being generated⁴.

The enlargement of the EU to include ten new Member States in 2004 adds another dimension to the problem. With anticipated higher levels of economic growth in the new Member States post enlargement, a significant increase in waste generation can be expected. According to EEA estimates, if quantities reach the average amount per capita for the EU, the total amount of municipal waste in these countries will increase by 50 percent from 34 million tonnes in 1995 to 53 million tonnes in 2010⁵.

Overall, 'the current situation cannot continue. Waste is now not only a danger to our environment. It is increasingly a threat to human health and our way of life' (European Commission, 1999⁶).

2.2 Decoupling waste and economic growth

At the Lisbon European Council in March 1999, it was decided that 3% economic growth per annum was a sustainable level, and that the EU should seek to maintain this. However, there is a question of whether the environment has the carrying capacity to support this level of growth. Waste generation is greatly influenced by how efficiently resources are used in production and by the quantities of goods produced and consumed. There is a strong link between GDP and waste generation. The decoupling of resource use and waste generation from economic growth is clearly required, particularly as less developed countries develop further.

According to the EEA (Environmental Signals, 2002), we are already moving in the right direction towards meeting this objective. It reported that the use of natural resources has remained relatively constant since 1980, at around 51-52 tonnes per capita, whilst at the same time there was growth in GDP. Therefore, there has been a relative decoupling of resource use and waste generation from economic growth already. This view is also supported by the *Zero study*⁷, which found that there has been a relative decoupling of economic growth from resource consumption, implying that market conditions already favour resource efficient production to some degree.

However, there is no absolute decline in the volume of the EU's total resource requirements, which implies that the environmental burden related to resource use and therefore waste generation remains constantly high. Consequently the need to focus attention on reducing resource use and waste reduction, and choosing the least environmentally damaging waste treatment options is of great significance.

2.3 The environmental consequences of waste

The environmental consequences of waste range from issues associated with depleting finite natural resources and energy, to the environmental impacts of different waste disposal options (see Table 1). The impacts of waste will also depend on the quantity generated and its characteristics, ie whether it has hazardous components and represents a risk to human health or the environment. It is usually the case that waste with higher environmental impacts per tonne is found in smaller quantities, and is therefore more difficult to separate and collect. Examples include hazardous chemicals, pesticides, solvents and heavy metals⁸.

We can also look beyond the direct environmental consequences to considering the wider impacts, for example the climate change implications of different disposal options, or the implications of waste transportation. For example, due to the increasing quantities of waste being generated, the transport of waste represents a significant proportion of total transport. In France, waste accounted for fifteen percent of total weight of freight in 1993 and five percent of the total transport sector energy consumption (Ripert, 1997⁹). Transportation of waste has a number of associated environmental impacts, such as emissions to air of dust, SO₂ and NO_x; the risk of contamination of water, soil and ecosystems from accidental spills; and the risk to human health from accidental spills of hazardous substances.

	Landfill	Composting	Incineration	Recycling
Air	Emission of CH ₄ , CO ₂ ; odours	Emission of CH ₄ , CO ₂ ; odours	Emission of SO ₂ , NO _x , HC ₁ , HF, NMVOC, CO, CO ₂ , N ₂ O, dioxins, dibenzofurans, heavy metals (Zn, Pb, Cu, As)	Emission of dust
Water	Leaching of salts, heavy metals, biodegradable and persistent organics to groundwater		Deposition of hazardous substances on surface water	Waste water discharges
Soil	Accumulation of hazardous substances in soil		Landfilling of slags, fly ash and scrap	Landfilling of final residues
Landscape	Soil occupancy; restriction on other land uses	Soil occupancy; restriction on other land uses	Visual intrusion; restriction on other land uses	Visual intrusion
Ecosystems	Contamination and accumulation of toxic substances in the food chain	Contamination and accumulation of toxic substances in the food chain	Contamination and accumulation of toxic substances in the food chain	
Urban areas	Exposure to hazardous substances		Exposure to hazardous substances	Noise

Table 1: Selected environmental impacts of waste treatment options¹⁰

3. Overview of EU waste policy

3.1 Existing waste policy

Before the mid-1970s, waste was largely regarded as a local matter in all Member States, and the EU had no legislation concerned with waste disposal. The adoption of the waste framework Directive in 1975 was in part a response to the introduction by some Member States of legislation intended to provide a national framework for waste policy, and sought to set out a coherent set of measures applicable in all Member States. The framework Directive was followed in the 1970s by Directives on toxic waste, PCB disposal and waste oils. In 1984 a Directive on transfrontier shipment of hazardous waste was adopted. These were all revised or replaced as EU waste policy developed further into a 'second generation' of legislation.

Annex 1, adapted from Haigh (1997¹¹), summarises the development of EU waste policy by looking at three distinct periods: 1975-85; 1986-96 and 1997 to the present day. From this it can be seen that there was a tendency in the earlier years to focus on end of pipe solutions to the problems associated with waste, for example setting emission standards for incinerators, and standards for safe disposal of oils. Since the 1990s policy has tended to focus on a more preventative approach, for example via the elimination of harmful substances in products. There has also been a marked increase in the number of policy measures using the principle of producer responsibility, which began in 1994 with the Packaging Directive. It can be seen that much of the policy to date has concentrated on particular waste streams.

In general, EU waste policy is based on four key principles:

- Prevention – reduction of waste at source
- Producer responsibility and polluter pays – those who produce waste should pay for their actions
- Precautionary principle – the potential problems should be anticipated
- Proximity principle – waste should be disposed of as near to its source as possible

The first EU waste strategy

The Commission published its first broad Communication on waste, entitled A Community Strategy for Waste Management, in September 1989 (SEC(89)934). It built on the waste management elements included in the EU's fourth action programme and outlined five guidelines: prevention, recycling and reuse, optimization of final disposal, regulation of transport and remedial action. Prevention was presented as the primary objective, to be achieved through the development of clean technologies and waste minimization. The other guidelines were envisaged as a hierarchy of next-best options – hence the term '**waste hierarchy**'.

The final section of the strategy paper considered waste management in the context of the single market, with particular regard to the movement of waste and the risk that 'in a Community without internal frontiers the flow of waste towards lower-cost disposal plants may become a flood'. Harmonizing disposal standards was seen as a priority but the Commission stated that 'the need to protect the environment may lead to a restriction of movements', favouring waste disposal 'in the nearest suitable centres, making use of the most appropriate technologies to guarantee a high level of protection for the environment and public health'. This has become known as the '**proximity principle**'.

The Council welcomed the Commission's strategy¹². It urged the further development of clean technologies and products and invited the Commission to bring forward a range of proposals. It also reinforced the strategy paper's bias in favour of minimizing movements of waste (the proximity principle), reducing the quantity and toxicity of waste for landfill and developing an 'adequate and integrated network of disposal facilities'.

The priorities in the strategy paper and Resolution were reflected in the strengthened waste framework Directive 91/156, which placed a new obligation on Member States to establish a network of disposal installations with the aim of self-sufficiency in waste disposal.

The waste framework Directive

Directive 91/156 placed general duties on Member States, to take measures to:

- encourage the prevention or reduction of waste production and its harmfulness, particularly through the development of clean technologies, techniques for the final disposal of dangerous substances in waste

- destined for recovery, and the development and marketing of products designed to have minimal environmental impact by nature of their manufacture, use or final disposal (Article 3.1);
- encourage the recovery of waste, including recycling, reuse or reclamation, and the use of waste as a source of energy (Article 3.1);
- ensure that waste is recovered or disposed of without endangering human health and without using processes or methods which could harm the environment, and in particular without risk to air, soil and plants and animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest. The abandonment, dumping or uncontrolled disposal of waste must be prohibited (Article 4);
- establish an integrated and adequate network of disposal installations, taking account of the best available technology not involving excessive costs. The network is to enable the Community to be self sufficient in waste disposal (Article 5).

The second EU waste strategy

Towards the end of 1995 the Commission signalled the start of a possible change in direction for waste management through a report (COM(95)522, 8.11.95) setting out its approach towards the establishment of 'a comprehensive policy to deal with all waste in the Community'. The Commission's Communication on the review of the Community's strategy for waste management was published in July 1996 (COM(96)399).

Like the previous strategy, this established a hierarchy of priorities for waste management with prevention being the preferred option, followed by increased recovery (material recovery is to be given preference over energy recovery) and then safe disposal. It was stated that the implementation of the hierarchy would be guided by the consideration of the 'best environmental solution' taking into account economic and social costs. The instruments envisaged include regulatory and economic instruments, improved statistics, waste management plans, life-cycle analysis and eco-balances.

In announcing the document, Commissioner Bjerregaard emphasized the important role producer responsibility for products must play in any future waste management strategy, and that waste management concerns should be taken into consideration from the product's design and conception. In support of this the Commission was positioned to take action to:

- promote clean technologies and products and the use of less raw materials in processes and products;
- reduce the generation of hazardous waste by limiting or banning certain heavy metals or dangerous substances in products and processes;
- promote the use of economic instruments able to influence waste prevention without distorting competition; and
- further develop the eco-audit and eco-label schemes

Priority waste streams

As part of its overall strategy, the Commission identified a number of specific waste streams to receive priority attention. The priority waste streams method seeks to bring together government, environmental and industrial interests with the aim of building a consensus before the Commission proposed legislation. Much of current waste policy stems from this programme, such as the end-of-life vehicles Directive, the WEEE Directive and the inclusion of used tyres in the landfill Directive. Outstanding priority waste streams include batteries, household hazardous waste, organic waste and PVC.

3.2 Current developments in EU waste policy

At present, waste policy is mainly being steered by the Sixth Environmental Action Programme¹³ (Sixth EAP). This identified natural resources and waste as one of the four environmental priorities of the ten-year Programme:

'better resource efficiency and resource and waste management to bring about more sustainable production and consumption patterns, thereby decoupling the use of resources and the generation of waste from the rate of economic growth and aiming to ensure that the consumption of renewable and non-renewable resources does not exceed the carrying capacity of the environment' (Article 2, paragraph 4).

This aim, as set out in Article 8 of the Decision, is to be pursued through a variety of means, including:

- Ensuring the consumption of resources and their associated impacts do not exceed the carrying

- capacity of the environment, and breaking the linkages between economic growth and resource use;
- reducing the volume of waste generated through waste prevention initiatives, better resource efficiency and a shift to more sustainable patterns of production and consumption;
- reducing the quantity of waste going to disposal and reducing the volumes of hazardous waste produced; and
- encouraging re-use.

These objectives, in part, are to be pursued in two Thematic Strategies: sustainable management and use of natural resources; and waste recycling (which has recently been expanded to include waste prevention).

The Decision states that the Thematic Strategy on waste recycling should include:

- Measures aimed at ensuring source separation, the collection and recycling of priority waste streams;
- further development of producer responsibility; and
- development and transfer of environmentally sound waste recycling and treatment technology.

The Thematic Strategy on natural resources should include:

- an estimate of materials and waste streams in the EU, including exports and imports;
- a review of the efficiency of policy measures and the impact of subsidies relating to natural resources and waste;
- establishment of goals and targets for resource efficiency and the diminished use of resources;
- promotion of extraction and production methods and techniques to encourage eco-efficiency and the sustainable use of raw materials, energy, water and other resources; and
- development and implementation of a broad range of instruments, including research, technology transfer, market-based and economic instruments, programmes of best practice and indicators of resources efficiency.

Other actions identified in Article 8 include developing and implementing measures on waste prevention and management; and developing or revising waste legislation, including measures in respect of construction and demolition waste, sewage sludge, biodegradable wastes, packaging, batteries and waste shipments. The need for clarification of the definition of waste and non-waste is also identified. These actions are to be developed in the context of Integrated Product Policy (IPP) and the Community's strategy for waste management.

Clearly the development and implementation of the Thematic Strategies represents a great opportunity for using an IEA approach to inform future waste policy developments. These have to be completed by July 2005, and are likely to provide a framework from which specific policies and measures may be proposed. It is expected that the waste recycling strategy in particular will place more focus on addressing shortcomings with existing policy and implementation, than proposing many new measures. The Commission is currently working on developing the first communications¹⁴, following which there be a consultation period. It is hoped that the White Papers will be released ahead of schedule in summer 2004.

Integrated Product Policy (IPP)

The objective of IPP is to reduce the environmental impacts from products throughout their lifecycle, including product design, processes and disposal. A leaked draft of the awaited Commission White Paper indicated that it would look at environmental problems identified in the EU Sustainable Development Strategy (SDS) and Sixth Environmental Action Programme, then focus on specific product groups and what policy instruments may be used to address these specifically.

It is thought that IPP will establish the framework conditions for continuous environmental improvement of all products throughout their life cycle, including non-legislative solutions, legislative solutions, and financial instruments, including taxes and subsidies. The leaked paper also outlined the need for IPP thinking to be integrated into policy areas other than the environment, and the Commission is to encourage individual sectors, via the Cardiff process, to be more explicit about how IPP will be integrated into their work.

Moving away from priority waste streams approach

Identifying where attention should be focused is likely to move away from the existing priority waste stream approach¹⁵. To some extent, there is a basic framework in place for the most important waste streams, although there are still some gaps. Instead, the logic may shift to looking at materials, regardless of whether these come from packaging or end of life vehicles. Targets for reuse and recycling may therefore be set for paper, plastic etc, rather than looking at these materials from different sources.

3.3 Limitations of existing EU policy

The limitations of existing waste policy have been highlighted by many observers. Those which may be seen as a potential barrier to applying IEA are discussed below, although this is by no means exhaustive. These limitations highlight areas where a more integrated approach may seek to overcome some of the barriers to sustainable waste management, for example through consistent policy messages reinforced by clearer definitions of waste and correct market signals. It also highlights where barriers exist to applying IEA, such as inadequate data.

i. The definition of waste

There are many instances where the definition of waste, and particularly the definition of treatment options, gives rise to uncertainty in implementing EU waste law. For example, when is incineration of waste classed as recovery, and when is it classed as disposal? This has been the issue raised in recent court cases. Although the European Court of Justice (ECJ) has set out criteria for establishing the difference between the two, the message remains at best inconsistent and at worst questionable (Boxes 1a and 1b). This alone threatens to undermine the EU waste hierarchy by allowing waste disposal to take place under the guise of recovery. It also, amongst other complications, affects the calculation of recovery and disposal levels and distorts data on recovery targets.

One of the most crucial implications of the difference in definition is in relation to exporting waste, not only within the EU but also to non Member States. Under the Shipment of Waste Regulations, Member States have little control over shipments of waste that are intended for recovery. If an export is for disposal, Member States can question shipments based on the principles of proximity and self-sufficiency. With recovery, however, the proximity principle does not apply.

Box 1a: Recent case law on the definition of waste - Waste or secondary material¹⁶

Case C-9/00 (Palin Granit Oy v. Vehmassalon kansanterveystyön kuntayhtymän, April 2002) concerned the granting of an environmental license by a Finnish municipal board to a company (Palin Granit) to operate a granite quarry, including a management plan for the use of leftover stone as gravel or filling material. Local courts had classified the leftover stone as waste, but this was contested by the company, who insisted that it was a reusable material, and that the area where it was kept was not a landfill but simply a storage area. The ECJ reiterated that there is no decisive test as to whether or not something is waste, and instead looked at a number of indicators. The argument that it has an economic value was not thought to be decisive, and instead the fact that it was a production residue from quarrying and processing stone was regarded as more important. The Court held that, having regard to the principle established in earlier cases that the concept of waste should be interpreted widely in order to limit its inherent risks, then 'the reasoning applicable to by-products should be confined to situations in which the reuse of the goods, materials or raw materials is not a mere possibility but a certainty, without any further processing prior to reuse and as an integral part of the production process' (para.36).

Consequently, the leftover stone is to be classified as waste and treated accordingly. This position was reiterated in the Advocate General's opinion of 10 April 2003 in response to a request from Finland for guidance on the criteria to be used (C-114/01).

Box 1b: Recent case law on the definition of waste - recovery and disposal¹⁷

The ECJ delivered two judgements regarding the definition of waste recovery on 13 February 2003. In both judgements, which were brought against Luxembourg and Germany respectively, the Court set three criteria that it says should be used to establish whether an operation is classed as an 'R1' recovery operation, as outlined in the waste framework Directive. Both cases were brought forward in the context of the 1993 waste shipments Regulation, which gives the Member State that is exporting waste greater powers to block exports if it is for disposal rather than recovery.

The German case (C228/00) concerned a blocking by German authorities of transfers of waste to Belgium for use in cement kilns as fuel. They believed that the waste should have been defined as disposal and not recovery, as indicated by the notifying party. The German Ministry upheld the position that, according to a number of criteria, the incineration could not be classed as the generation of energy, and therefore had to

be disposal. The ECJ continued to disagree with the Ministry, and stated that the criteria it had used did not comply with EU law, and that Germany had infringed provisions in the Regulation by raising unjustified objections to the transfer. Germany argued, however, that in the absence of clear criteria at the EU level, national authorities should be able to lay down their own criteria to distinguish between different operations. The ECJ ruling went against the Ministry decision, and stated that the use of waste as a fuel in cement kilns was indeed **waste recovery** in this instance.

Conversely, in the Luxembourg case (C458/00) the ECJ agreed with the authority's decision to block the export of municipal waste for incineration, agreeing that the treatment was **waste disposal**, despite the fact that there was energy recovery. The Commission had issued proceedings against Luxembourg, as it believed that it was infringing the Regulations by blocking the shipment of the waste, agreeing with the exporter that it was a recovery operation. In its decision, the ECJ found that the Commission's application was unfounded. In this instance it ruled that the 'shipment of waste in order for it to be incinerated in a processing plant designed to dispose of waste cannot be regarded as having the recovery of waste as its principal objective, even if when that waste is incinerated all or part of the heat produced by the combustion is reclaimed' (para 41) and that 'reclamation of the heat generated by the combustion constitutes only a secondary effect of an operation whose principal objective is the disposal of waste, it cannot affect the classification of that operation as a disposal operation'(para 42).

The criteria used by the ECJ were as follows:

- the operation's principal objective must be to allow the use of wastes to produce energy;
- the operation must be able to be considered effectively as 'a means of producing energy', which requires that more energy is produced than consumed and that the surplus energy is put to an effective use as heat or electricity; and
- the majority of the waste must be consumed during the operation, and the majority of energy produced recuperated and used.

The criteria used by the ECJ seem to have set the precedent, as they were again used in a judgement delivered on 3 April 2003 (Case C-116/01) against the Netherlands, concerning the issue of recovery and disposal definitions.

In these cases it was recorded that the calorific content of the waste was not a valid consideration. It was also recorded that, in the absence of EU criteria for definitions, a Member State could set its own criteria so long that it was compatible with the waste framework Directive and shipment of waste Regulation. What this means in practice remains unclear, however, considering that both the German and Netherlands criteria were said to infringe EU law.

There are several implications of permitting exports of waste for recovery operations. As waste can be shipped all over Europe with low levels of administrative effort and weak control mechanisms (Ökopol 2002¹⁸), waste producers may choose this option in preference to more costly and complicated national procedures for dealing with waste. This occurs, as demonstrated by recent case law (see Boxes 1a and 1b), in cases where the process is in fact disposal and not recovery, and should consequently have been subject to tighter controls under that definition. Incineration with recovery is in most cases cheaper than waste incineration. This is partly due to less stringent emission standards being applied to co-incineration plants, and to plants in general in non-EU countries where environmental standards are not as high. Of course, costs can also be less due to the value of the waste as a secondary material, and the substitution of virgin raw materials. There may be opportunities for IEA in helping to determine what the best practicable environmental option would be in any given case. Such an approach would also allow an exploration of questions of scale, which are highly relevant to IEA practice.

The waste incineration Directive (2000/76) covers different kinds of installations. In its general provisions it sets out the principle that *"The co-incineration of waste in plants not primarily intended to incinerate waste should not be allowed to cause higher emissions of polluting substances in that part of the exhaust gas volume resulting from such co-incineration than those permitted for dedicated incineration plants and should therefore be subject to appropriate limitations"* (General Provisions 27). However, there are special provisions for emissions from cement kilns, combustion plants and other industrial sectors co-incinerating waste, as set out in Annex II of the Directive (Ökopol, 2002).

The European Environmental Bureau (EEB), amongst others, is calling for changes in the definition of waste recovery. In a policy statement released in March 2003¹⁹, it states that current EU waste laws are unclear and 'make eco-dumping an acceptable practice'. They propose nine conditions, or criteria for credible

recovery, which include: the right for Member States to object to exports of waste for recovery; harmonising emission standards for co-incineration operations with incineration operations; minimum standards for efficiency and rate of destruction; a minimum range for calorific value of waste to be set at between 11.5 and 15MJ/kg (otherwise incineration is to be classed as disposal); and not increasing the level of hazardous substances in the product when hazardous waste is used as a recovered fuel.

The EEB argues that if such criteria were to be applied, it would prevent Member States from using incineration to meet recovery targets under several EU Directives, and make trade in waste for incineration within the EU more difficult.

ii. Lack of comprehensive, reliable and comparable data

The ability to predict trends in waste generation, to inform new policy and to assess the effectiveness of existing policy is greatly restricted by the inadequacy of available data. Statistics are usually not comparable across Member States due to differences in definition of different waste streams, differences in how data are collected and aggregated and different reporting periods. Therefore figures that we do have do not reflect a completely clear picture.

This problem has been highlighted in several studies. For example, the EEA report on hazardous waste generation in Member countries (2002²⁰) concluded that further improvement was needed to increase the comparability of data between the EEA countries. The study looked at existing data on hazardous waste in order to assess its comparability. The situation it found was that national definitions of hazardous waste were not limited to those defined on the EU Hazardous Waste List (HWL), and that different codes were probably being used for the same waste type. It was acknowledged that the requirement for Member States to implement the HWL will improve this situation, although historical data will remain a problem in tracking trends. Another shortcoming was that the source of hazardous waste is often not recorded. This inhibits the assessment of waste generation paths and hence the development of appropriate policy measures.

The problem of incomparable and inconsistent data was also highlighted by discussions at the 5th EIONET Workshop in June 2002²¹, which raised the following issues:

- Overall lack of hard data inhibits analysis of trends, comparisons of Member States and assessment of policy effectiveness.
- There is a need to verify the level of aggregation used for the collection of waste statistics, and whether this is comparable to other countries, and whether it includes the same waste streams.
- Data are often created nationally and are rarely provided to a higher level, which inhibits analysis.
- There are problems in obtaining data and information on best available technology (BAT) from small and medium sized companies (SMEs)

iii. Implementation in Member States

In the Commission's Third Annual Survey on the implementation and enforcement of EU environmental law²², it was reported that 20.6% of all open infringements are in relation to waste policy. This includes cases brought against Member States for non-communication, non-conformity and bad application. Of all cases brought for non-conformity, 29.1% were regarding waste policy, which was the largest proportion of all sectors. There was not one Member State that did not have infringement proceedings against it in relation to waste policy. This demonstrates that regardless of how much policy on waste exists, and however it is informed, implementation in Member States is critical.

Most of the implementation difficulties concerned the application of the waste framework Directive to specific installations. However, infringements were also brought regarding the landfill Directive (99/31), hazardous waste Directive (91/689), the batteries and accumulators Directive (91/157 and 93/86), the packaging Directive (94/62), the shipment of waste Regulation (259/93/EEC), the disposal of waste oils Directive (75/439), the disposal of PCBs and PCTs Directive (96/59) and the sewage sludge Directive (86/278).

It is worth noting that the implementation of waste legislation is likely to be one of the hardest areas of the environmental acquis for the new Member States after enlargement. What implications this will have for the level of scrutiny that will be given to implementation in existing Member States remains to be seen.

iv. Market failures

Existing EU waste policy steers the way that waste is managed, and often in the wrong direction. For example, despite landfill being the least preferred treatment option of the waste hierarchy, it remains the most common form of treatment throughout the EU. This is in part due to market signals, which make more preferable options, such as incineration with energy recovery, more expensive.

The EEA (1999²³) found that in nearly all EEA member countries the average treatment prices for landfilling non hazardous waste were far below those for incineration. Consequently, the market mechanism directs waste towards landfill and will continue to do so unless conditions are changed. It was recognised that prices are largely influenced by national rules and regulations, for example the taxation of landfill, or operational requirements which increase the price of disposal or treatment options. The EEA therefore recommended that the EU determine ‘an obligatory state of the art for all kinds of waste management activities, leading to the gradual internalisation of external costs’, and that there is a gradual substitution of taxes on labour with taxation on energy and raw materials. The latter, it believes, ‘is probably the most efficient way of obtaining sound resource management in a free-market economy’.

The EEA (1999) also reports that variations in treatment prices between countries may run counter to the principle of proximity. Furthermore it may affect the competitiveness of recycling industries where operational costs and the costs of disposing of residuals are higher, and as a result may inhibit the growth of the recycling industry in some Member States. On the former point, the EEB (2003)²⁴ commented that existing laws incentivise the directing of waste towards cheaper, low quality installations in order to avoid the higher costs associated with higher national standards. In particular, the Waste Shipments Regulation does not allow Member States to object to shipments of waste for recovery on the grounds of having higher national environmental standards itself, nor on the availability of more preferable treatment alternatives. The EEB is calling for the Regulation to be amended to allow Member States to object to shipment of waste for recovery if the environmental standards in the receiving installation are lower than in the exporting country, or if recycling options are available.

The waste hierarchy

Two questions can be asked about the waste hierarchy. Firstly, is the hierarchy of options correct; and secondly, is the hierarchical approach working? The first of these questions has been researched in some detail, as discussed in section 5. In relation to the second question, there has been criticism that policy has failed to focus on the most preferred option – prevention. On the contrary, waste generation has continued to increase. There is also recognition that in spite of policy and measures to reduce landfill, it continues to be the most common disposal option in the EU. This is an area where an integrated analytical approach may help to clarify current debates.

4. Overview of Integrated Environmental Assessment

In essence, Integrated Environmental Assessment (IEA) is an approach that brings together different disciplines to allow a more holistic assessment of environmental issues. Several definitions exist, amongst which is that used by the European Environment Agency (EEA):

‘The interdisciplinary process of identification, analysis and appraisal of all relevant natural and human processes and their interactions which determine both the current and future state of environmental quality, and resources, on appropriate spatial and temporal scales, thus facilitating the framing and implementation of policies and strategies’ (NERI, 1997²⁵).

This is further elaborated on by Luiten (1998), who outlines the main ‘steps towards improving the environment’ as:

- (i) Data collection, including monitoring, scientific research or modelling processes;
- (ii) Statistical analysis of the gathered data in order to identify trends, differences, etc.
- (iii) Assessment of the information to deliver conclusions about developments, priorities etc.
- (iv) Reporting of the results, including justification;
- (v) Supporting the political approval and guiding the implementation of results.

According to Luiten, IEA could be considered one of these steps, but has relations with each of the other steps. In a broader sense, therefore, IEA ‘has to deal with the whole process from data collection up to and

including implementation'. The involvement of the relevant scientific disciplines, information technology and the interests of society must also be considered in each of the five steps, as illustrated in Table 2.

The EEA has adopted a framework for IEA showing the chain of linkages from driving forces in society right the way through to desirable response. This approach, termed DPSIR, has been used in assessments of the Europe's environment, for the production of its State of the Environment reports. These reports contribute to the preparation of policy at the EU level.

The DPSIR approach looks at the chain of events from driving forces [D], to pressure on the environment [P], to the state of the environment itself [S], the impact on people and nature [I] and the desirable response [R] (Luiten, 1998²⁷; Wieringa, 1999²⁸). Although more detailed explanations are available elsewhere, Figure 1 helps to illustrate the different stages in the EEA approach.

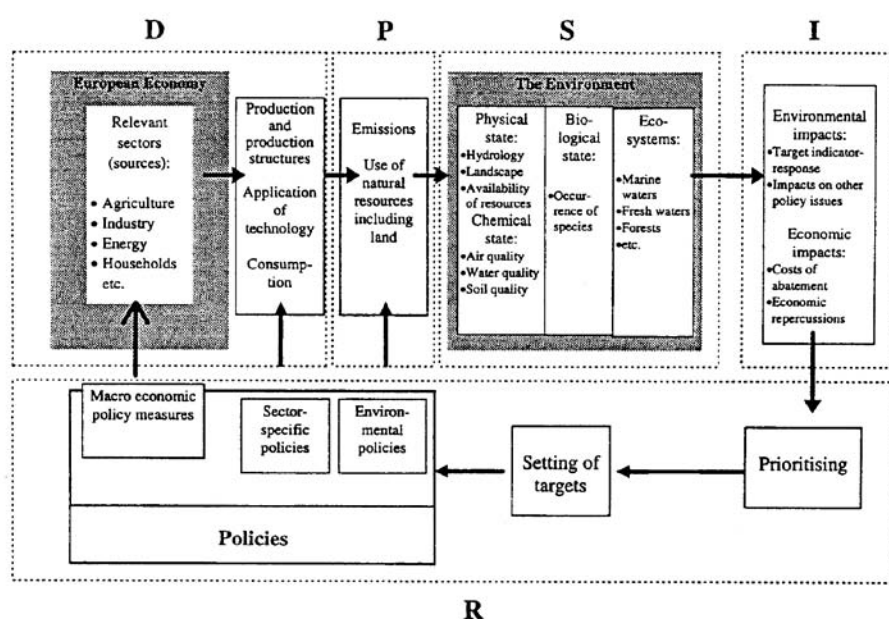
Applying IEA is not straightforward, however. Haigh (1998³⁰) highlights the importance of the political process in decision-making, regardless of scientific evidence, and the different situations in Member States, both politically and culturally. According to Haigh, 'any attempt to play down the human equation will doom IEA to irrelevance'. The complexity of bringing together academics and scientists from different disciplines, and politicians from different Member States with their own political cultures and local conditions also needs to be considered. Additionally, there is the question of whether this will become even more complex when the EU expands to include 25 Member States in 2004.

	Public/politics	Information technology	Science
Data collection	Selection of DPSIR indicators	Data warehouse, GIS, geographical and sector aggregation.	Monitoring, specific modelling, experts opinion, local studies
Statistical analysis	Sensitivity	Uncertainty	Credibility
Modelling	Scenarios Strategic environmental assessment	Structured knowledge, hardware, software	Integrated environmental modelling, local models
Reporting	Public participation, launching reports	Communication, EIONET/Internet	Documentation
Decision making and implementation	Green accounting	Multi-criteria analysis	Cost-benefit analysis, environmental efficiency

^a The cells are not to be considered as stand-alone; there are many interactions between the items. Each cell indicates one or more specific aspects, but this has to be in coordination with other items. For example, the selection of indicators should make it possible to carry out cost-benefit analysis. For an appropriate IEA all items must be presented in a well-balanced manner

Table 2: Elements of IEA^a

Source: Luiten, 1998²⁶



Though beyond the scope of this paper, it is worthwhile noting that further literature exists on the theory of IEA, including how it should be defined, how it can work in practice, critiques of methodology, the need for quality guidelines and the inherent problems of applying scientific evidence to policy debates (see for example Rotmans, 1998³¹ and Ravetz, 1999³²). There is also an ongoing debate about whether IEA should be defined more broadly to explicitly include economic and social considerations, and if so whether the IEA term should be altered accordingly.

Figure 1: Integrated Environmental Assessment in a DPSIR Framework

Source: NERI (1997), reproduced in Luiten (1999)²⁹

5. To what extent has IEA already been applied to EU waste policy?

To some extent, researchers have been looking at the integrated environmental assessment of waste policy for some time. However, this has generally been in the form of other approaches such as life cycle analysis, cost-benefit analysis, environmental accounting, environmental impact assessment, etc, rather than being defined as IEA as such. In particular, a lot of work has focused on looking at the environmental impact of the different treatment and disposal options, and life cycle analyses of different products. Below is a selection of the different studies that have been undertaken. These demonstrate how research has looked at different aspects of the bigger picture.

5.1 Focusing on waste streams or specific materials

Since the 1990s the EU has taken a waste stream approach to identifying where the focus on policy development needs to be. The aim of this approach was to bring together relevant interest groups to participate in the decision-making process prior to proposals being adopted. These priority wastes included batteries, end-of-life vehicles, waste electrical and electronic equipment, organic waste, packaging waste and household hazardous waste. It has been indicated that in the future the Commission will instead possibly look at material-specific waste sources, and not waste streams. A lot of literature exists on specific waste streams in particular, not least from the Commission itself. The two approaches are demonstrated below.

Waste streams

Many studies exist on those waste streams that have been the focus of policy attention in recent years. For example, a recent study looked at waste from construction and demolition³³. An interesting aspect of this particular study was that it was conducted in a local context. The study goes through the life cycle of mineral resources in the north west of England, beginning with the quarries in the region. At each stage of the life cycle the impacts on society are considered, using mass balance analysis and other modelling tools to identify and assess impacts associated with different activities.

The analysis revealed that waste arose at every stage in the life cycle of construction materials, including 'excessive exploitation' of resources, inefficiencies in energy use, impacts on the road transport system, and poor final management of waste. This, the authors commented, has a negative impact on the region's economy, the environment and health, and threatens to undermine its commitment to sustainable development. The main concerns identified by the study were inefficiency, pollution and waste generation. It found that for every tonne of construction material used in the northwest, approximately 115kg of CO₂ is produced, and approximately 13 million tonnes of building materials are discarded from building sites in the region, placing additional pressure on landfill capacity. Following this analysis, the authors recommended a number of solutions to the problems, such as converting waste streams into resources via the increased use of aggregates.

The EEA (2002)³⁴ demonstrated how an integrated approach could be applied to the management of biodegradable municipal waste (BMW) in Europe. The report looks at different national strategies set up by Member States to divert biodegradable waste away from landfill, as required by Directive 1999/31. At that time, reliance on landfill for the treatment of BMW ranged from 5% in Denmark to over 80% in the UK and Ireland. The waste stream of BMW was broken down into four phases:

- (i) production
- (ii) presentation (preparation for collection), collection, transfer and movement
- (iii) treatment
- (iv) end-use/final destination (beneficial use or disposal)

The report outlined that in developing national strategies it was necessary to look at each of these phases, and measures vary accordingly. For example, in phase one, strategies relating to production might include public education programmes and waste reduction initiatives, whereas in phase three, initiatives may include bans or restrictions on the type of waste that can go to landfill.

Denmark is a good case to consider as it was found to have the lowest reliance on landfill for BMW. Incineration with energy recovery is the main treatment route for BMW, accounting for 54.3% of this waste. Most plants in Denmark have been upgraded to combined heat and power generation, which is in line with

energy policy, as incineration with energy recovery is important for district heating schemes. There has also been an increase in participation in home composting schemes, and there are high separate collection rates for municipal waste. This is encouraged by separate collection schemes, for example for garden waste, food waste and paper.

This level of success has been achieved through a mix of policy measures across each of the four phases. For example, municipalities are legally obliged to collect 40-55% of newspapers and magazines for recycling, establish collection systems for food waste from canteens and restaurants that generate more than 100kg of food per week, and there are reduced fees for municipal waste collection from households that carry out home composting. There are taxes on landfill and incineration, differentiated between those plants with energy recovery and those without. The aim is to encourage recycling, and consequently this is not taxed, and nor is composting and anaerobic digestion. In 1997 a ban on landfilling any waste that would be suitable for incineration was introduced. This has been very successful in diverting biodegradable waste away from landfill.

The Danish example also highlights the importance of local considerations in defining a waste strategy. What is appropriate in one Member State cannot be equally applied in another, and therefore there is a limit to what can be prescribed at the EU level. In this instance, Denmark has succeeded in diverting BMW away from landfill very successfully, but this has mainly been achieved by the expansion of incineration with energy recovery. Although this is a viable option, and more preferable to disposal, such a move could arguably not be adopted in other countries, for example the UK, where there is much opposition to incineration and expansion would be politically unpopular. This represents, therefore, an example of Haigh's 'human equation' (see above).

Priority materials

Several studies have looked at the environmental impacts of different materials through their entire life cycle. One material of concern, and where the EU may in the future focus attention, is PVC. DG Environment commissioned a report to assess the waste management costs of diverting PVC waste away from incineration, in particular towards recycling, and the associated environmental costs and benefits³⁵. The study covered the EU-15 and six Candidate Countries for the period 2000 to 2020. Over this time frame post-consumer PVC waste is anticipated to increase from 3.6 to 6.4 million tonnes per annum, whilst recycling remains low at 3% of arisings. This low rate is due to high separation and processing costs. At the time of the study 82% of PVC waste went to landfill, and 15% was incinerated.

Due to restrictions on landfill the amount of PVC going to incineration was expected to increase to 45% of arisings over the time period being reviewed, with 9% being mechanically recycled, and 50% still going to landfill. The study looked at three scenarios based on different diversion rates of landfill to recycling, incineration to recycling, and incineration to landfill:

- Scenario 1: Recycling increases to 15%, decrease in landfill and incineration
- Scenario 2: Recycling increases to 22%, decrease in landfill and incineration
- Scenario 3: Recycling unchanged, incineration decreases to 30% (from BAU forecast of 45%), increase in landfill.

The researchers firstly considered the financial costs associated with incineration, recycling, landfill and sorting. As part of this they looked at what they termed the 'incinerator subsidy'. This cost accounts for the higher costs associated with incinerating PVC (as the chlorine content of PVC places a high demand on alkaline reagents in air pollution control systems at incinerators, so much so that each unit of PVC requires the same amount of reagents as up to 70 units of MSW), which is presently distributed between other materials being incinerated.

The initial results showed that scenarios one and two were dependent on the net recycling costs charged to waste producers as a disposal fee for recycling: when the revenue from the sale of recyclate is low, the disposal fee increases and vice versa. Also, a major component of the recycling cost was for collection and segregation. Unit costs were found to be lowest in scenario one, where recycling is focussed mainly on easier to process products, and highest in scenario two where there are higher rates of recycling and for a range of applications. In scenario three there were net savings in costs to be achieved when diverting PVC from incineration to landfill. If this study alone were to influence policy, a change would be needed to allow PVC disposal in landfill in some Member States.

The researchers then went on to assess, as far as possible, the external costs associated with each

scenario. The analysis specifically focused on air pollution effects and the impact on climate change and human health. Due to uncertainties, best estimates and lower and upper costs were calculated based on different assumptions for valuations of externalities. From this analysis it was concluded that:

- In all cases diverting PVC from incineration resulted in environmental improvements;
- Environmental benefits were sufficient to outweigh the financial costs in scenario one, even when the avoided 'incinerator subsidy' is excluded;
- In scenario two, environmental benefits only exceed costs when the high valuation of externalities is used; and
- Scenario three shows a net cost saving in financial and environmental terms.

However, it was acknowledged that not all externalities were included in the analysis, and if more were to be included this may affect the results. Nevertheless, it was concluded that there would be benefits of diverting PVC disposal away from incineration, particularly to recycling.

Another study assessed different recovery options for plastics. The Öko-Institute (2000³⁶) prepared a literature review on behalf of the EEB looking at LCA studies on the different disposal options for plastics used in packaging. This came in response to claims from industry that the waste hierarchy was obsolete and that materials needed to be looked at on a case-by-case basis. The study confirmed that although results from studies reviewed differed greatly, the waste hierarchy for this material should run in the following order of preference: Mechanical and monomer recycling; feedstock recycling and mono-incineration; waste incineration with energy recovery; landfill. It did mention, however, that divergences in this hierarchy occur in certain instances, such as if mechanical recycling is restricted to low quality mechanical recycling, or where incineration plants have very high waste to energy ratios. From this analysis the following policy recommendations were made: Incineration should only be favoured over landfill where high energy recovery ratios could be achieved; recovery plants should fulfil BAT standards (Best Available Technology required under the IPPC Directive, see Annex 1), or comply with a specific audit scheme; increasing targets for recycling of plastics should be set; and measures to reduce hazardous substances should be introduced.

It is worth noting that the examples above, though looking at specific materials or waste streams, have tended to concentrate on the environmental performance of these materials when they become waste. In an integrated approach the whole life cycle would need to be considered.

5.2 Waste treatment options and the waste hierarchy

Many studies to date have looked at the relative merits of different waste treatment options, and have used different research techniques, such as cost-benefit analysis, economic evaluation and life-cycle analysis.

A report for Friends of the Earth, UK Waste and Waste Watch, on the economics of different waste management options for municipal waste, used a cost-benefit analysis approach to prove the hypothesis that: *'although the financial costs of recycling are greater than that for other methods of dealing with waste, to the extent that one is able to incorporate the environmental costs and benefits associated with all methods, the overall economic analysis will show that when one accounts for all the costs and benefits, the net result shows recycling to be the best option in respect of materials recovered from the household waste stream'*³⁷

The study analysed different cost analyses undertaken in the UK for the waste disposal options of landfill, kerbside recycling, composting, and incineration, and sought to shed light upon the usefulness of valuation approaches in the context of waste management.

The study provided an overview of existing studies where economic values have been assigned to disposal options. For example, the UK Government's Draft Waste Strategy³⁸ (1999) contained figures (see table 4) based on the total resource costs (excluding landfill tax), collection, transfer and transportation to the recovery or disposal site, gate fees, operational and capital costs (which have been annualised for conversion to cost per tonne).

Treatment	Cost range (£/t)
Recycling (kerbside collection)	55-145
Composting (kerbside collection)	70-120
Incineration	45-100
Landfill (excluding tax)	45-65

Table 4: Costs of different waste management options

Source: DETR 1999

However, the cost estimates had a wide range due to the uncertainty over present and future costs, and the differences in applying the options to different regions, for example urban versus rural. The researchers found that figures presented in this table and elsewhere did not tend to look at the financial costs of the different recycling options and therefore tried to obtain more detailed costs. They also went one step further by aiming to incorporate the environmental costs and benefits, and in so doing reviewed existing literature on the externalities of waste management. An example is set out in Box 2.

Box 2: Coopers and Lybrand/CSERGE (1997)³⁹

The study looked at 12 EU Member States for the base year of 1990, and addressed the following factors for deeming external costs:

- Composition of waste stream;
- Size of the disposal site or facility;
- Physical characteristics of the disposal site;
- Age of the disposal site, or facility;
- Spatial location of the disposal site; and
- Level of pollution abatement in a facility.

The study included recycling and broke this down into seven different materials. It concluded that, except for plastic film, recycling generates positive externalities which are very large in comparison to the externalities associated with landfilling and incineration (based on the assumptions made in the study). One criticism of the study, however, was that it did not consider certain issues, such as the environmental costs associated with different municipal solid waste options, toxic air pollutants from incineration or landfill, and disamenity impacts and leachate.

The DETR (1999) updated the study's results, which can be seen in table 5.

Waste Management Option

External Cost Estimate, £ per tonne of waste, 1999 prices

Landfill	- 3
Incineration (displacing electricity from coal-fired stations)	+ 17
Incineration (displacing average mix electricity generation)	- 10
Recycling	+ 161
- Ferrous metals	+ 297
- Non-ferrous metals	+ 929
- Glass	+ 196
- Paper	+ 69
- Plastic film	- 17
- Rigid plastic	+ 48
- Textiles	+ 66

Table 5: External costs and benefits of different waste management options

Source: Adapted from Coopers and Lybrand et al (1997) in DETR (1999)

The study concluded that the hypothesis (that recycling is the best option) could not be proven conclusively: 'There are a number of persuasive arguments that one can present for recycling. *There are fewer for other treatment options (other than they make the job of 'dealing with waste' disarmingly simple). There are more for waste minimisation (and energy efficiency).*

Perhaps more important was the study's overall message about the use of studies quantifying costs and benefits in determining waste policy: '*...however strongly one believes the quantification of private and external costs and benefits should be an ultimate arbiter of whether or not something may or may not be a good idea, one is likely to have to accept the fact that studies attempting to do this will be less than conclusive*'. It highlighted the limitations of life cycle analysis as a tool upon which to base waste management decisions, and the problems with using cost-benefit analysis when there is so much scientific uncertainty involved in any valuations. Economic valuations, whether they incorporate externalities or otherwise, are also based on existing market structures.

Questions were also raised regarding the use of such methods for decision making in the context of such uncertainty, and it was noted that 'valuation exercises can raise as many questions as they solve'. This issue of uncertainty is one to which IEA might usefully be applied.

In the waste hierarchy, recycling is deemed to be preferable to incineration (with energy recovery or without) and landfill. Although recycling may have several benefits over landfill (such as reduced volume to land, reuse of resources, etc) research has shown that it has environmental impacts of its own: plants processing scrapped cars, for example, produce large amounts of shredder waste contaminated with oil and heavy metals and smelting of the metals give rise to emissions of heavy metals, dioxins etc. from secondary steel works and aluminium smelters (EEA, 1999); in most cases the recycled product is of a lower quality than the virgin material; even high quality recycled materials represent a net loss of resources because the energy used for initial production is lost and some material is always lost during collection and treatment; and there are often higher transport distances for waste for recycling than disposal (Ripert, 1997).

Once recycling has taken place there is also the dilemma of what should happen to the residual waste (materials remaining after recycling). In a recent report focusing on recycling in the UK⁴⁰, a life-cycle assessment of several residual waste options was carried out. Again, the limitations of using a life cycle analysis (LCA) approach are highlighted, and it was stressed that there is a need for such analyses to be considered amongst a range of different techniques available for comparing different options. In particular, the following shortcomings are highlighted:

- The difficulty in assessing the issue of time;
- A tendency to view the world as static;
- The lack of location-dependent impact assessment;
- There are a number of different approaches to impact assessment which weight emissions differently to one another;
- Data used in the process have different ages and origin, leading to potential bias in the analysis.

Nevertheless, the analysis looked at several potential waste treatment scenarios for residuals. The performance of the different options was examined at per tonne of waste processed in relation to various criteria: global warming potential of the gases released; human toxicity analysis; acidification; eutrophication; ozone depletion; smog; and resource depletion. The assessment concluded that all options have some environmental impacts, and that different options are better in relation to certain criteria and over different time scales. For example, in relation to climate change, landfill performs better than incineration where the time horizon is longer (modelled up to 500 years), as time affects the relative global warming potential of the different gases, and there are different residence times in the atmosphere. However, in the short term methane is more powerful than carbon dioxide, so landfill performs less well. Alternatively, if we are more interested in focusing on reducing acidification, the best performers were found to be co-incineration options, because of the displacement effect for fossil fuels. Although the research was unable to conclude what the best option for dealing with residual waste in the UK would be, it did find that sending untreated residual waste to landfill or a 'UK-standard mass-burn grate' incinerators are the worst options available.

The above reports have in common that they start from the premise that recycling is a preferable treatment option. However, there is still not even a consensus that recycling is preferable to other treatment options lower down the waste hierarchy.

Recent studies in both Denmark⁴¹ and Sweden⁴² have challenged the benefits of sorting and recycling waste versus incineration with energy recovery. In the Danish study, researchers argued that it would be better for them to burn paper collected for recycling. It argued that as a carbon neutral activity it would benefit the environment, and even reduce CO₂ emissions by replacing the need to burn coal. Financially it was found to be better too, as the market price for paper is lower than that for coal. According to Swedish researchers, any advantages of sorting household waste are more than offset by the high costs involved. Instead it is recommended that all household and packaging waste, organic or otherwise, should be incinerated and the heat recovered for district heating and electricity supply.

In direct response to the arguments presented in the Swedish research, officials from Sweden's Environmental Protection Agency have recently put forward a counter-argument⁴³. In letters printed in the Swedish press, the research was criticised as showing 'a lack of both holistic thinking and substantiated environmental arguments'⁴⁴. The Swedish EPA argued that that too much emphasis on incineration could deter efforts to focus on waste reduction, and the public was encouraged to continue separating waste for

recycling. The environmental benefits of recycling over incineration were highlighted, including the gain of recovering and recycling material, compared with burning it (although recognising that the environmental gain of recovering is judged in Sweden to be greatest for metals and plastics and but less apparent for food waste and cardboard based on renewable raw materials); reduced energy needs of not using virgin materials, resulting in reduced emissions; and most importantly by motivating producers to develop more resource-efficient and non-polluting products.

The letter also makes reference to the fact that recycling is often more expensive than incineration as the market does not place adequate economic value on environmental gains. Therefore the market reduces the incentive to recycle, and it is difficult for recycling to compete. However, it insists that once the socio-economic gains are taken into consideration, this levels the playing field. It also draws attention to the shortage of incineration capacity, and recommends that capacity be reserved for those materials that cannot be recycled.

Thus it can be seen that, even in the most forward-looking states in environmental terms, the current waste hierarchy is intensely controversial, and would benefit from better analysis using integrated assessment techniques.

5.3 Policy and practice

In trying to establish why some areas perform better than others in managing waste, numerous studies have looked at best practice, and the potential for applying this elsewhere. Such reports offer valuable insights into the strengths and weaknesses of existing policy and practice at the EU level, at the Member State level, locally or elsewhere.

Whilst such information may perhaps not be a component of an IEA as such, it instead represents examples of where analysis has informed certain choices. This experience can help inform the future decision-making process, of which IEA is one element.

Such examples include the EEA's report, *Case studies on waste minimisation practices in Europe* (2002)⁴⁵, the Eurocities Conference report (1999)⁴⁶ which contains examples of where Member States have used very different approaches and a mix of measures, and recent work by the Green Alliance, *Creative policy packages for waste*⁴⁷ (2002), which looked at waste strategies of seven countries and states in the EU and US.

5.4 Predicting future trends

A technical report on waste management⁴⁸, which was commissioned by DG Environment as one of a series supporting the main report: *European Environmental Priorities: an Integrated Economic and Environmental Assessment*, looked at scenarios for the future based on projections of waste data for specific streams, and waste generation data. Four scenarios were applied to the data to project different waste trends in 2010: Baseline (BL-1993); Baseline (BL-2010); Technology Driven (TD-2010a and TD-2010b) and Accelerated Policies (AP-2010). The scenarios looked at the marginal costs of five disposal options (landfill, incineration, incineration with energy recovery, recycling and composting) for all EU Member States. The cost estimates presented included all impacts associated with emissions to air and the risk to health from the treatment of municipal solid waste (MSW), and considered the avoided costs of virgin material as a result of recycling, the avoided costs of virgin material as a result of prevention, and the avoided costs of waste treatment/disposal as a result of prevention. No distinction was made for variations in the cost of techniques between Member States, nor was any distinction made between rural and urban areas.

Conclusions from this work included:

- The accelerated policy scenario, which included initiatives such as a virgin materials tax on paper and plastics, resulted in prevention of overall waste by 3% in 2010;
- Compared to MSW figures in BL-1993, there is still an increase of nearly 13% in waste arisings for the accelerated policy scenario, thus illustrating the basic need to address rising waste arisings;
- The shift in MSW treatment/disposal methods from landfill to more desirable options is successful in a cost effective way in the accelerated policy scenario. Compared to BL-1993, landfill decreases and incineration without energy recovery vanished; and
- Shifting to incineration with, rather than without energy recovery, is considered to be cost effective, especially when considering the climate change benefits.

The analysis was used to present recommendations for future policy options. These were based on policy

measures used in the scenarios, and included a virgin materials tax to encourage reduction at source, product taxes to reflect the cost of disposal, recycling credits, increased landfill taxes and variable domestic collection fees.

It was recognised, however, that more work needs to be undertaken to identify other impacts and costs that were beyond the scope of this particular study. For example, the costs associated with impacts on water and soil were not explored, but are of importance if we are to take a more integrated approach.

5.5 Sustainable production and consumption

More recently, policy thinking has started to take on a more holistic approach, based on the premise that 'it is the total of environmental impacts associated with the entire life cycle of raw materials which has to be considered' (the Zero Study, 2003). The development of the Thematic Strategy on natural resources involves looking at the whole issue of resource use, right through its life cycle. A study recently commissioned by DG Environment, the 'zero study'⁴⁹, will feed into the development of the Thematic Strategy. The purpose of the study was to present information on the materials and waste streams in the EU using the method of material flow accounting. The material flow analyses (MFA) presented provided information on the volume, structure and interlinkages of European resource and material flows, both for the EU-15 and for the Candidate Countries, looking specifically at the resource flow of fossil fuels, metals and industrial materials, construction minerals and biomass. From this, a number of conclusions were made, including:

- There has been a relative decoupling of economic growth from resource consumption, implying that market conditions already favour resource efficient production to some degree. However, there is no absolute decline in the volume of the EU's total resource requirements, which implies that the environmental burden related to resource use remains constantly high.
- Resource use varies between Member States: The total material requirement (TMR –measures the physical basis of an economy in terms of primary materials) in the EU is on average fifty tonnes per capita, and ranges between approximately 32t/capita in Italy to almost 100t/capita in Finland.
- In Candidate Countries, direct materials productivity will have to rise by a factor of five to reach that of the EU.
- The EU is increasingly importing more of its resources, which is resulting in a shift in the environmental burden associated with resource use to other regions. Resource use is consequently becoming more of an issue of international burden sharing.
- The growth in infrastructures and urban development, particularly as the Candidate Countries strive towards greater economic growth to meet EU levels, will affect future waste generation and the capacity for renewable supply and resource generation.
- It is currently not scientifically possible to assess which environmental impacts of resource use are of greater importance, nor to determine the various specific impacts of major resource flows which may or may not become more significant in the short or longer term. Therefore, political judgement will be required for setting priorities.

The authors point out that the information presented in the study highlights some general characteristics of the material flow system, but that more in-depth analysis needs to be undertaken on more specific causal relationships and impacts. Therefore, a precautionary approach should be taken, based on the rationale that a volume reduction in resource use *ceteris paribus* also leads to a reduction of potential environmental impacts.

Thus there are clearly moves towards more integrated analysis, and it is recognised that more research is needed to support the development of a new policy framework.

6. Exploring the opportunities for IEA in waste policy

Integrated environmental assessment clearly represents an opportunity to look at the issue of waste in a more holistic manner than appears to have been done before. According to a representative from the Commission⁵⁰, the main advantage of IEA is that it can help to make the issues and trade offs of policy options transparent. It can also help to identify areas where it is possible to get real environmental benefits at a low cost. It was commented, however, that there should also be caution: by looking at the whole picture you sometimes may not concentrate on the specifics, and there are issues associated with quantification. Therefore even though policy decisions could be better informed, there will still be a degree of uncertainty.

In order to take an integrated approach towards waste policy, the whole life cycle of waste needs to be

considered, beginning with the design and production of goods, right through to final disposal.

As the EEA (1999) states, *'The challenge of increasing waste quantities cannot be solved in a sustainable way by efficient waste management and recycling alone. There is an urgent need for integration of waste management into a strategy for sustainable development, where waste prevention, reduction of resource depletion and energy consumption and minimisation of emissions at the source is given high priority. Waste must be analysed and handled as an integrated part of total material flow through the society.'*

Integrated environmental assessment therefore needs to reflect the different stages associated with waste generation, and to understand the factors influencing these stages, as highlighted in figure 2.

There are also a number of different levels where IEA could be applied to waste policy, as demonstrated in Figure 3. This illustrates the potential approaches to IEA and in part reflects the research that has been done to date.

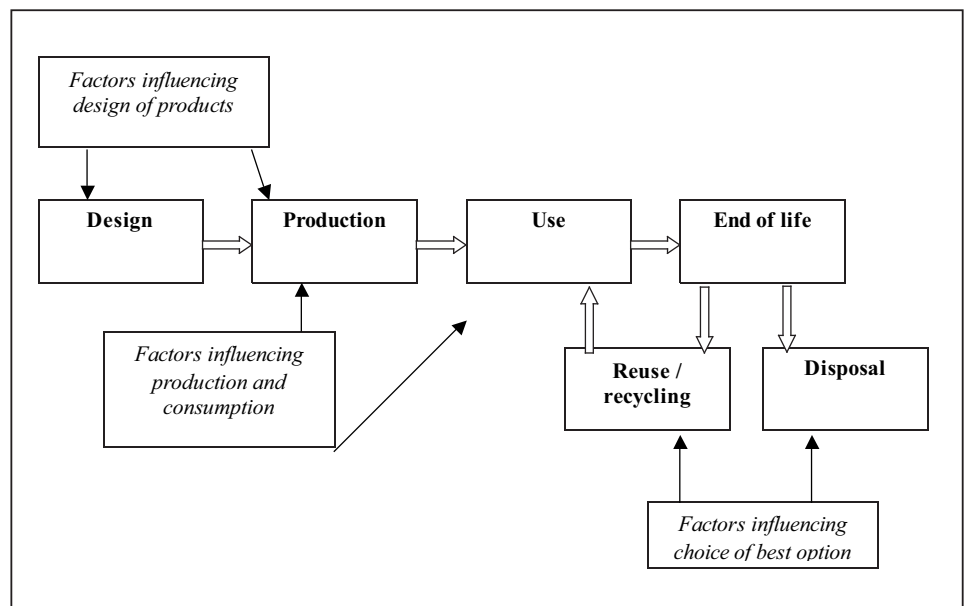


Figure 2: Understanding stages in waste generation

From this it can be seen that there are a number of different approaches that could make up the overall IEA approach. For example, life cycle analyses of products or scientific research into the environmental aspects of different waste disposal options, to name but two possible approaches, each has a valid input to contribute to understanding the bigger picture. Research could also be broken down to different scales. For example, an IEA of waste could be carried out for a local administrative region, or a Member State, for the EU or globally. Looking at the issue of waste as a whole would arguably be far too complex, and so breaking it down into more manageable, digestible parts is perhaps the best way forward. Scoping the appropriate course and approach would, however, in itself show some of the strengths of the IEA approach.

What is important, however, is that this is done in a coordinated manner underneath the 'umbrella' of an overall integrated approach. It is also important that the correct people are involved in any assessment, regardless of whether this is for one particular waste stream or one specific region, and that this includes relevant social/political sensitivities (the 'human equation'). The whole rationale of IEA is that it needs to be an interdisciplinary process of identification, analysis and appraisal of all relevant natural and human processes and their interactions, and this could apply regardless of scale or scope. EFIEA is well placed to tackle these challenges.

What are the barriers to IEA?

After looking at the limitations of existing policy and the information reviewed on what assessments have been carried out to date on waste policy, the barriers to adopting an integrated approach include, but are not restricted to:

- The lack of comprehensive and comparable data;
- Scientific uncertainty regarding environmental effects and modelling techniques;
- Difficulty in assigning monetary values to the environment and health;
- Market failures in reflecting negative externalities; and
- Knowledge of the actors who need to be involved in IEA.

These challenges emphasise some of the potential strengths and distinctive features of the IEA approach, as promoted by EFIEA.

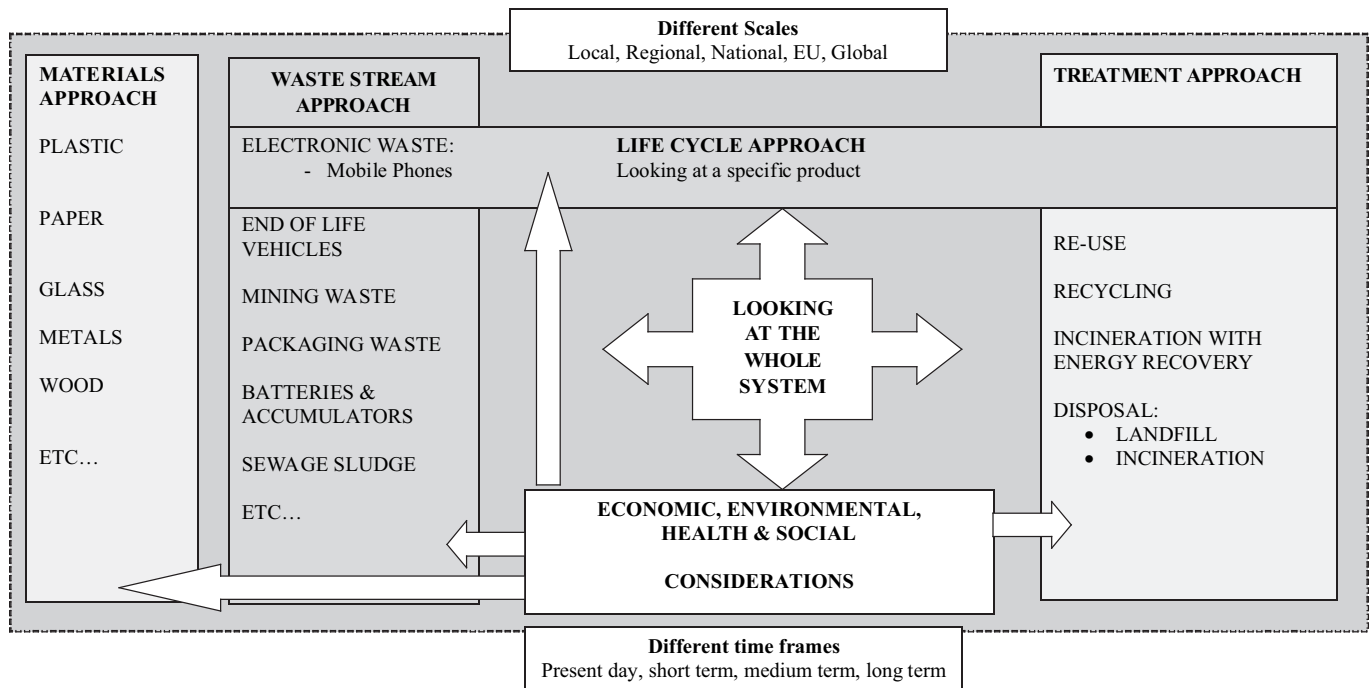


Figure 3: Potential Approaches to IEA in Waste Policy

7. Next Steps

Before an IEA framework could be developed, there are a number of questions that need answering, and these are by no means in themselves easy to solve. It is suggested that, should a workshop on IEA in waste policy be arranged, the following would provide some guidance for the discussion:

Structural considerations / How would IEA work in reality?

- How can / should the EU put in place an overarching IEA system for waste policy?
- Should the focus of such a system be on the whole issue, or should it be broken down into digestible parts, for example waste streams, life cycle analysis, etc?
- How can the EU coordinate all inputs into the overall IEA process: the research community; public participation, etc?
- At what stage should the defining of sustainable waste policy be set by Member States to reflect different national circumstances? How far does the EU need to go to protect the Internal Market and EU environment?
- How can the research community better influence, inform and meet the needs of policy makers?
- What barriers need to be overcome before a truly integrated approach could be developed?

Issue specific considerations:

- What is the best treatment option for waste from different waste streams?
- How can policy address material flow, and tackle waste as an 'upstream' issue?
- Where should the focus be – reducing hazardous substances, reducing resource use, limiting the environmental effects of treatment options, etc?

The actors

Identifying the appropriate actors is extremely important. Although we can take an educated guess about the groups that should be involved in any discussions, in reality a comprehensive list of all actors is not known. Taking the regulatory authorities as an example, the way that waste disposal is administered in different Member States varies. Even within a Member State the situation is not always entirely transparent. For example, in the UK waste collection and disposal is the responsibility of Waste Collection Authorities (WCA) and Waste Disposal Authorities (WDA) respectively. However, the WDA do not undertake waste disposal themselves, but contract this out to the private sector, which is a very disjointed sector comprising numerous operators, some of which are not legitimate. Whilst the WCA and WDA are easy to identify, as

these are County Councils and District Councils, identifying private sector actors would not be so easy.

However, the broad categories of potential actors should include:

- Policy makers at the EU, Member State and Candidate Country level;
- The research community, involving researchers from various disciplines;
- Competent authorities in Member States and Candidate Countries;
- Non Governmental Organisations (NGOs);
- Industry groups; and
- Members of the public

8. Conclusions

The issue of sustainable waste management is now more than ever an issue of great concern. This is starting to be addressed at both the EU and Member State level, but much remains to be done if current levels of resource consumption and waste generation are to be placed on a more sustainable footing.

This paper has provided an overview of the current situation regarding the application of IEA to waste policy, and the challenges which lie ahead for policy makers. Although it is by no means all-inclusive, it demonstrates that whilst much research has been undertaken in this field, there are many opportunities for the application of IEA to waste policy, and at a variety of levels.

To look at the whole system at once would arguably be too complex a task, and the best approach would perhaps be to continue looking at smaller parts of the system, for example priority waste streams/materials or specific disposal options. However, this should be within an overall integrated framework. This overall 'bigger picture' needs to be coordinated at the EU level, ensuring that all stakeholders are brought together to provide a more holistic assessment of waste. Also, and critically, there is a need to address the shortcomings of existing policy, for example data limitations and problems with definitions, in order to remove the barriers to a more integrated approach.

IEA presents a major opportunity to bring existing information together in a new context to contribute to the development of strategic thinking on waste policy. It must be remembered, however, that IEA will not provide all the solutions: it represents one important input into policy making. The interactions of scientific debate, the political process itself, and the individual characteristics of Member States will continue to determine how future waste policy will be defined. According to Haigh (1998)⁵¹ '*...we should not delude ourselves that it [IEA] will always be easy...IEA must be framed with as much understanding as its proponents can manage of all the many complexities of policy making. They must be prepared to admit that any IEA is likely to be incomplete. The effort to be comprehensive is laudable, the claim that IEA will provide a complete solution would be misleading*'.

Nevertheless, IEA can 'help to identify areas where we are really trying to get environmental benefits...and it can help make issues and the trade-offs of policy options more transparent'⁵².

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Annex 1: The Development of EU Waste Policy Since 1975

Strategies	Phase I 1975-85	Phase II 1986-96	Phase III 1997 -	Purpose ⁵³
Waste Strategies		EU 1 st waste strategy – September 1989, SEC(89)934; Council Resolution May 1990 (OJ C122, 18.5.1990)	EU 2 nd waste strategy – July 1996, COM(96)399; Council Resolution February 1997 (OJ C76, 11.3.97)	<p>The first EU strategy outlined five guidelines: prevention, recycling and reuse, optimisation of final disposal, regulation of transport and remedial action. Prevention was presented as the primary objective, to be achieved through the development of clean technologies and waste minimization. Other guidelines were envisaged as a hierarchy of next-best options.</p> <p>The 1996 Strategy confirmed the principles of prevention, producer responsibility, precaution and proximity, and set out the preferred hierarchy of waste management options. It also stressed the need for reduced movements of waste and improved waste transport regulation, and the need for new and better waste management tools, such as: regulatory and economic instruments; reliable and comparable statistics on waste; waste management plans; and proper enforcement of legislation. Priority waste streams were defined.</p>
The Sixth Environmental Action Programme			2002-2010	The Sixth EAP is considered one of the major driving forces for waste policy at present, specifically the Thematic strategies on natural resources and waste recycling. See section 3.2 for more details.
Legislation	Phase I 1975-85	Phase II 1986-96	Phase III 1997 -	Purpose
Framework Directive	Directive 75/442	Directive 91/156		In all Member States waste disposal was regarded as a local or regional problem until the early 1970s. Several Member States then introduced or proposed legislation to provide some kind of national framework for dealing with it and the Directive accordingly seeks to set out a coherent set of measures applicable in all Member States. The Directive was entirely revised in 1991.
Waste Oils	Directive 75/439	Directive 87/101		<i>End of pipe</i> – safe disposal of waste oils and priority of recovery.
PCBs and PCTs	Directive 76/403	Directive 96/59		<i>End of pipe</i> – controls for environmentally safe disposal. Directive 96/59 sets out a system of control for the elimination of PCBs within the framework of Directive 75/442. It requires steps to be taken to identify PCBs, to dispose of them by a

				specified deadline, and to decontaminate or dispose of contaminated equipment. NB. Separate Directives 76/769 and 85/467 restrict the sale and use of PCBs.
Legislation	Phase I 1975-85	Phase II 1986-96	Phase III 1997 -	Purpose
Hazardous waste	Directive 78/319	Directive 91/689, as amended by Directive 94/31/EC		<i>End of pipe</i> - Strict requirements for operations involving hazardous waste.
Transfrontier shipment	Directive 84/631	Regulation 259/93 (repealed 84/631, 85/469, 86/279, 87/112).	Amending Regulations: 120/97, 2408/98, 1420/1999 and Regulation 1547/1999 (repealed Decision 94/575)	<i>End of pipe</i> – notifications procedure; avoiding shipments for disposal; principles of proximity and self sufficiency. Regulation 259/93 establishes systems to monitor and control the shipment of waste within, into and out of the Community. It replaced a number of earlier Directives concerned with the shipment of hazardous waste, and now applies to all waste.
Packaging	Directive 85/339 (beverage containers)	Directive 94/96	Under revision COM(2001)729	<i>End of pipe</i> – targets for recovery and recycling AND <i>Prevention</i> – reduction of waste in design stage
Sewage sludge		Directive 86/278	Proposal expected for a new Directive addressing the issues more widely, extending regulatory controls to all domestic and industrial sludge and establishing tough harmonising requirements on contaminants.	<i>End of pipe</i> – measures for preventing harmful effects when used in agriculture.
Batteries and accumulators		Directive 91/157	Proposal expected for its revision	<i>Prevention</i> - To reduce heavy metal content of batteries and accumulators, ensure separate collection, inform consumers and prohibiting marketing of certain batteries.
Incinerators		Directive 89/369 (municipal) Directive 89/429 (municipal) Directive 94/67 (hazardous)	Directive 2000/76 (repealed earlier Directives)	<i>End of pipe</i> – Sets emission limit values and operation requirements. The aim is to prevent or limit negative effects on the environment and risks to human health from incineration and co-incineration of waste.
Ecolabel		Regulation 880/92	Regulation 1980/2000	<i>Prevention</i> of waste generation and use of hazardous substances. It is a voluntary award scheme for the award of eco-labels to products and services which have the potential to reduce negative environmental impacts, as compared with other products of the same product group. One objective concerns the efficient use of resources.
EMAS		Regulation 1836/93	Regulation 761/2001	<i>Prevention</i> of waste generation and use of hazardous substances as part of an overall

				environmental management system.
Landfill			Directive 1999/31	<p><i>End of pipe</i> - aims to tackle emissions of methane by limiting the amount of biodegradable waste going to landfill. Sets standards for proper licensing, monitoring and aftercare of new and existing landfill sites.</p> <p>AND</p> <p><i>Prevention</i> - encouraging the prevention, recycling and recovery of waste by limiting its final disposal through landfill. By requiring that charges are levied by operators to reflect the continuing costs of landfill, including clean up and aftercare, it seeks to make other, apparently more expensive, methods of waste disposal more attractive to waste producers.</p>
Legislation	Phase I 1975-85	Phase II 1986-96	Phase III 1997 -	Purpose
End of life vehicles (ELVs)			Directive 2000/53	<i>End of pipe and Prevention</i> - Seeks to reduce the amount of waste, and therefore the adverse environmental effects, resulting from the disposal of vehicles. It aims to improve the environmental performance of all the operators involved at each stage of a vehicle's life, but, in particular, those involved in the treatment of ELVs. There are requirements for restrictions on the use of hazardous substances, and certain substances will be banned.
Ozone depleting substances			Regulation 2037/2000	<i>End of pipe and Prevention</i> - Articles regarding the safe disposal of ozone depleting substances from waste refrigerators, and phasing out of certain ODS in production.
Port reception facilities for ship generated waste and cargo residues.			Directive 2000/59	<i>Prevention</i> - Aims to reduce the amount of pollution caused to seas and coastlines of member states by waste and cargo residues discharged into the sea by shipping. This is to be done by improving the availability of reception facilities at community ports in order to meet the needs of ships without causing undue delay.
Integrated Pollution Prevention and Control (IPPC)		Directive 1996/61		<i>Prevention and end of pipe</i> - The waste management industry is one of the categories covered by IPPC. Facilities are subject to authorisation through permitting, which set certain requirements, including avoidance of waste and safe recovery or disposal. It requires that Best Available Technology (BAT) is applied, which includes the use of low waste technology, the use of less hazardous substances, the furthering of recovery and recycling, the consumption of raw materials and energy,

				and energy efficiency.
Waste statistics			Regulation 2150/2002	To establish a framework for the production of community statistics on the generation, recovery and disposal of waste. Designed to complement reporting under several Directives, and ensure the effective provision of statistics. It provides details of data collection procedures and timeframes for reporting by Member States.
Waste electrical and electronic equipment (WEEE) and the Restriction of hazardous substances (ROHS)			Directive 2003/96 and Directive 2003/95	<i>End of pipe and prevention</i> - Seeks to prevent WEEE and increase the rates of reuse, recycling and recovery of waste. It also aims to improve the environmental performance of producers, distributors and consumers involved in the life cycle of electrical and electronic equipment (EEE). The ROHS Directive focuses on the restriction on the use of hazardous substances in EEE to facilitate safer disposal.
Future developments				
Composting / Biodegradable waste			Proposal expected 2003/4	<i>Prevention</i> - To provide guidance in diverting this stream away from landfill.
Mining waste			Proposal expected 2003	
Construction waste			Proposal expected	
Integrated product policy			Green Paper COM(2001)68, White paper expected in 2003	A <i>life-cycle approach</i> to the impact of products from design and production to their use and disposal. The main priority of IPP is to internalise the environmental costs of products through the use of market forces. To achieve this it is anticipated that the focus would be on eco-design and manufacturing of products, information dissemination, and incentives to increase demand for greener products.
Classification of waste-to-energy process			Proposal expected	
Environmental standards for end user equipment (EUE)			Proposal expected	
Measures from the Thematic Strategies on natural resources and waste recycling			Thematic strategies to be developed by July 2005. Specific measures may be proposed after this.	

The European Forum on Integrated Environmental Assessment (EFIEA)

The European Forum on Integrated Environmental Assessment (EFIEA) is an initiative to improve the current practice of IEA. It was established as a concerted action in early 1998, after preparations through a series of meetings organised by DG Research of the European Commission. The first phase was completed in early 2001, and the second phase will run until Spring 2005.

EFIEA is a network of some 50 European research groups, policy advisors, stakeholders, and decision makers. The aim of the network is to enable the practise of IEA to develop by a cross-fertilisation of the various approaches practised in this field and building an IEA community.

The specific aims of EFIEA are:

- to improve the scientific quality of IEA;
- to strengthen the interaction between environmental science and policy-making; and
- to establish a peer community on IEA.

For further information see www.efiea.org



The Institute for European Environmental Policy (IEEP)

The Institute for European Environmental Policy (IEEP) is a leading centre for the analysis and development of environmental and related policies in Europe. An independent, not for profit organisation, the Institute has offices in London and Brussels. IEEP brings a non-partisan analytical perspective to policy questions, engaging in both pressing short-term questions and long-term strategic studies.

IEEP focuses primarily on European Union (EU) environmental and sustainable development policies, and relevant aspects of other policies such as agriculture, transport, rural and regional development and fisheries. It is also actively engaged in the development of policy at a national level in Europe. The Institute seeks both to raise awareness of the policies that shape the European environment and to advance policy-making along sustainable paths.

IEEP undertakes research and analysis and provides consultancy and information services, working both independently and on commissioned projects. Its partners and audience range from international and European institutions to local government, non-governmental organisations (NGOs), industry and others who contribute to the policy debate. It has regular contact with the full range of policy actors.

IEEP operates in a network with like-minded institutes in Europe. The interdisciplinary team of staff includes lawyers and natural and social scientists with experience of working in a wide range of European countries. It collaborates closely with a network of associates in universities, other specialist institutes and consultancy organisations across the continent. The London office of IEEP was founded in 1980, the Brussels office in 2001.

For further information see www.ieep.org.uk

