

# Towards a Waste and Resource Management Research and Development Strategy – a discussion document

## DRAFT

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## Towards a Waste and Resource Management Research and Development Strategy – a discussion document

### 1.1 Introduction

In the past 10 years waste management has come to be at the centre of EU and national environment policy. During this time substantial progress has been made in relation to waste recovery/recycling, improvement of environmental standards in waste management infrastructure, and control and regulation of waste. From almost full dependence on landfilling of waste in this country substantial progress has been achieved, with for example a current municipal waste recovery rate of 34% in 2004. Implementation of Regional Waste Management Plans across the country has resulted in development of a modern waste infrastructure system that is capable of working towards national policy objectives and targets in relation to waste management.

However, substantial progress remains to be made in many areas of waste management including for example; waste prevention and reduction of overall waste arisings, improved diversion of biodegradable waste from landfill, development of home markets for recycled materials, waste data control/management generally (C&D waste in particular), prevention of fly-tipping and back yard burning of waste and lack of provision/uptake of waste collection services.

Likewise the sustainable use of resources, involving sustainable production and consumption and incorporating modern and sustainable waste management practices is crucial to maintaining and improving environmental standards, the functioning of our economy and to our quality of life.

Systems of improved resource efficiency, together with a reduction in the negative environmental impact of resource use is required *i.e.* decoupling environmental impacts from economy growth, will have to be integrated into policy making – and research and development in this area will serve to inform these policies.

### 1.2 The EPA ERTDI Research programme (2007-2013)

The objectives of the EPA research programme (2007-2013) are to build on the success of existing work carried out and to:

- Contribute to a better environment by delivering applicable and relevant RTDI data, information and knowledge based on high quality science and technology,
- Develop new techniques, methods and systems for measuring, recording and predicting the quality of the environment,
- Develop practical methods for the integration of environmental considerations into policies and programmes of the main economic sectors,
- Support the EPA's strategic goals through collaborative relationships by providing high-quality, relevant, responsive and timely scientific information and research results,
- Increase and sustain the number of active, productive researchers in all Environmental-related disciplines at Third Level Institutions,

- Promote strategic alliances and partnerships (multi-institutional and interdisciplinary) among Irish (and non-Irish) researchers to undertake integrated research in areas of mutual interest,
- Continue to develop and integrate the environmental component of the knowledge economy,
- Disseminate the findings of the individual research projects and the overall programme to the widest possible audience in a coherent and timely manner,
- Manage the research programme to the highest standards with respect to project/programme evaluation and ensuring optimal value for money for stakeholders, and
- Co-ordinate environmental research in Ireland.

Priority areas identified for inclusion under the Research Programme (2007-2013) include:

1. Air pollution
2. Biodiversity
3. Climate change
4. Environmental Technologies
5. Environment and Health
6. Socio-Economics
7. Soils, Land-use and Urban Environment
8. Waste and resource management
9. Water management and quality

This discussion document is concerned with item 8 – ‘Waste and resource management’

### **1.3 ‘Waste and resource management’ - discussion document and strategy objectives**

This document will serve as a beginning point and will be modified in the light of input and findings of the ‘EPA Waste and Resource Management Research Workshop’ to be held in summer 2006. Additionally, comments received from interested parties will be considered and the research areas adjusted where appropriate. The purpose of this seminar and consultation process will be to identify knowledge and technology gaps in the area of Waste and Resource Management, to identify upcoming challenges in this area and to outline the existing barriers to achieving current and future environmental and waste related targets and objectives.

A key objective of the ERTDI Research Programme generally, and the research areas outlined in this document is to develop capacity and provide support for research groups working in the area of Waste and Resource Management.

Ultimately the aim of this discussion document is to generate a strategy for research and development which will improve waste and resource management practices and achieve environmental objectives. These practices and objectives are detailed in national and EU policies and have recently been outlined for example in the EU ‘Thematic Strategy on the prevention and recycling of waste’ and the ‘Thematic Strategy on the Sustainable Use of Natural Resources’.

More specifically, it is intended that research and development carried out under this programme will result in the following:

- Continuing to move waste flows away from landfill.
- The channeling of wastes into a variety of options higher up the waste hierarchy, resulting in for example more composting and energy recovery from waste
- Increased recycling of certain waste streams (including more markets, higher recycling rates and higher quality recycled end products)
- Implementation of prevention programmes resulting in the elimination on waste before it arises
- Reducing resource consumption and improving resource efficiency
- Improving recycling rates and green procurement
- Developing integrated product policy (IPP)

#### **1.4 Research Themes**

This document outlines a number of Research Themes (and sub-Themes) to tackle many of the problems identified in the area of waste management, with suggested areas of Research and Development detailed. These areas have been highlighted due to the need for research and development as directed from various reports, policies and findings of previous research in the area of Waste Management. These themes are outlined as follows:

**Theme 1. Waste Prevention and Minimisation**

**Theme 2. Waste Technologies:**

- **Sub-theme 2.1: Waste Recovery - methods, processes, initiatives and opportunities**
- **Sub-theme 2.2: Other areas of waste management (including disposal and residual waste management)**

**Theme 3. Resource Management**

**Theme 4. Market, Social and Management aspects of waste**

- **Sub-theme 4.1: Market & outlet development for waste derived resources**
- **Sub-theme 4.2: Society & behavioural aspects of waste management**
- **Sub-theme 4.3: Management tools, economics & the cost of waste management**

**Theme 5. Impact of waste management processes and facilities**

Where a need is demonstrated for research in areas not specifically referred to in this document it shall be considered on its merits. This document is not meant to be prescriptive, rather to suggest areas of research, and act as a discussion document. Well-argued and presented proposals that address areas not listed but of clear relevance to waste and resources management will also be considered.

#### **1.5 Funding**

The EPA intends to commit significant funding to projects under this programme, if a sufficient number of high quality proposals are received. As outlined above this document is not a call for projects, rather an exercise in determining research priority areas and knowledge gaps.

It is intended that following specific research calls, large infrastructural or large outlay/multi institutional projects will be funded as an initial priority. Subsequent calls for specific and more defined research areas will be published, outlining more focused projects suitable for PhD Research formats.

## Theme 1. Waste Prevention and Minimisation

*Research and development work carried out under this theme should look at how prevention and minimisation efforts can be investigated and implemented. This work should result in an increased understanding of waste generation patterns along with lower waste quantities being generated.*

### Possible Research and Development Areas

- Research and development in waste reduction in production processes through minimisation, prevention and elimination – e.g. packaging prevention, elimination of hazardous wastes generated from production processes, substitution of difficult materials/wastes, improved process control/process optimisation etc.
- Implementation of waste prevention methodologies e.g. through Industrial/Commercial settings and/or State bodies.
- Improved product design (Eco-design and design for disassembly) with specific design aspects being addressed for improved recycling rates or design for product repair/reuse
- Development and demonstration of household waste prevention methodologies, including both producer and consumer (i.e. householder) aspects.
- Development of waste prevention and minimisation through the framework of internal local authority Environmental Management Systems (EMS) or likewise in manufacturing industries
- Development of better product design to increase lifespan of products or ease of repair of products.
- Development of policy and legislative tools to encourage and develop Waste Minimisation and Prevention practices and behaviour patterns.
- Research and development into Zero Waste and Zero Emissions waste processes and waste elimination.

## Theme 2. Waste Technologies

### 2.1 Sub-theme: Waste recovery - methods, processes, initiatives and opportunities

*Research and development work carried out under this sub-theme should look at how increased waste recovery rates can be achieved, including for example diverting more waste from disposal, generating higher quality/more suitable recovered products, and improving waste recovery efficiency and techniques.*

### Possible Research and Development Areas

- Development of improved process control systems in waste management processes e.g. on-line sensors and monitoring systems in biological waste processing or other waste treatments
- Specific examination and development of re-use and recycling of 'difficult wastes' e.g. industrial and hazardous wastes. This could for example include mining wastes, oils, solvents slags etc.
- Developing waste management guidelines prior to waste generation in order to improve waste management practices e.g. guidelines for demolition of buildings with a view to increasing efficiencies of C&D Waste recovery
- Research and development into the diversion of organic waste from landfill. This could include developing capacity for smaller decentralized composting facilities in

<p>Ireland, examining home composting, community composting, proactive screening of companies who might be suitable for on-site composting, use of insulated/powered composting for single house to hotel/institution scale and on-farm composting methodologies.</p>
<ul style="list-style-type: none"> <li>- Examination of opportunities for development of the indigenous recycling industry (in cooperation with the Markets Development Group where appropriate)</li> </ul>
<ul style="list-style-type: none"> <li>- Examining the use of waste derived resources in areas where they can replace the existing use of non-waste resources (e.g. compost and C&amp;D waste in soil manufacture or fertilizer/soil conditioner). This work could include product trials and further product development.</li> </ul>
<ul style="list-style-type: none"> <li>- Developing quality assurance schemes and voluntary (industry-led) standards defined by user groups in order to encourage increased utilisation of waste derived resources. Products could include plastics, paper, compost and C&amp;D wastes.</li> </ul>
<ul style="list-style-type: none"> <li>- Examination of new processes and technological developments in the area of sorting and processing of dry recyclables. This could include mechanical, optical (e.g. various sensors, X-ray, Near Infra-Red(NIR), TV cameras) and other screening, sorting and processing technologies.</li> </ul>
<ul style="list-style-type: none"> <li>- Improving the quality of C&amp;D waste information available, including for example further development of waste indicator/factor tools or development of waste data collection methodologies.</li> </ul>
<ul style="list-style-type: none"> <li>- Analysing the efficiencies of various waste collection and segregation schemes and the resulting recovery rates to examine differences caused by the choice of collection/segregation scheme.</li> </ul>
<ul style="list-style-type: none"> <li>- Identification and targeting of new waste streams with potential to be included within new/existing producer responsibility programmes.</li> </ul>
<p><b>2.2 Sub-theme: Other areas of waste management (including disposal and residual waste management)</b></p> <p><i>Research and development work carried out under this sub-theme should look at the environmental and other impacts of waste disposal and management of residual wastes. This includes for example looking at thermal treatment of wastes, impacts of locating waste facilities on local areas, and impacts of closed landfills.</i></p>
<p><b>Possible Research and Development Areas</b></p>
<ul style="list-style-type: none"> <li>- Development of bioremediation processes and techniques in the treatment of waste and contaminated materials.</li> </ul>
<ul style="list-style-type: none"> <li>- Development of new and improved collection schemes for waste, examining possibilities for increasing efficiencies, increased integration of collections and improved logistical efficiencies.</li> </ul>
<ul style="list-style-type: none"> <li>- Applications and development of pyrolysis systems and handling and/or processing of residual waste arising from pyrolysis.</li> </ul>
<ul style="list-style-type: none"> <li>- Research and development of Incineration methods and practices; including heat recovery issues, control of waste inputs, emissions and processes, co-incineration of hazardous waste etc. This could also include research and development in alternative thermal treatment technologies including pyrolysis and gasification</li> </ul>
<ul style="list-style-type: none"> <li>- Development of methodologies and/or facilities for the small-scale testing of treatment conditions and emissions for thermally treated wastes (e.g. test burn facilities).</li> </ul>
<ul style="list-style-type: none"> <li>- Development of improved and/or novel waste management practices within the mining/extractive industry.</li> </ul>

<ul style="list-style-type: none"> <li>- Research and development of odour emission reduction methods/technologies from waste management facilities and modern operational landfills. This could include for example novel monitoring methods (e.g. Remote Sensing, Thermal Infra-Red Imaging), changing of operational practices, and use of odour amelioration/reducing techniques (e.g. biofiltration using natural temporary/daily capping).</li> </ul>
<ul style="list-style-type: none"> <li>- Development of remote sensing techniques to aid monitoring of environmental issues, such as; <ul style="list-style-type: none"> <li>Rate of settlement/differential settlement of landfills</li> <li>Landfill height and volume/void space calculations</li> <li>Fugitive gas emissions and landfill gas plume dispersion,</li> <li>Increased accuracy in quantification of greenhouse gas emissions</li> <li>Landfill site selection using remote sensing and GIS</li> </ul> </li> </ul>

### Theme 3. Resource Management

*Research and development work carried out under this theme should look at how examination of resource, waste and material flows and development of efficiencies can lead to lower resource use and decreased waste generation.*

#### Possible Research and Development Areas

<ul style="list-style-type: none"> <li>- Understanding resource flows and examining existing and potential future sustainable consumption patterns</li> </ul>
<ul style="list-style-type: none"> <li>- Research and development into the application of Life-cycle thinking and integration of LCA (Life Cycle Analysis) into Waste Management Planning – this could include implementing LCA procedures on a specific waste stream – e.g. a C&amp;D waste stream in a city compared to a regional town.</li> </ul>
<ul style="list-style-type: none"> <li>- Development of guidelines for management of various waste streams, based on LCA (Life Cycle Analysis). Work could examine environmental and economic impacts and compare resulting waste management recommendations with the waste hierarchy.</li> </ul>
<ul style="list-style-type: none"> <li>- Incorporation of Integrated Product Policy (IPP) and Integrated Product Design (IPD) policies into the decision making process, developing tools for facilitating IPP in budgetary considerations, and general communication of the Integrated Product Policy methodology.</li> </ul>
<ul style="list-style-type: none"> <li>- Developing specific programmes of Integrated Product Policy (IPP) and Integrated Product Design (IPD) with a view to reducing the environmental impact of waste arisings (e.g. lower quantities of waste, lower environmental significance of waste etc.)</li> </ul>
<ul style="list-style-type: none"> <li>- Examining the impact of potential future waste elimination, prevention and minimisation efforts on recovery rates and targets, and possible conflict due to design of tonnage/percentage recovery targets. (e.g. successful elimination of wastes formerly recycled resulting in higher disposal %)</li> </ul>
<ul style="list-style-type: none"> <li>- Development of research flow methodologies and application in the Irish environment including for example mass balance studies, Material Flows Accounting etc. This could look at their use in determining waste generation/prevention progress and informing policy decisions</li> </ul>
<ul style="list-style-type: none"> <li>- Studies of existing baseline waste information and predicting change of the residual composition of municipal solid waste in future (e.g. 10 years). This could include the implications of predicted MSW composition change e.g. potential increasing elimination of organics, increasing elimination of high calorific</li> </ul>

packaging/decreasing fuel value of waste <i>etc.</i>
- Developing our understanding of resource flows, resource flow methodologies and how these relate to waste generation and waste management.
- Examination of the 'decoupling' of the increase in generation of various waste streams from economic activity in various sectors.

## Theme 4. Market, social & management aspects of waste

### 4.1 Sub-theme: Market and outlet development for waste derived resources.

*Research and development work carried out under this sub-theme should look at the development of market and non-market outlets for waste derived resources and recycled materials. It should be noted that the **National Strategy on Biodegradable Waste (2006)** refers specifically to developing markets for compost products, and potential initiatives in this area. Additionally, a Market Development Group has been established – focussing on paper, plastics and compost. Any proposed R&D in this area should be carried out in the light of these initiatives.*

#### Possible Research and Development Areas

- Development of market and non-market outlets for recycled or potentially recyclable wastes.
- Demonstration of beneficial use of products derived from wastes. This could include *e.g.* use of organics, C&D and plastic derived wastes in the substitution of non-waste resources *etc.*
- Examination of potential for use of wastes as RDF/Biofuels. This work could include;
  - Assessment of emissions
  - Assessment of the energy value of the RDF/Biofuels
  - Investigation of technologies for burning RDF/Biofuels
  - Assessment of the economics of the RDF/Biofuels
- Development of White Biotechnologies, including for example recovery of high value products from food waste (*e.g.* vitamins).
- Examination of the use and development of procurement guidelines for the creation of markets for recycled materials. Potential quantities involved, relevant waste types, potential benefits from use of waste material *etc.*
- Development and application of existing tools for the creation of markets/outlets for recycled wastes. This could include localisation/contextualising existing tools from other jurisdictions - taking account of domestic considerations including market size, market conditions, local regulations and economic environment.
- Encouraging and developing waste exchange, based on existing waste information systems, databases and contact lists.

### 4.2 Sub-theme: Society and behavioural aspects of waste management.

*Research and development work carried out under this sub-theme should look at how waste management and society interact, and could include such items as the impacts of locating waste management facilities on communities, how people segregate waste in the home, and impact of new waste schemes on how people treat their waste (*e.g.* increased recycling and/or fly-tipping).*

#### Possible Research and Development Areas

- Examination of the possible benefits which could be provided to communities within which waste management facilities are located. Relevant aspects could include the

<p>various incentives, amenities, and advantages which could be provided in given situations and provide a framework for determining and implementing the provision of such measures.</p>
<ul style="list-style-type: none"> <li>- Developing increased consumer awareness of the need for changing lifestyles and developing more sustainable consumption patterns.</li> </ul>
<ul style="list-style-type: none"> <li>- Understanding behaviour of householders in order to optimise home collection systems and home composting and develop more effective publicity campaigns, public guidance notes, collection methods <i>etc.</i></li> </ul>
<ul style="list-style-type: none"> <li>- Analysis of the factors determining public acceptability of waste management facilities. This could examine existing situations and successful/unsuccessful efforts to develop acceptability with neighbours, including consultation/dialogue models, and ongoing communication both pre-construction and post-construction/operation.</li> </ul>
<ul style="list-style-type: none"> <li>- Examining the improved valuation of social and public aspects in the determination of waste management options and methodologies.</li> </ul>
<ul style="list-style-type: none"> <li>- Implications, effects and further examination of new waste management and collection policies.</li> </ul>
<ul style="list-style-type: none"> <li>- Examining the extent to which modern waste management facilities have affected property values in their locality.</li> </ul>
<ul style="list-style-type: none"> <li>- Examining causes and solutions to municipal waste not currently being collected/managed within appropriate collection schemes</li> </ul>
<ul style="list-style-type: none"> <li>- Social and ethical aspects of waste management <i>e.g.</i> the moral, ethical, legal and economic cost of the export of waste to countries where there are lower environmental protection standards for its treatment and handling.</li> </ul>
<ul style="list-style-type: none"> <li>- Developing designs of Civic Waste Facilities and other types of waste management infrastructure in terms of the public interaction with the infrastructure and facility staff – with a view to increased usage and segregation efficiencies.</li> </ul>
<p><b>4.3 Sub-theme: Management tools, economics and the cost of waste management</b></p> <p><i>This area of work should look at the overall costs of waste management and management tools which can be used in decision making for waste management purposes.</i></p>
<p><b>Possible Research and Development Areas</b></p>
<ul style="list-style-type: none"> <li>- Examine the economics of solutions to existing waste management issues <i>e.g.</i> the cost benefit of providing fixed and mobile Construction/Demolition Recycling facilities in the regions</li> </ul>
<ul style="list-style-type: none"> <li>- Examining the practicalities of measuring and benchmarking data in relation to progress on waste prevention</li> </ul>
<ul style="list-style-type: none"> <li>- The economic and social benefit of provision of more decentralised waste management options <i>e.g.</i> the development and viability of small scale Recycling Centres in rural areas.</li> </ul>
<ul style="list-style-type: none"> <li>- Development of regional and national audit programmes to verify waste management data <i>e.g.</i> to improve the integrity of data provided by collection permit and waste permit holders and to ensure that reported collection and management of household and commercial waste is accurate.</li> </ul>
<ul style="list-style-type: none"> <li>- Development of improved Data Collection Systems for Waste (<i>e.g.</i> Waste Permitting, Annual Environmental Reports, IPPC waste returns <i>etc.</i>) to ensure that new &amp; existing waste facilities have the necessary technology &amp; methodology to collect &amp; track data of local authority data gathering initiatives.</li> </ul>
<ul style="list-style-type: none"> <li>- Developing uniform user-friendly, accurate and representative data</li> </ul>

management/reporting methodologies for generators of waste.
- Development of policy and legislative tools to ensure more accurate and representative waste data reporting <i>e.g.</i> mandatory maintenance and reporting of waste data for C&D waste generators
- Examining the cost-benefit of various waste management options <i>e.g.</i> cost of poor waste management, cost of delays in providing integrated waste management <i>etc.</i>
- Examining the implementation of further waste/environmental taxes with a view to waste reduction and sustainable use of resources
- Development a decision support tools for Local Authorities and Private operators for selecting appropriate Waste processing/management technology (including appropriate environmental abatement).

## Theme 5. Impact of waste management processes and facilities

*This area of work should look at the direct impacts of waste management processes and facilities on the environment including such issues as air quality, groundwater impacts, health effects etc.*

### Possible Research and Development Areas

- Examination of increasingly reported problems with occupational health in the waste recycling and processing industry.
- Research in to the impact of closed waste management facilities. This could include for example; Old/Closed Landfill Greenhouse Gas Control - assessing greenhouse gas emissions from candidate old/closed landfills and field trialing of Stabilised Biowaste (SBW)/other composts covers as mitigating measures.
- Examining the health effects of landfilling and/or incineration of waste – further development of baseline data and health risk assessments.
- Examining the environmental/health effects of organic waste management facilities in order to guide the development of future monitoring activities. This could include an evaluation of existing data and carrying out of further monitoring and assessment <i>e.g.</i> bioaerosol monitoring
- Assessment of comparative risk caused by modern waste management facilities compared to other common environmental hazards ( <i>e.g.</i> traffic emissions, household chemicals <i>etc.</i> ). This should be an exposure based comparison.
- Exposure assessment outside the boundaries of modern waste management facilities due to emissions from waste management processes. This could include ambient monitoring and receptor based monitoring ( <i>e.g.</i> houses/dwellings)
- Examination and development of opportunities for energy efficiencies and opportunities for reduced energy use within modern waste management facilities

## **Annexe 1: Key national and international polices, plans, strategies, legislation and initiatives**

*Many groups and initiatives both Government/ State Agency and Industry led are working towards achieving national waste policies including:*

- National Waste Prevention Programme – EPA  
<http://www.epa.ie/TechnicalGuidanceandAdvice/NationalWastePreventionProgramme/>
- Markets Development group - Appointed by the Minister for the Environment, Heritage and Local Government [www.environ.ie](http://www.environ.ie)
- Various initiatives under the EPA's Environmental Research,
- Technological Development and Innovation (ERTDI) Programme (e.g. Cleaner Greener Production Programme) <http://www.cleanerproduction.ie/>
- National Construction and Demolition Waste Council [www.ncdwc.ie](http://www.ncdwc.ie)
- Race Against Waste [www.raceagainstwaste.com](http://www.raceagainstwaste.com)
- REPAK [www.repak.ie](http://www.repak.ie)
- Enterprise Ireland's Environmentally Superior Products Programme Programme. <http://www.envirocentre.ie/home.asp>

*Significant policies, regulations and plans in this area include*

- Changing Our Ways (1998)
- Landfill Directive (1999/31/EC)
- Packaging Directive (94/62/EC)
- EPA National Hazardous Waste Management Plan 2001
- Preventing and Recycling Waste – Delivering Change (2002).
- 2000/53/EC on end-of-life vehicles directive
- Waste Electrical and Electronic Equipment (WEEE) Directive
- Regional Waste Management Plans
- National Climate Change Strategy 2000

*Documents and other sources of information consulted during this process include:*

- Various Regional Waste Management Plans
- Local Authorities and Government Departments
- Private Waste Operators and other stakeholders in the Waste Management Sector
- Third Level Research Institutions
- Environmental Protection Agency [www.epa.ie](http://www.epa.ie)
- EPA National Waste Database reports
- National Construction and Demolition Waste Council
- Construction Industry Federation [www.cif.ie](http://www.cif.ie)
- Cré- The Composting Association of Ireland [www.compostireland.ie](http://www.compostireland.ie)
- European Compost Network [www.compostnetwork.info](http://www.compostnetwork.info)

The following documents, policies and initiatives were also consulted, and links are included which are useful sources of information for further review and research:

<p>- <b>Thematic Strategy on the prevention and recycling of waste</b> - This Strategy outlines a combination of measures promoting waste prevention, recycling and re-use in such a way as to reduce the overall environmental impact of waste.</p>	<p><a href="http://europa.eu.int/comm/environment/waste/strategy.htm">http://europa.eu.int/comm/environment/waste/strategy.htm</a></p>
<p>- <b>Thematic Strategy on the Sustainable Use of Natural Resources</b> - This strategy emphasises the importance of integration of environmental concerns into other policies that affect environmental impacts of natural resources use</p>	<p><a href="http://europa.eu.int/comm/environment/natres/index.htm">http://europa.eu.int/comm/environment/natres/index.htm</a></p>
<p>- <b>Towards a Thematic Strategy for Soil Protection</b> This strategy consists <i>inter alia</i> of a revision to the Sewage Sludge Directive, and relates to compost and other biowaste and the previous proposed Biowaste Directive</p>	<p><a href="http://europa.eu.int/comm/environment/soil/index.htm">http://europa.eu.int/comm/environment/soil/index.htm</a></p>
<p>- <b>Promoting environmental technologies: Sectoral analyses, barriers and measures.</b> A Report from the Sustainable Production and Consumption Issue Group (including contributions from various EU DG's and the Institute for Prospective Technological Studies) in relation to Environmental Technologies.</p>	<p><a href="http://europa.eu.int/comm/environment/etap/pdfs/spc_final_report_ipts.pdf">http://europa.eu.int/comm/environment/etap/pdfs/spc_final_report_ipts.pdf</a></p>
<p>- <b>6<sup>th</sup> EU Community Environmental Action Plan</b> – Sets four environmental priority areas for the EU and reviews progress towards targets set</p>	<p><a href="http://europa.eu.int/comm/environment/newprg/index.htm">http://europa.eu.int/comm/environment/newprg/index.htm</a></p>
<p>- <b>EU 7<sup>th</sup> Framework Programme</b> - (Waste) A collection of presentations in conjunction with the EU Commission given where future research needs and projects were discussed.</p>	<p><a href="http://forum.europa.eu.int/Public/irc/rtd/eesdwatkeact/library?l=/workshops_research&amp;v=m=detailed&amp;sb=Title">http://forum.europa.eu.int/Public/irc/rtd/eesdwatkeact/library?l=/workshops_research&amp;v=m=detailed&amp;sb=Title</a></p>
<p>- <b>Department for Environment, Food and Rural Affairs - Waste and Resources R&amp;D Strategy</b> A document outlining a three year strategy by Defra to develop and implement a new Waste and Resources R&amp;D programme.</p>	<p><a href="http://www.defra.gov.uk/environment/waste/wip/research/index.htm">www.defra.gov.uk/environment/waste/wip/research/index.htm</a></p>
<p>- <b>National Strategy on Biodegradable Waste (2006)</b> Recently published strategy for the management of Biodegradable Waste in Ireland.</p>	<p><a href="http://www.environ.ie/DOEI/doeipub.nsf/0/240abc2e06d4d1908025714800372a91/\$FILE/Biodegradable%20Waste.pdf">http://www.environ.ie/DOEI/doeipub.nsf/0/240abc2e06d4d1908025714800372a91/\$FILE/Biodegradable%20Waste.pdf</a></p>
<p>- <b>WRAP-UK (Waste Resources Action Programme)</b> – This site details various marketing and waste product related research</p>	<p><a href="http://www.wrap.org.uk">www.wrap.org.uk</a></p>
<p>- <b>National Overview of Waste Management Plans. DEHLG, Ireland DEHLG (2004).</b> This report presents a picture of the current state of progress in relation to each regional waste management plan</p>	<p><a href="http://www.environ.ie/DOEI/doeipub.nsf/0/22eb358f59499ce280256f0f003db978/\$FILE/Waste%20Management%20Plan.pdf">http://www.environ.ie/DOEI/doeipub.nsf/0/22eb358f59499ce280256f0f003db978/\$FILE/Waste%20Management%20Plan.pdf</a></p>
<p>- <b>EPA National Waste Report 2004.</b> This report presents national statistics on waste generation and management in Ireland.</p>	<p><a href="http://www.epa.ie/NewsCentre/ReportsPublications/Waste/FileUpload.8578.en.pdf">http://www.epa.ie/NewsCentre/ReportsPublications/Waste/FileUpload.8578.en.pdf</a></p>

<p>- <b>Communication from the EU Commission on Integrated Product Policy.</b> The EU Integrated Product Policy is aimed at reducing resource use and the environmental impact of waste and refers to Life Cycle Assessments as the best framework for assessing the potential environmental impacts of products</p>	<p><a href="http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2003/com2003_0302en01.pdf">http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2003/com2003_0302en01.pdf</a></p>
<p>- <b>European Platform on Life Cycle Assessment (LCA)</b> This forum provides a platform to facilitate communication and exchanges on life-cycle data.</p>	<p><a href="http://europa.eu.int/comm/environment/ipp/lca.htm">http://europa.eu.int/comm/environment/ipp/lca.htm</a></p>
<p>- <b>Draft EPA Research Strategy.</b> This document outlines future research strategy in a number of key areas relating to environmental research in this country.</p>	<p><a href="http://www.epa.ie">www.epa.ie</a></p>
<p>- <b>The Nature and Extent of Unauthorised Waste Activity in Ireland (EPA, 2005)</b> This report details a nationwide investigation by the EPA's Office of Environmental Enforcement (OEE) on the nature &amp; extent of unauthorised waste management activities in Ireland since 1996.</p>	<p><a href="http://www.epa.ie/NewsCentre/ReportsPublications/Waste/FileUpload/7788.en.pdf">http://www.epa.ie/NewsCentre/ReportsPublications/Waste/FileUpload/7788.en.pdf</a></p>