

EPA-Funded Research: Waste and Resource Management

Reports from completed projects are available on the EPA website at www.epa.ie/downloads/pubs/research/waste/

During the ERTDI Programme 2000-2006, 49 research projects were funded in the area of Waste and Resource Management, including:

- 5 Contributory scholarships
- 7 Desk studies
- 8 Doctorate projects
- 4 Fellowships
- 5 Large-scale studies
- 7 Medium-scale studies
- 13 Small-scale studies
- 49 Total projects**

49 EPA (2000 – 2006) Projects indexed by

Year and Content

Lead Organisations

Project Leaders

Year and Content:

<i>2000-DS-2-M1</i>	<i>Inventory for Dioxins and Furans</i>
<i>2000-DS-3-M1</i>	<i>Procedure for the Identification of the Hazardous Components of Waste</i>
<i>2000-DS-6-M1</i>	<i>Effects of Weight Based Charges on Solid Waste Disposal</i>
<i>2000-LS-1a-M2</i>	<i>Environmentally Sustainable Conversion Options for Large Volume Organic Wastes</i>
<i>2000-LS-1b-M2</i>	<i>Environmentally Sustainable Conversion Options for Large Volume Organic Wastes</i>
<i>2000-MS-6-M1</i>	<i>Outlets for Compost from Municipal Waste</i>
<i>2000-MS-7-M1</i>	<i>Characterisation of Non-Household Municipal Waste in Ireland and the Development of an Approach to Tracking Municipal Waste Composition</i>
<i>2000-MS-8-M1</i>	<i>Outlets for Materials Recovered from Municipal Waste</i>
<i>2000-MS-10-M1</i>	<i>Environmental Benchmarking for IPC Industries</i>
<i>2000-MS-12-M1</i>	<i>Methodology for the Assessment of Hazardous Waste Disposal</i>
<i>2000-SS-3-M1</i>	<i>Development of Analytical Systems for the Profiling of Microbial Biodegradatory Activity in Soils Contaminated by Creosote</i>

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2000-SS-5-M2	<u>Development of a Database of All Marketing, Educational and Research Activity Developed by Local Councils to Promote Awareness of Waste Issues and Maximise Participation in Waste Reduction Initiatives</u>
2000-SS-6-M1	<u>Microbial Efficacy Testing for Healthcare-Risk Waste Facilities</u>
2001-CS-3-M1	<u>Phenylacetic Acid Derivatives to PHA</u>
2001-CS-4-M1	<u>Halophenols and their Derivatives</u>
2001-CS-6-M1	<u>Assessment of the Effect of Surfactants on Microbial Degradation of Xenobiotic Compounds</u>
2001-CS-10-M1	<u>High Pressure Combustion of Various Fuels</u>
2001-CS-11-M1	<u>Identifying the Toxicity of Sediments Using an Exotoxicology Hierarchy as Set by Deplege (1993)</u>
2001-DS/WM1-M1	<u>Assessment and Development of a Waste Prevention Framework for Ireland</u>
2001-LS/FW1-M1	<u>A Biotechnological System for Production of Value-Added Products, Bioethanol and Methane from Non-Animal Food Wastes with Emphasis on Hygiene Aspects</u>
2001-LS-FW2-M1	<u>Biological Approaches to Nutrient Removal in the Irish Food Sector</u>
2001-LS-FW3-M1	<u>Assessment of Vermicomposting Techniques for the Treatment of Dairy Processing WWT Sludge</u>
2001-MS/W1-M1	<u>Waste Electrical and Electronic Equipment (WEEE) Collection Trials in Ireland</u>
2001-PHD-12/44-M1	<u>Physiology and Genetics of Flouranthene Degradation by Pseudomonas Alcaligines PA-10, Potential for Bioremediation/Rhizoremediation Pf Polycyclic Hydrocarbon Contaminated Ecosystems</u>
2001-PHD-5-M1	<u>Development of a Novel Biosensor for the Rapid Detection of Phenols in Environmental Samples</u>
2001-PHD-6-M1	<u>Environmental Attitudes and Behaviour, Values, Actions and Waste Management</u>
2001-WMWS/MS-1/2	<u>The Development of a Waste Audit Methodology for the Identification and Quantification of Construction and Demolition Wastes Arising in Ireland</u>
2002-PHD2-20	<u>Biodegradation of Sheep Dip Wastes as an Environmentally Safe Method of Disposal</u>
2002-PHD2-28	<u>Hybrisense: Electrochemical DNA Hybridisation Sensors for Application to Environmental Diagnostics</u>

2002-PHDe-3/5	<u>Environmental Predictors of Metal Contamination in the Vicinity of Abandoned Mine Sites (Silvermines)</u>
2003-COE-FS8-M4	<u>Data Integration and Statistical Analysis to Support and Advance the Implementation of EU and Irish Water and Waste Policy</u>
2003-FS-CD-LS-11	<u>A Biological System for Production of Value-Added Products, Bio-Ethanol and Methane from Non-Animal Food Wastes with Emphasis on Hygiene Aspects</u>
2003-SS-11-M1	<u>Developing Design and Monitoring Specifications for Landfill Gas Flares</u>
2003-SS-13	<u>Preparation of an Historic Review of the Success of Mine Tailings and Other Mine Waste Rehabilitation at the Tynagh Mine in Ireland</u>
2003-SS-17-M	<u>A Preliminary Epidemiological Survey of the Cryptosporidium Biotypes in Pig Slurry From Pig Farms of Ireland and Assessments for Reviewing the Potential Environmental Health Risks for Its Safe Disposal</u>
2003-SS-18-M1	<u>Recycling and Reuse of Spent Motor Vehicle Coolants</u>
2003-SS-19	<u>The Use of Geosynthetics in Landfills</u>
2004-PHD4-8-M1	<u>A Rapid Compression Machine and Complementary Modelling Study of an Alternative Diesel Fuel</u>
2004-SS-29-M1	<u>Treatment of Toxic Metals in Industrial Wastewaters and Contaminated Groundwaters Using Irish Seaweeds</u>
2005-FS-30-M1	<u>Pharmaceutical Residues within Sewage Sludges</u>
2005-PHD5-GIS-8	<u>GIS for Biodegradable Municipal Waste Management</u>
2005-SS-31-M1	<u>Green Wheelie Bin Project (GWB) – Achieving Greater Participation and Knowledge in Household Recycling. Utilising an already Existing Service</u>
2005-SS-32-M1	<u>The Effects of Harvesting on Biomass Growth and Nutrient Uptake Rates in Williamstown Constructed Wetland</u>
2005-SS-35-M1	<u>Instrumentation and Monitoring Requirements for Treatment Wetlands</u>
2005-SS-44-M1	<u>The Potential for Combined Heat and Power Units for Recycled Wood</u>
2005-WRM-DS-23	<u>Organic Waste Management in Multi-storey Dwellings and the Use of In-Sink Macerators</u>
2005-WRM-MS-33	<u>Evaluating Domestic Waste Collection Charges and their Impacts: a Nationwide Study of Weight and Use Based Mechanisms</u>

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- 2005-WRM-MS-34 [*Implementation of a Community Composting Programme in an Urban Environment for the Production of High Grade Quality Compost to Be Used in Growth Trials to Promote the Beneficial Qualities of Compost Use and Develop Markets Outlets for its Distribution*](#)
- 2005-WRM-MS-35 [*MBT – Has It an Irish Role?*](#)
- 2006-FS-NE-38-M4 [*Modelling National Emissions to Air and Water*](#)
- 2006-SS-5-M1 [*Developing a Novel Ecological Footprint \(EF\) Assessment Model for Schools*](#)
- 2006-WRM-DS-26 [*To Develop an Industry Led Quality Standard for Composted Materials Produced in Ireland*](#)
- 2007-WRM-DS-28 [*Capacity Building for Decentralised Organic Waste Management and Composting in Ireland*](#)

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Lead Organisations:

Ballymun Regeneration Limited

2005-WRM-MS-34 [Implementation of a Community Composting Programme in an Urban Environment for the Production of High Grade Quality Compost to Be Used in Growth Trials to Promote the Beneficial Qualities of Compost Use and Develop Markets Outlets for its Distribution](#)

Clean Centre Technology

2000-DS-3-M1 [Procedure for the Identification of the Hazardous Components of Waste](#)

2000-MS-7-M1 [Characterisation of Non-Household Municipal Waste in Ireland and the Development of an Approach to Tracking Municipal Waste Composition](#)

2000-MS-8-M1 [Outlets for Materials Recovered from Municipal Waste](#)

2000-MS-10-M1 [Environmental Benchmarking for IPC Industries](#)

2001-DS/WM1-M1 [Assessment and Development of a Waste Prevention Framework for Ireland](#)

Composting Association of Ireland (Cré)

2006-WRM-DS-26 [To Develop an Industry Led Quality Standard for Composted Materials Produced in Ireland](#)

2007-WRM-DS-28 [Capacity Building for Decentralised Organic Waste Management and Composting in Ireland](#)

Cork Institute of Technology

2001-MS/W1-M1 [Waste Electrical and Electronic Equipment \(WEEE\) Collection Trials in Ireland](#)

CyberColloids Limited

2004-SS-29-M1 [Treatment of Toxic Metals in Industrial Wastewaters and Contaminated Groundwaters Using Irish Seaweeds](#)

Dublin City University

2005-FS-30-M1 [Pharmaceutical Residues within Sewage Sludges](#)

Economic and Social Research Institute - ESRI

2000-DS-6-M1 [Effects of Weight Based Charges on Solid Waste Disposal](#)

Environmental and Resource Management Limited

2000-MS-6-M1 [Outlets for Compost from Municipal Waste](#)

Enviroplan Services Limited

2003-SS-13 [Preparation of an Historic Review of the Success of Mine Tailings and Other Mine Waste Rehabilitation at the Tynagh Mine in Ireland](#)

Enviros Consulting Limited

2003-SS-11-M1 [Developing Design and Monitoring Specifications for Landfill Gas Flares](#)

Fehily Timoney and Company

2005-WRM-MS-35 [MBT – Has It an Irish Role?](#)

Galway-Mayo Institute of Technology

2001-WMWS/MS-1/2 [The Development of a Waste Audit Methodology for the Identification and Quantification of Construction and Demolition Wastes Arising in Ireland](#)

GAP Ballymun

2005-SS-31-M1 [Green Wheelie Bin Project \(GWB\) – Achieving Greater Participation and Knowledge in Household Recycling, Utilising an already Existing Service](#)

Glanbia Ingredients

2001-LS-FW3-M1 [Assessment of Vermicomposting Techniques for the Treatment of Dairy Processing WWT Sludge](#)

Green Schools Committee, Ballina NS

2006-SS-55-M1 [Developing a Novel Ecological Footprint \(EF\) Assessment Model for Schools](#)

NUI Galway

2001-CS-10-M1 [High Pressure Combustion of Various Fuels](#)

2001-LS/FW1-M1 [A Biotechnological System for Production of Value-Added Products, Bioethanol and Methane from Non-Animal Food Wastes with Emphasis on Hygiene Aspects](#)

2002-PHD2-28 [Hybrisense: Electrochemical DNA Hybridisation Sensors for Application to Environmental Diagnostics](#)

2003-FS-CD-LS-11 [A Biological System for Production of Value-Added Products, Bio-Ethanol and Methane from Non-Animal Food Wastes with Emphasis on Hygiene Aspects](#)

2004-PHD4-8-M1 [A Rapid Compression Machine and Complementary Modelling Study of an Alternative Diesel Fuel](#)

2005-SS-32-M1 [The Effects of Harvesting on Biomass Growth and Nutrient Uptake Rates in Williamstown Constructed Wetland](#)

O'Callaghan Moran & Associates

2000-MS-12-M1 [Methodology for the Assessment of Hazardous Waste Disposal](#)

Phillip Farrelly & Co.

2000-LS-1b-M2 [Environmentally Sustainable Conversion Options for Large Volume Organic Wastes](#)

RPS Consulting Engineers

2005-WRM-DS-23 [Organic Waste Management in Multi-storey Dwellings and the Use of In-Sink Macerators](#)

Trinity College Dublin

2001-PHD-6-M1 [Environmental Attitudes and Behaviour, Values, Actions and Waste Management](#)

2003-COE-FS8-M4 [Data Integration and Statistical Analysis to Support and Advance the Implementation of EU and Irish Water and Waste Policy](#)

2005-WRM-MS-33 [Evaluating Domestic Waste Collection Charges and their Impacts: a Nationwide Study of Weight and Use Based Mechanisms](#)

2006-FS-NE-38-M4 [Modelling National Emissions to Air and Water](#)

University College Cork

2000-SS-6-M1 [Microbial Efficacy Testing for Healthcare-Risk Waste Facilities](#)

2001-CS-11-M1 [Identifying the Toxicity of Sediments Using an Exotoxicology Hierarchy as Set by Deplege \(1993\)](#)

2001-LS-FW2-M1 [Biological Approaches to Nutrient Removal in the Irish Food Sector](#)

2001-PHD-12/44-M1 [Physiology and Genetics of Flouranthene Degradation by Pseudomonas Alcaligines PA-10, Potential for Bioremediation/Rhizoremediation Pf Polycyclic Hydro-carbon Contaminated Ecosystems](#)

2003-SS-18-M1 [Recycling and Reuse of Spent Motor Vehicle Coolants](#)

University College Dublin

2000-SS-3-M1 [Development of Analytical Systems for the Profiling of Microbial Biodegradatory Activity in Soils Contaminated by Creosote](#)

2001-CS-3-M1 [Phenylacetic Acid Derivatives to PHA](#)

2001-CS-4-M1 [Halophenols and their Derivatives](#)

University College Dublin (continued)

- 2001-CS-6-M1 [Assessment of the Effect of Surfactants on Microbial Degradation of Xenobiotic Compounds](#)
- 2001-PHD-5-M1 [Development of a Novel Biosensor for the Rapid Detection of Phenols in Environmental Samples](#)
- 2002-PHD2-20 [Biodegradation of Sheep Dip Wastes as an Environmentally Safe Method of Disposal](#)
- 2003-SS-19 [The Use of Geosynthetics in Landfills](#)
- 2005-PHD5-GIS-8 [GIS for Biodegradable Municipal Waste Management](#)
- 2005-SS-35-M1 [Instrumentation and Monitoring Requirements for Treatment Wetlands](#)

University of Limerick

- 2000-LS-1a-M2 [Environmentally Sustainable Conversion Options for Large Volume Organic Wastes](#)
- 2002-PHDe-3/5 [Environmental Predictors of Metal Contamination in the Vicinity of Abandoned Mine Sites \(Silvermines\)](#)

URS Dames & Moore

- 2000-DS-2-M1 [Inventory for Dioxins and Furans](#)

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Project Leaders:

Barron, Dr Leon

2005-FS-30-M1

[Pharmaceutical Residues within Sewage Sludges](#)

Breen, Dr John

2002-PHDe-3/5

[Environmental Predictors of Metal Contamination in the Vicinity of Abandoned Mine Sites \(Silvermines\)](#)

Brooks, Ms Sarah

2001-CS-4-M1

[Halophenols and their Derivatives](#)

Brooks, Dr Mariel

2004-SS-29-M1

[Treatment of Toxic Metals in Industrial Wastewaters and Contaminated Groundwaters Using Irish Seaweeds](#)

Carragher, Mr Vincent

2006-SS-55-M1

[Developing a Novel Ecological Footprint \(EF\) Assessment Model for Schools](#)

Clipson, Dr Nicholas

2002-PHDe-20

[Biodegradation of Sheep Dip Wastes as an Environmentally Safe Method of Disposal](#)

Colleran, Dr Emer

2001-LS/FW1-M1

[A Biotechnological System for Production of Value-Added Products, Bioethanol and Methane From Non-Animal Food Wastes With Emphasis on Hygiene Aspects](#)

2003-FS-CD-LS-11

[A Biological System for Production of Value-Added Products, Bio-Ethanol and Methane From Non-Animal Food Wastes With Emphasis on Hygiene Aspects](#)

Coughlan, Mr Benjamin

2001-CS-11-M1

[Identifying the Toxicity of Sediments Using an Exotoxicology Hierarchy as Set by Deplege \(1993\)](#)

Cunningham, Mr Dermot

2000-MS-7-M1

[Characterisation of Non-Household Municipal Waste in Ireland and the Development of an Approach to Tracking Municipal Waste Composition](#)

2000-MS-8-M1

[Outlets for Materials Recovered from Municipal Waste](#)

2001-DS/WM1-M1

[Assessment and Development of a Waste Prevention Framework for Ireland](#)

Curran, Mr Henry

2004-PHD4-8-M1

[A Rapid Compression Machine and Complementary Modelling Study of an Alternative Diesel Fuel](#)

Dallas, Mr Bill

2003-SS-13

[Preparation of an Historic Review of the Success of Mine Tailings and Other Mine Waste Rehabilitation at the Tynagh Mine in Ireland](#)

Davies, Dr Anna

2005-WRM-MS-33

[Evaluating Domestic Waste Collection Charges and their Impacts: a Nationwide Study of Weight and Use Based Mechanisms](#)

Davies, Dr Janette

2000-SS-5-M2

[Development of a Database of All Marketing, Educational and Research Activity Developed by Local Councils to Promote Awareness of Waste Issues and Maximise Participation in Waste Reduction Initiatives](#)

Dobson, Dr Alan

2001-LS-FW2-M1

[Biological Approaches to Nutrient Removal in the Irish Food Sector](#)

2001-PHD-12/44-M1

[Physiology and Genetics of Flouranthene Degradation by Pseudomonas Alcaligines PA-10, Potential for Bioremediation/Rhizoremediation Pf Polycyclic Hydro-carbon Contaminated Ecosystems](#)

Doyle, Ms Evelyn

2000-SS-3-M1

[Development of Analytical Systems for the Profiling of Microbial Biodegradatory Activity in Soils Contaminated by Creosote](#)

Duffy, Mr Noel

2000-DS-3-M1

[Procedure for the Identification of the Hazardous Components of Waste](#)

2000-MS-10-M1

[Environmental Benchmarking for IPC Industries](#)

2001-MS/W1-M1

[Waste Electrical and Electronic Equipment \(WEEE\) Collection Trials in Ireland](#)

Farrelly & Co., Phillip

2000-LS-1b-M2

[Environmentally Sustainable Conversion Options for Large Volume Organic Wastes](#)

Foster, Mr Percy

2006-WRM-DS-26

[To Develop an Industry Led Quality Standard for Composted Materials Produced in Ireland](#)

Gallagher, Ms Sheila

2001-CS-10-M1 [High Pressure Combustion of Various Fuels](#)

Guinan, Ms Bernadette

2005-WRM-MS-35 [MBT – Has It an Irish Role?](#)

Hanahoe, Mr John

2001-WMWS/MS-1/2 [The Development of a Waste Audit Methodology for the Identification and Quantification of Construction and Demolition Wastes Arising in Ireland](#)

Hayes, Mr Fergus

2000-DS-2-M1 [Inventory for Dioxins and Furans](#)

Healy, Dr Mark

2005-SS-32-M1 [The Effects of Harvesting on Biomass Growth and Nutrient Uptake Rates in Williamstown Constructed Wetland](#)

Hickey, Ms Anne Marie

2001-CS-6-M1 [Assessment of the Effect of Surfactants on Microbial Degradation of Xenobiotic Compounds](#)

Kelvin, Dr Norbert

2003-SS-18-M1 [Recycling and Reuse of Spent Motor Vehicle Coolants](#)

Leahy, Dr Martin

2000-LS-1a-M2 [Environmentally Sustainable Conversion Options for Large Volume Organic Wastes](#)

Leech, Dr Donal

2002-PHD2-28 [Hybrisense: Electrochemical DNA Hybridisation Sensors for Application to Environmental Diagnostics](#)

Magette, Dr William E.

2005-PHD5-GIS-8 [GIS for Biodegradable Municipal Waste Management](#)

Miller, Dr Sarah

2005-WRM-MS-34 [Implementation of a Community Composting Programme in an Urban Environment for the Production of High Grade Quality Compost to Be Used in Growth Trials to Promote the Beneficial Qualities of Compost Use and Develop Markets Outlets for its Distribution](#)

Moag, Mr Andrew

2005-SS-44-M1 [The Potential for Combined Heat and Power Units for Recycled Wood](#)

Moore, Dr John E.

2003-SS-17-M1

[A Preliminary Epidemiological Survey of the Cryptosporidium Biotypes in Pig Slurry From Pig Farms of Ireland and Assessments for Reviewing the Potential Environmental Health Risks for Its Safe Disposal](#)

Moran, Mr Sean

2000-MS-12-M1

[Methodology for the Assessment of Hazardous Waste Disposal](#)

Mulkerrins, Dr Donal

2000-SS-6-M1

[Microbial Efficacy Testing for Healthcare-Risk Waste Facilities](#)

Nagle, Ms Elizabeth

2003-SS-11-M1

[Developing Design and Monitoring Specifications for Landfill Gas Flares](#)

Neilan, Ms Paula

2001-LS-FW3-M1

[Assessment of Vermicomposting Techniques for the Treatment of Dairy Processing WWT Sludge](#)

O'Connor, Dr. Kevin

2001-PHD-5-M1

[Development of a Novel Biosensor for the Rapid Detection of Phenols in Environmental Samples](#)

O'Sullivan, Dr Catherine

2003-SS-19

[The Use of Geosynthetics in Landfills](#)

Otte, Dr Marinus

2005-SS-35-M1

[Instrumentation and Monitoring Requirements for Treatment Wetlands](#)

Phelan, Mr Warren

2005-WRM-DS-23

[Organic Waste Management in Multi-storey Dwellings and the Use of In-Sink Macerators](#)

Prasad, Dr Munoo

2007-WRM-DS-28

[Capacity Building for Decentralised Organic Waste Management and Composting in Ireland](#)

Scott, Ms Sue

2000-DS-6-M1

[Effects of Weight Based Charges on Solid Waste Disposal](#)

Smith, Mr Gavin

2003-COE-FS8-M4

[*Data Integration and Statistical Analysis to Support and Advance the Implementation of EU and Irish Water and Waste Policy*](#)

Styles, Dr David

2006-FS-NE-38-M4

[*Modelling National Emissions to Air and Water*](#)

Taylor, Prof. David

2001-PHD-6-M1

[*Environmental Attitudes and Behaviour, Values, Actions and Waste Management*](#)

van der Werf, Mr Paul

2000-MS-6-M1

[*Outlets for Compost from Municipal Waste*](#)

Warburton, Mr Roger

2005-SS-31-M1

[*Green Wheelie Bin Project \(GWB\) – Achieving Greater Participation and Knowledge in Household Recycling, Utilising an already Existing Service*](#)

Ward, Mr Patrick

2001-CS-3-M1

[*Phenylacetic Acid Derivatives to PHA*](#)

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PROJECT TITLE

*Inventory for Dioxins and Furans
(2000-DS-2-M1)*

LEAD ORGANISATION

URS Dames and Moore

START DATE

16/10/2000

CONTACT

Mr Fergus Hayes

STATUS

Completed (**ERTDI Report 3**)

PROJECT TYPE

Desk study

TOTAL BUDGET (€)

30,410.23

PROJECT DESCRIPTION

Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), commonly referred to as 'dioxins', are compounds which can be emitted from a wide range of combustion sources and industrial activities, and may also be found in effluents and in solid waste residues and products. There are approximately 210 dioxin and furan congeners, though only 17 have been identified as posing significant risk to human health. Significant uncertainty still remains with regard to the impact of exposure to dioxin concentrations on humans, particularly chronic effects, although dioxins have been associated with carcinogenic effects. Up to 90% of the human intake of dioxins and furans is through food consumption. However, it is thought that most dioxins and furans enter the food chain from the air.

The aim of this study is to identify the principal sources of dioxin emissions to air, land and water in Ireland for the year 2000 and to quantify those emissions on the basis of reported information. Industrial and non-industrial sources will be identified. In recent years several countries have developed dioxin emission inventories to assess total emissions to air. To assist other countries in developing emission inventories, the United Nations Environment Programme has developed a 'toolkit', which helps generate initial estimates of dioxin emissions to air, land and water. Dioxin measurements were not carried out as part of the study, and where measured data does not exist, emission factors developed from measurements in other countries (included in the toolkit) are used.

An estimate of dioxin emissions in 2010 is also under preparation to assess the impacts of new sources, such as the possible construction of municipal waste thermal treatment plants, or changes in existing sources. The inventory should provide a realistic estimate of future dioxin levels in light of existing and proposed legislation and projected levels of dioxin production.

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PROJECT TITLE

Procedure for the Identification of the Hazardous Components of Waste (2000-DS-3-M1)

LEAD ORGANISATION

Clean Technology Centre

START DATE

01/11/2000

CONTACT

Mr Noel Duffy

STATUS

Completed (ERTDI Report 12)

PROJECT TYPE

Desk study

TOTAL BUDGET (€)

31,044.33

PROJECT DESCRIPTION

According to the Waste Management Act, 1996, waste categorised, as hazardous waste must be handled in accordance with certain procedures. However, the procedures for determining if a waste is hazardous waste are often complex and difficult to follow. There was a requirement, therefore, for a definitive methodology, backed by all pertinent information, which would guide a holder of waste through the categorisation of its waste, and which could also be used by regulators in making a determination. The only effective approach to this project, ultimately, was the production of a paper-based tool and a prototype computer-based package, which guide the user through the procedures. As part of this project, all the relevant legislation was gathered and the properties and test methods of the Dangerous Substances Directive and its amendments were distilled into a usable format. Both tools direct the user to current Irish and European legislation and also address the changes to the new waste list, which became effective from 1 January 2002. The paper-based tool is in the form of a workbook with associated worksheet.

Five worked examples are provided in the final report to illustrate the use of the paper-based tool. The paper-based tool is available from the Technical Information page of the Environmental Protection Agency website. These tools interpret current Irish and EU legislation. However, their validity is dependent on their being maintained. The tools must be regularly updated to reflect any legislative advances. This refers not only to the waste legislation, but also to the associated test methods and the classification of substances. Guidance has been provided in the final report on a mechanism to maintain the validity of these tools. In examining practice in other EU member States, it was apparent that there is a common desire among regulatory authorities to address the difficulties, which are shared. Consequently there is a need for additional cooperation between EU Member States to share experiences and harmonise practices, particularly at the level of those responsible for actual classification of wastes.

If there is any doubt regarding classification, reference must be made to the appropriate regulatory authority. This is particularly necessary if a suspect waste is to be classified as non-hazardous waste.

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PROJECT TITLE

***Effects of Weight Based Charges on Solid Waste Disposal
(2000-DS-6-M1)***

LEAD ORGANISATION

Economic and Social Research
Institute (ESRI)

START DATE

01/03/2001

CONTACT

Ms Sue Scott

STATUS

Completed (**ERTDI Report 54**)

PROJECT TYPE

Desk study

TOTAL BUDGET (€)

50,789.52

PROJECT DESCRIPTION

As part of a policy to encourage waste minimisation and the diversion of waste from landfill, a number of local authorities are in the process of introducing weight-based charges for solid waste services. Under this system, household and commercial waste is weighed as it is collected and the households and businesses are subsequently billed. Clearly, the system provides an incentive to reduce the amount of waste being disposed of, through recycling, re-use, composting or minimisation. This objective of this study is to carry out a review of the experience in other countries of the use of weight-based charges and to carry out a pilot trial of such a system in Ireland. This involves an analysis of a pilot scheme in Killarney.

The weighing technology has been introduced and is currently in operation. Weight based charges are being levied to commercial customers beginning spring 2002 and subject to local council approval to households in 2003. By comparing the weights of waste from before and after the introduction of the charges, we will be able to estimate the impact of the charge. In addition, by surveying the households and businesses in the area, we will be able to relate responses to household and business characteristics. Relevant recommendations will be made with respect to the general implementation of weight-based charging systems considering such factors as location, household composition, incomes and pricing.

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PROJECT TITLE

**Environmentally Sustainable Conversion Options for Large Volume Organic Wastes
(2000-LS-1a-M2)**

LEAD ORGANISATION

University of Limerick

START DATE

01/11/2000

CONTACT

Dr Martin Leahy

STATUS

Completed (Report Pending)

PROJECT TYPE

Large-scale study

TOTAL BUDGET (€)

386,889.19

PROJECT DESCRIPTION

The most recent figures on the quantity and nature of non-hazardous organic wastes produced in Ireland relate to 1998 as outlined in the National Waste Database Report (EPA, 2000). The largest volume of organic waste produced in Ireland is agricultural waste. Of the estimated 80 million tonnes of waste produced in Ireland in 1998, a total of 65 million tonnes originated from agricultural sources, mainly animal slurries and manures, silage effluent, spent mushroom compost, and washwaters. Urban wastewater sludge's give rise to an additional 493,000 tonnes of organic waste and septic tanks and small wastewater treatment plants produce about 12,700 tonnes of sludge. Food processing industry generates a further 668,500 tonnes. (All these figures are based on wet weight.)

A significant portion of these non-hazardous wastes is currently land spread for agricultural use. While direct land spreading may, in certain circumstances, be considered a beneficial reuse of such material, little consideration has been given to alternative treatment systems to minimise the environmental impact of such material. There is need to consider treatment options to improve management, reduce storage requirements, improve sterilisation, reduce run off and loss of nitrogen and phosphorus when applied to land, to create new market outlets, and increase acceptance for end-users. The potential for loss of methane and ammonia from organic wastes is of increased concern in light of international commitments in relation to transboundary air pollution and emissions of greenhouse gases.

Considering the wide variety of organic waste sources in Ireland, there is opportunity for synergies in terms of co-treatment of such materials with potential impacts in terms of cost reduction, maximisation of capital investment and tailoring of product to market demands. While it is likely that direct land spreading will continue to be the major utilisation mechanism for organic wastes it appears that there is considerable opportunity to investigate alternative options and refinement to minimise the environmental impact associated with land spreading activities. The primary objective of the project is to reduce the requirement for land spreading of organic waste and to reduce the environmental impact of such spreading. The aim is to develop innovative practical cost-effective treatment/technologies/management systems for large volume priority organic wastes which will minimise and abate the impact of land spreading activities.

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PROJECT TITLE

**Environmentally Sustainable Conversion Options for Large Volume Organic Wastes
(2000-LS-1b-M2)**

LEAD ORGANISATION

Phillip Farrelly and Co.

START DATE

01/09/2001

CONTACT

Mr Phillip Farrelly

STATUS

Completed (**ERTDI Report 28**)

PROJECT TYPE

Large-scale study

TOTAL BUDGET (€)

642,390.97

PROJECT DESCRIPTION

The objectives of the project are to develop and evaluate the market potential of a range of compost fertiliser products derived from mixtures of separated pig slurry solids and other biodegradable wastes. The work programme involves extracting solids from pig slurry using a press-screen type separator and preparing 10 tonne batches of compost from mixtures of pig solids and other bio-degradable wastes such as straw, wood shavings, sawdust, paper, cardboard, spent mushroom compost, poultry litter, and green waste. Granulation equipment and expertise from USA will be used to pelletise the resulting composts and produce granulated organic based fertilisers of varying nutrient ratios for a range of potential markets.

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PROJECT TITLE

**Environmental Benchmarking for IPC Industries
(2000-MS-10-M1)**

LEAD ORGANISATION

Clean Technology Centre

START DATE

01/11/2000

CONTACT

Mr Noel Duffy

STATUS

Completed (ERTDI Report 11)

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

93,114.97

PROJECT DESCRIPTION

This project has three main areas of study:

- Effective and efficient reporting of mandatory, non-confidential data;
- Examination of the potential for benchmarking, and
- Assessment of the usefulness of environmental management system support software.

The objectives of Part 1 of the project relate to the preparation of a specification for a software support tool which will address the following objectives:

- Support the production of mandatory IPC reports of both numerical and textual data in a defined format;
- Using defined benchmark criteria;
- Provide internal (company-specific) performance measures in absolute and relative terms;
- Provide relative indicators of performance in combination with publicly reported data from other companies;
- Provide enhanced and extended benchmark ranking values in the event of data in excess of statutory requirements being shared on a confidential or non-confidential basis;
- Contribute or participate in any international sharing of performance measures and best practice. These criteria may be general to IPC companies or specific to a sector or sectors. Provision may also be made for the company to define its own indicators. This will allow prioritisation of areas within companies, the subsequent setting of objectives and targets and the formulation of programmes as part of environmental management systems, and
- Support the implementation and maintenance of an environmental management system through the provision of document templates and task utilities.

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PROJECT TITLE

**Methodology for the Assessment of Hazardous Waste Disposal
(2000-MS-12-M1)**

LEAD ORGANISATION

O'Callaghan Moran and Associates

START DATE

08/02/2001

CONTACT

Mr Sean Moran

STATUS

Completed (**ERTDI Report 16**)

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

124,128.00

PROJECT DESCRIPTION

The Environmental Protection Agency published the National Hazardous Waste Management Plan in July 2001 in accordance with Section 26 of the Waste Management Act 1996. The Act requires the Agency to provide *inter alia* for the identification and assessment of sites at which the disposal of hazardous waste took place. The Plan presents a methodology to identify and assess such sites.

The Agency appointed O'Callaghan Moran & Associates (OCM) under the Environmental RTDI Programme (2000 - 2006) to test and develop the proposed Methodology. OCM completed the assessment and development of the methodology using Laois as a model county. A draft report submitted by OCM is currently being reviewed by the Agency.

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PROJECT TITLE

**Outlets for Compost from Municipal Waste
(2000-MS-6-M1)**

LEAD ORGANISATION

Environmental and Resource
Management Limited

START DATE

01/11/2000

CONTACT

Mr Paul van der Werf

STATUS

Completed (ERTDI Report 6)

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

76,888.99

PROJECT DESCRIPTION

A policy statement published by the Minister for the Environment and Local Government entitled *Waste Management - Changing our Ways* outlines a target for diversion of the amount of biodegradable waste going to landfill by 65% (by 2013). Composting will play a part in achieving this target. In response to this policy the EPA to assess and evaluate the outlets for compost produced from municipal waste drew up a project specification.

In line with this, the objectives of the project are:

- To identify and evaluate methods to reuse the biodegradable fraction of municipal waste via composting, and
- To develop a strategic approach to the development of adequate, reliable and stable markets and other outlets for compost produced from municipal waste.

Reuse of the biodegradable fraction of municipal waste can contribute to meeting the targets. An important aspect is the availability of outlets for the compost, whether this is market (for profit) or non-market (not for profit) outlets.

Surveys of local authorities, producers of organic amendments and sectoral organisations are being undertaken in order to gather information on the extent of present and future composting and requirements to market the resultant compost. The information gathered will form the basis of a marketing strategy designed to meet any relevant statutory and market quality standards. The final output of the project will be a recommended strategic approach to the development of adequate, reliable and stable outlets for compost produced from municipal waste so that the targets set out in *Waste Management - Changing our Ways* can be met.

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PROJECT TITLE

Characterisation of Non-Household Municipal Waste in Ireland and the Development of an Approach to Tracking Municipal Waste Composition (2000-MS-7-M1)

LEAD ORGANISATION

Clean Technology Centre

START DATE

17/09/2001

CONTACT

Mr Dermot Cunningham

STATUS

Completed (Report pending)

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

96,910.22

PROJECT DESCRIPTION

Successful waste management planning requires information about the composition of waste streams. This information allows the waste planner to evaluate, for instance, the recycling potential or resource value of a particular waste stream. The material fractions and packaging content of each fraction (glass, paper, plastic, metals, *etc.*) of the household and commercial waste streams are estimated from compositional surveying of these streams.

Estimating recycling rates, both at local and national level, is therefore dependent on knowing the composition of waste streams. Compositional data is of particular importance for mixed waste streams such as household refuse and mixed commercial waste. In Ireland, at present, over 90% of the municipal waste stream is collected as mixed waste with all of this waste currently disposed of to landfill. About 67% of this is collected from households with the remaining 33% collected from commercial, institutional, trade, industrial and other enterprises.

At present, there is a considerable body of information available on the composition of waste collected from households because many local authorities have conducted composition surveys on household waste during the last decade. However, there is relatively little information available on the composition of municipal waste from other sources.

The commercial waste stream is more diverse than the household waste stream as it comes from many sources such as supermarkets, offices, hotels, restaurants, shops, hospitals, schools and other sources, each of which have their own characteristic waste 'fingerprint'. To date, there have been a limited number of waste composition surveys conducted in Ireland. There is therefore a clear need for better information on the composition of non-household municipal waste.

The objectives of this project are to:

1. Develop a reliable and easy-to-use methodology for the characterisation of non-household municipal waste, and
2. Develop a cost-effective approach to tracking the composition of municipal waste.

The main outputs of this project will include:

1. Comprehensive and reliable information on the composition of the non-household municipal waste stream in Ireland;
2. The specification of a practical and cost-effective approach to tracking the composition of municipal waste (both household and non-household) at both

- local authority and national level;
3. A methodology for characterising the non-household municipal waste stream;
 4. A final report addressing the above and a synopsis report.

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PROJECT TITLE

**Outlets for Materials Recovered from Municipal Waste
(2000-MS-8-M1)**

LEAD ORGANISATION

Clean Technology Centre

START DATE

01/11/2000

CONTACT

Mr Dermot Cunningham

STATUS

Completed (ERTDI Report 7)

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

100,281.37

PROJECT DESCRIPTION

A study of the current outlets for the recovered municipal solid waste streams considered (glass, textiles, ferrous metals, paper, cardboard, plastics, non-ferrous metals, aluminium, wood, composites (used beverage cartons)) shows that such outlets are being utilised for all these streams, both in Ireland and abroad, with the exception of used beverage cartons. A variety of such outlets for the various materials was identified and analysed in this study.

Several potential new outlets for each waste stream were also identified and analysed as part of this research. While some of these are more viable than others, many such outlets are worth considering, all of which are being widely utilised in other countries with higher recycling levels than Ireland. The barriers to recycling in Ireland were also identified and analysed as part of this study. This analysis considered current general barriers to waste recovery and also specific barriers to each material waste stream. Many of these barriers are having a deleterious effect on the viability of developing a widespread culture of recycling in Ireland.

In order to overcome these barriers, a strategic approach is recommended, whereby all the required elements for a major increase in the recovery and recycling of waste can be put into place and the forces and drivers to achieve this can be managed effectively and proactively. A variety of key stakeholder groups are identified in this study whose active participation is of paramount importance. Three levels are recommended in this strategy. At the widest level is the strategy itself in order to create a sustainable culture of recycling in Ireland. Within the strategy, and driving it, a range of tools and policy instruments are required in order to develop the proper awareness, information, and economic, infrastructural and legislative conditions necessary for a higher rate of recycling. Several such recommended tools and instruments are identified and described in this report. However, in order to bring about and deliver these instruments, several specific actions are required by the various main stakeholders.

The carrying out of these actions delivers the tools and instruments required to put into place the framework for widespread recycling. These stakeholder groups and their required actions are identified and described in the main report. In particular, a range of actions is required from national government, local government, industry, recyclers, the EPA, REPAK, environmental experts, NGOs and the general public. In all, 79 such actions are recommended so that these stakeholder groups can play their role in the development of recycling in Ireland. All stages of the recycling chain (supply, collection, processing, and demand) must be developed in Ireland. All are interdependent and mutually supportive, and all require positive actions by a range of stakeholders, using a 'carrot and stick' approach, to solve the problem. This overall strategy to developing recycling markets for Irish waste streams must be

developed and co-ordinated properly. In particular, allocation of responsibility and provision of adequate resources are required to drive forward the actions necessary to create the conditions under which a sustainable recycling system can prosper in Ireland.

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PROJECT TITLE

**Assessment and Development of a Waste Prevention Framework for Ireland
(2001-DS/WM1-M1)**

LEAD ORGANISATION

Clean Technology Centre

START DATE

01/03/2002

CONTACT

Mr Dermot Cunningham

STATUS

Completed (**ERTDI Report 22**)

PROJECT TYPE

Desk study

TOTAL BUDGET (€)

50,242.00

PROJECT DESCRIPTION

Prevention is the cornerstone of Ireland's current waste management policies. In the policy statement *Prevention and Recycling Waste – Delivering Change (2002)*, the Irish government announced the establishment of a well-resourced National Waste Prevention Programme (NWPP) to deliver substantial results on waste prevention and minimisation. As part of this programme, significant financial investment and technical assistance will be necessary to achieve an overall 'win-win' situation for both industry and the environment. Furthermore, initiatives in the commercial and industrial sectors are required as well as changes in personal behaviour among householders and the general public.

In order to assist this plan and to develop a framework within such a programme can function as effectively and efficiently as possible, it is necessary, however, to learn how a preventive approach has been achieved in other countries and regions. Then the lessons learned elsewhere can be applied, the required instruments and initiatives adapted to an Irish context, the required financial investments can be made based upon best available information, and the success stories elsewhere replicated to Ireland – moving this country towards sustainable development.

The objectives of this desk study are thus as follows:

1. To learn the current levels of waste prevention in Ireland today;
2. To identify the current measures and instruments being applied or planned to increase waste prevention in Ireland;
3. To identify the current barriers to waste prevention in Ireland today;
4. To identify and analyse current preventive measures and instruments being applied in other countries and regions, and
5. To identify and recommend which tools and instruments could be applied in order to overcome the barriers identified and how they could be adapted to an Irish context.

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PROJECT TITLE

A Biotechnological System for Production of Value-Added Products, Bioethanol and Methane from Non-Animal Food Wastes with Emphasis on Hygiene Aspects (2001-LS/FW1-M1)

LEAD ORGANISATION

NUI Galway

START DATE

01/12/2001

CONTACT

Dr Emer Colleran

STATUS

Completed (Report pending)

PROJECT TYPE

Large-scale

TOTAL BUDGET (€)

382,943.74

PROJECT DESCRIPTION

Carbohydrate-rich wastes are generated in abundance by the agri-feed/market gardening, food processing and service industries, and constitute a significant component of the source-separated fraction of municipal solid waste (OFMSW). More than 2 million tonnes of municipal waste consigned to landfill sites in Ireland each year. In 1998, there were over 126 operating landfill sites and the number of private landfill sites had increased by over 60% from 1995 to 1998. Waste recovered or recycled from municipal stocks constituted <10% of the total amount generated. It has been recognized by several national authorities that Ireland is currently facing a crisis situation in dealing with the ever-increasing quantities of organic waste and in complying with EU legislation requiring immediate implementation of sustainable and effective waste management strategies.

The primary objectives of this project are focused on developing an integrated biotechnological strategy which will meet the highest environmental and public health regulations for transformation of vegetable, fruit and confectionery wastes (VFCWs) and selected source-separated OFMSW organic wastes to high-value products and energy. Specifically, thermostable enzymes (thermozymes) from generally regarded as safe (GRAS), non-sporulating micro-organisms will be used as safe, eco-friendly biotechnological tools to yield high-value products, such as soluble sugars and potential natural antioxidant/flavour-rich cocktails which can be utilized for the production of bio-fuels (bioethanol, methane), bio-pharmaceuticals, probiotics, nutraceuticals, biodegradable polymers, and feedstock's for enzyme and chemical production. Energy requirements for thermozyyme-catalysed carbohydrate hydrolysis, at high reaction temperatures, will be provided by thermophilic digestion of a fraction of the sugar-rich hydrolysate to yield methane gas, which will reduce fossil fuel dependence. In addition, process wastewaters will be anaerobically digested to maximize recovery of biomass energy, and ensure reduction of greenhouse gas emissions. All reaction processes will be rigorously evaluated with respect to microbial pathogen kill-rates using a variety of indicator organisms and test procedures (MPN, COLILERT, ENTEROLERT, *etc.*) in order to meet the highest environmental and public health standards, and to determine ideal reaction conditions for both thermozyyme hydrolysis and thermophilic digestion which will yield maximum bioconversion of the target wastes yet achieve optimum pasteurisation.

In order to ensure a complete and integrated life-cycle approach to the re-use, recycling, recovery of energy and new product development from VFCW and OFMSW wastestreams, selected VFCWs will be used to produce the required

thermozyme cocktails using solid-state fermentation systems. Finally, prototype reactor systems used for enzyme production, generation of bioethanol, and thermophilic and mesophilic methane production from initial hydrolysates and process wastewaters will be designed to meet strict environmental guidelines and safety standards, and to facilitate process scale-up to pilot-scale.

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PROJECT TITLE

***Biological Approaches to Nutrient Removal in the Irish Food Sector
(2001-LS-FW2-M1)***

LEAD ORGANISATION

University College Cork

START DATE

01/07/2002

CONTACT

Dr Alan Dobson

STATUS

Completed (**ERTDI Report 60**)

PROJECT TYPE

Large-scale study

TOTAL BUDGET (€)

701,135.00

PROJECT DESCRIPTION

The overall objectives of this project are threefold:

- First, the development of biological management procedures, incorporating both microbial based and molecular based methodologies; to study and assess the performance of biological nutrient removal systems, treating waste streams from food processing plants;
- Secondly to investigate the use of low pH 'shock' as a method of phosphate removal from a variety of different food waste streams, including poultry, piggery abattoir and various dairy waste streams, and
- Thirdly to ascertain, using compost quality testing standards, whether sludge generated from Biological Phosphate Removal (BPR) effluent plants can be successfully composted to a satisfactory quality.

Thus the production of a suitable P-rich compost product in this way, would in addition to establishing BPR conditions in the waste water treatment plant, be attractive from an operational standpoint for the food industry.

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PROJECT TITLE

**Assessment of Vermicomposting Techniques for the Treatment of Dairy Processing WWT Sludge
(2001-LS-FW3-M1)**

LEAD ORGANISATION

Glanbia Ingredients

START DATE

01/08/2002

CONTACT

Ms Paula Neilan

STATUS

Completed (Report pending)

PROJECT TYPE

Large-scale

TOTAL BUDGET (€)

130,632.27

PROJECT DESCRIPTION

The vermicomposting project is a comprehensive research project coordinated and led by Glanbia Ingredients (GI) with the Environmental Science Department, Institute of Technology, Sligo (ITS) as joint research partners. The project coordinates research into vermicomposting as a technology to divert dairy organic waste from land spreading and/or to minimize its environmental impact.

The vermicomposting project will assess and investigate under real operating conditions, in a small-scale pilot, an environmentally sustainable sludge treatment alternative to the current treatment and disposal options used by the Irish dairy processing industry, in the expectation that the technology will ultimately become commercialised.

The research design of the vermicomposting project integrates the work so that the technology is thoroughly investigated theoretically and empirically by an industry partner supported by the research institute. The underlining scientific basis of the vermicomposting process and technology will be evaluated, examined and experimented by the research institute with findings contributing to pilot scale research trials by the industrial partner. Significant voids in the scientific research into the culturing of worms for commercial applications are apparent from initial desk studies and the proposed high quality trial experiments are structured to provide the necessary conclusions to assist in the advancement and optimization of vermicomposting techniques for use in the treatment of waste water treatment sludge from the largest integrated milk processing facility in Europe.

It is the intention that at its conclusion this project will have rigorously assessed the feasibility of using vermicomposting as a viable technology for the treatment of sludge from the Glanbia Wastewater Treatment Plant. The assessment will include a cost/benefit comparison with other technologies and establish the fundamentals of a protocol for the use of vermicomposting on a large scale in Ireland. The findings from the study will provide a basis for the transfer of vermicomposting technology to other industries and situations in both Ireland and further a field.

Glanbia hope to enter discussions with Enterprise Ireland to extend the project to fully research and quantify the market for the end products (both worm compost and worms). If this avenue proves unsuccessful a desk study on alternatives markets for the end compost will be completed by an ITS student.

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PROJECT TITLE

**Waste Electrical and Electronic Equipment (WEEE) Collection Trials in Ireland
(2001-MS/W1-M1)**

LEAD ORGANISATION

Cork Institute of Technology

START DATE

01/12/2001

CONTACT

Mr Noel Duffy

STATUS

Completed (**ERTDI Report 19**)

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

124,200.68

PROJECT DESCRIPTION

Waste from electrical and electronic equipment (WEEE) is considered to be a priority waste stream because of the potentially hazardous nature of the waste, the consumption of resources and expected increase in waste due to the growth in sales of new equipment. The European Commission proposes comprehensive legislation to prevent such waste and encourage the reuse, recycling and recovery of EEE. One particular measure contained within the legislation is that Member States put systems in place for the collection of waste electrical and electronic equipment free of charge from private households. There is a relatively underdeveloped WEEE recycling infrastructure in Ireland and it is therefore imperative that models for the collection of WEEE are developed in order to establish a background within which a nationwide system can be developed. This project aims to establish collection trials in a variety of different locations throughout Ireland in order to characterise and quantify WEEE arisings, assess different collection methodologies, and develop markets and outlets for processed WEEE.

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PROJECT TITLE

Physiology and Genetics of Fluoranthene Degradation by *Pseudomonas Alcaligenes* PA-10, Potential for Bioremediation/Rhizoremediation of Polycyclic Hydro-carbon Contaminated Ecosystems (2001-PHD-12/44-M1)

LEAD ORGANISATION

University College Cork

START DATE

01/09/2002

CONTACT

Dr Alan Dobson

STATUS

Ongoing

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

76,184.28

PROJECT DESCRIPTION

This project involves the molecular characterisation of the fluoranthene degradative pathway in *Pseudomonas alcaligenes* PA-10. The xenobiotic fluoranthene is a high molecular weight polycyclic aromatic hydrocarbon and is a common environmental pollutant. It bears structural relationships with other xenobiotic compounds such as dibenzofurans and dibenzodioxins and is thus a useful model for biodegradation studies. The characterisation of the fluoranthene (fla) catabolic genes in *P. alcaligenes* will allow the determination of the pathway employed in the degradation of this PAH and the construction of mutants which are defective in fluoranthene degradation and in which catabolic intermediates will accumulate.

Subsequent chromatographic analysis of these intermediates will allow us to determine the fluoranthene catabolic pathway employed in this strain. In addition it is hoped to introduce the fla operon from strain PA-10, as a gene cassette into a corn rhizosphere competent *P. putida* strain, under the control of a root exudate responsive promoter and assess the efficiency of fluoranthene removal in soil microcosms colonized by corn. This should allow the treatment of PAH contaminated soils with corn, with *P. putida* strains selectively growing in their root systems and expressing the fla catabolic genes in the root rhizosphere. This approach should help overcome the inherent bioavailability problems routinely encountered in the degradation of this and other high molecular weight sparingly soluble PAH compounds.

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PROJECT TITLE

*Development of a Novel Biosensor for the Rapid Detection of Phenols in Environmental Samples
(2001-PHD-5-M1)*

LEAD ORGANISATION

University College Dublin

START DATE

01/11/2001

CONTACT

Dr Kevin O'Connor

STATUS

Completed

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

76,184.28

PROJECT DESCRIPTION

The main aim of this project is to look at the potential of this novel phenol oxidase to transform substituted phenols, *e.g.* chlorophenols in aqueous solutions. Phenol oxidase has the potential to convert phenols to quinones which react with 3-methyl-2-benzothiazolinone hydrazone (MBTH) to produce a strong colour reaction. The strength of the colour is directly proportional to the concentration of the product formed. We will purify the phenol oxidase enzyme in order to determine the optimum conditions for enzyme catalysis and assess the performance of the enzyme under test conditions.

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PROJECT TITLE

***Environmental Attitudes and Behaviour, Values, Actions and Waste Management
(2001-PHD-6-M1)***

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/10/2001

CONTACT

Prof. David Taylor

STATUS

Completed

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

76,184.28

PROJECT DESCRIPTION

This project examines public attitudes towards environmental issues in Ireland, focusing particularly on waste management. Using both extensive and intensive research, the project aims to produce essential baseline information on attitude/behaviour relationships and fine grained understanding of these relationships in the waste management field, and to engage with the apparently paradoxical contrast between the desire for high environmental quality and behaviour which does not directly produce such an environment.

The research will investigate methods of broadening the perceptions of waste management options and of introducing stakeholders to new methods of managing waste. It will adopt a bottom-up approach to investigate initially the barriers to more sustainable waste management and subsequently mechanisms for improved environmental policy making.

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PROJECT TITLE

The Development of a Waste Audit Methodology for the Identification and Quantification of Construction and Demolition Wastes Arising in Ireland (2001-WMWS/MS-1/2)

LEAD ORGANISATION

Galway-Mayo Institute of Technology

START DATE

03/02/2003

CONTACT

Mr John Hanahoe

STATUS

Ongoing

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

100,000.00

PROJECT DESCRIPTION

The project is applied research aimed at investigating one of the key environmental problems facing the country currently, namely the production and disposal of construction and demolition waste. The hypothesis to be tested in this project is *'Will the adoption of best practice waste management measures result in significant savings in disposal costs and a reduction in disposal to landfill for the Irish Construction Industry?'*

The project will explore the balance between economic activity and environmental protection in the Irish Construction Industry.

The objectives of the project are as follows:

- a. To identify best practice examples throughout the world for successful construction and demolition waste management;
- b. To identify best practice in the Ireland and to establish a guideline for the successful management of construction and demolition waste;
- c. To identify a range of construction projects providing an accurate representation of the construction industry as a whole;
- d. To establish point source assessments on a wide range of construction projects;
- e. To assess each project individually examining the viability of various construction and demolition waste management practices;
- f. To identify supply chain opportunities implementing practical and sustainable construction and demolition waste segregation, recycling and reuse schemes;
- g. To collate individual case studies and identify any specific trends;
- h. To establish indicative quantities and types of wastes generated by such project types and to put forward a methodology.

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PROJECT TITLE

**Biodegradation of Sheep Dip Wastes as an Environmentally Safe Method of Disposal
(2002-PHD2-20)**

LEAD ORGANISATION

University College Dublin

START DATE

01/01/2003

CONTACT

Dr Nicholas Clipson

STATUS

Ongoing

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

75,000.00

PROJECT DESCRIPTION

Synthetic pyrethroid containing sheep dips are highly toxic to aquatic invertebrates and fish and have become potentially serious contaminants of water courses. There is a pressing need to develop technology to remove the toxic effects of sheep dips prior to wastes being released into the environment. It is proposed to use molecular and conventional microbial techniques to identify and isolate micro-organisms associated with the biodegradation of synthetic pyrethroids and to use these isolates for the development of *in situ* and *ex situ* bioremediation protocols for the effective breakdown of synthetic pyrethroid sheep dip wastes.

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PROJECT TITLE

Hybrisense: Electrochemical DNA Hybridisation Sensors for Application to Environmental Diagnostics (2002-PHD2-28)

LEAD ORGANISATION

NUI Galway

START DATE

01/10/2002

CONTACT

Dr Donal Leech

STATUS

Completed

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

75,000.00

PROJECT DESCRIPTION

Hybridisation sensors detect nucleic-acid strand binding, which is increasingly useful in environmental diagnosis, *e.g.* for detection of the presence of bacteria and pathogens. Conventional DNA-based assays use radioactive-labelled probes which require complicated operations and conventional sample culturing involves long incubation periods. Electrochemical detection DNA hybridisation offers a promising alternative. Most DNA sensors use labels which detect hybridisation. We intend to develop reagentless DNA hybridisation sensors. These sensors are based on co-immobilised redox polymers and DNA strands at electrodes of high microscopic surface area. Hybridisation alters the electrochemical response of the redox films. These sensors eliminate conjugation of a label to DNA or incubation steps with label or indicator. Following demonstration of this concept it is proposed to develop sensors for the detection of environmental pathogens, such as *E. coli* and *Listeria monocytogenes*.

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PROJECT TITLE

Environmental Predictors of Metal Contamination in the Vicinity of Abandoned Mine Sites (Silvermines) (2002-PHDe-3/5)

LEAD ORGANISATION

University of Limerick

START DATE

01/07/2002

CONTACT

Dr John Breen

STATUS

Completed

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

76,200.00

PROJECT DESCRIPTION

A 1999 EPA report concluded that the TMF (Tailings Management Facility) at Gortmore, Silvermines, County Tipperary, represented a 'perpetual risk to human health and to the environment'. This project is examining the possible human health impacts of lead which occurs at levels which caused the deaths of cattle during 1999.

The project aims to quantify the relationships between the concentration of lead in household dust and garden soils, to which local residents are exposed, and incremental changes in blood lead concentration (biomarker) and to relate this to levels in plant and invertebrate bio-indicators.

It will adopt a multivariate approach to relate human health data / human biomarkers (e.g. blood Pb levels) with contaminated dust, air, soils, invertebrate and plant bio-indicators. An objective of this project is to attempt to identify environmental factors which can be used to predict incremental changes in blood lead concentrations.

The study will be in a position to compare results with concurrent projects in Poland and Bulgaria.

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PROJECT TITLE

Data Integration and Statistical Analysis to Support and Advance the Implementation of EU and Irish Water and Waste Policy (2003-COE-FS8-M4)

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/11/2003

CONTACT

Mr Gavin Smith

STATUS

Completed

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

126,384.30

PROJECT TITLE

A Biological System for Production of Value-Added Products, Bio-Ethanol and Methane From Non-Animal Food Wastes With Emphasis on Hygiene Aspects (2003-FS-CD-LS-11)

LEAD ORGANISATION

NUI Galway

START DATE

01/01/2004

CONTACT

Dr Emer Colleran

STATUS

Ongoing

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

126,984.00

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PROJECT TITLE

A Rapid Compression Machine and Complementary Modelling Study of an Alternative Diesel Fuel (2004-PHD4-8-M1)

LEAD ORGANISATION

NUI Galway

START DATE

01/09/2004

CONTACT

Dr Henry Curran

STATUS

Ongoing

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

75,000.00

PROJECT DESCRIPTION

This work will provide the first quantitative data for the combustion of ethyl butanoate in the fuel/air, temperature and pressure regime relevant to operating engine conditions. Understanding the oxidation of ethyl butanoate will be important if fuels such as methyl/ethyl esters are to be used as an alternative to petroleum products for diesel engine combustion because of:

- (i) their low sulphur content;
- (ii) they are renewable fuels, and
- (iii) with an oxygen content typically 10% or greater by mass, biodiesel fuels may also provide soot-reduction benefits similar to those observed for other oxygenated diesel fuels and additives.

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PROJECT TITLE

**Pharmaceutical Residues within Sewage Sludges
(2005-FS-30-M1)**

LEAD ORGANISATION

Dublin City University

START DATE

27/02/2006

CONTACT

Dr Leon Barron

STATUS

Ongoing

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

140,256.74

PROJECT DESCRIPTION

Pharmaceuticals and personal care products (PPCPs) represent a 'new wave' of environmental pollutants. To date in Ireland, very little work has been carried out to evaluate the level of environmental contamination by such products, although pioneering projects aimed at

- a. Method development (IRCSET funded postgraduate fellowship for Mr. J.J. Bones, Oct. 2003), and
- b. Assessment of pharmaceutical residue levels at selected sewage treatment plants (STPs) have recently been initiated at DCU (EPA ERTDI programme project 2004-PHD4-6).

Current work in the EU indicates that sorption to sewage sludge during wastewater treatment may be the main removal process for certain classes of pharmaceuticals which in turn represents an important route of entry to the environment for these PPCPs when the sludge is used as a fertiliser on agricultural land. Therefore, the purpose of this project is to develop methods for the determination of selected PPCPs sorbed onto solid phase, to characterise the sorption of a range of PPCPs onto actual sludge in laboratory trials and finally, to assess the levels of PPCPs in sludges obtained from selected Irish STPs.

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PROJECT TITLE

*Organic Waste Management in Multi-storey Dwellings and the Use of In-Sink Macerators
(2005-WRM-DS-23)*

LEAD ORGANISATION

RPS Consulting Engineers

START DATE

23/01/2006

CONTACT

Mr Warren Phelan

STATUS

Ongoing

PROJECT TYPE

Desk study

TOTAL BUDGET (€)

42,032.50

PROJECT DESCRIPTION

The proposed research study *Organic Waste in Multi Storey Dwellings* has two distinct tasks to be completed.

The first main task will research the potential for developing organic waste collection services in existing multi-storey dwelling buildings. The construction of apartment complexes across the country continues to grow particularly in urban areas. The implementation of an effective organic waste collection scheme is a challenge. Key issues such as frequency of collection, access, storage, odour and hygiene are all issues with need to be addressed. In addition, the study will also try to identify some general building design guidelines to incorporate waste collection issues for planned multi-store buildings.

The second task will look at the rise in use of in-sink macerators in both homes and multi storey dwellings in Ireland. In-sink macerators are advertised as the cost free method of organic waste disposal but their use is having serious consequences on the organic loading put on the country's WWTPs. Waste management and polluter pays issues also need to be considered. The study will look at the current use of these products and examine the need for regulation in this area or the possibility of a nationwide ban on their use.

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PROJECT TITLE

Evaluating Domestic Waste Collection Charges and their Impacts: a Nationwide Study of Weight and Use Based Mechanisms (2005-WRM-MS-33)

LEAD ORGANISATION

Trinity College Dublin

START DATE

01/02/2006

CONTACT

Dr Anna Davies

STATUS

Ongoing (**ERTDI Report 63**)
(Interim Report)

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

126,944.36

PROJECT DESCRIPTION

A review of the nationwide experience of weight-based domestic waste collection charges' aims over a period of eighteen months and using a €139,292.72 budget to analyse and evaluate the use of weight based domestic waste collection charges in Ireland.

The project will examine the effectiveness of the various weight-based schemes in terms of displaying a reduction in domestic waste to landfill and recycled waste, and also include an investigation into the prevalence of illegal dumping of domestic waste in the light of the introduction of these charges. This information will be gathered through both a desk-based study of international research into the impact of weight-based waste collection charges and empirical fieldwork combining qualitative and quantitative research.

The project will culminate in an evaluative report of the nationwide experience of weight-based domestic waste collection charges, production of a best practice model for waste charges under a weight-based system and recommendations for future action.

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PROJECT TITLE

Implementation of a Community Composting Programme in an Urban Environment for the Production of High Grade Quality Compost to be Used in Growth Trials to Promote the Beneficial Qualities of Compost Use and Develop Markets Outlets for its Distribution (2005-WRM-MS-34)

LEAD ORGANISATION

Ballymun Regeneration Limited

START DATE

03/01/2006

CONTACT

Dr Sarah Miller

STATUS

Ongoing

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

216,017.26

PROJECT DESCRIPTION

The project will establish a collection a processing system for organic waste in a multi-story residential apartment block in Ballymun. Waste will be used to produce a high-grade quality compost which will be used in pot trials to assess the beneficial properties of compost use. The details from the trial will be used to promote compost and develop market outlets for the product. The project will provide:

- A template for the development of community composting systems;
- An evaluation of composting options for residential dwellings;
- A quality management system and operating procedure for the composting processes;
- An evaluation of current compost standards in relation to community-produced compost, and
- An assessment of and development plan for the marketing of waste derived compost.

The project will also provide a demonstration project which highlights the benefits of community composting in apartment blocks. The project will have environmental benefits in relation to resource management and landfill avoidance and will highlight the potential social and economic benefits of creating a viable community composting business.

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PROJECT TITLE

**MBT – Has It an Irish Role?
(2005-WRM-MS-35)**

LEAD ORGANISATION

Fehily Timoney and Company

START DATE

03/01/2006

CONTACT

Ms Bernadette Guinan

STATUS

Ongoing

PROJECT TYPE

Medium-scale study

TOTAL BUDGET (€)

138,445.51

PROJECT DESCRIPTION

The research team for this project consists of researchers and a leading international waste management operator who has first hand access to information regarding the operational performance and costs associated with MBT plants using varying technology. The team will be lead by Fehily Timoney and Company and assisted by Ramboll (Denmark) and Onyx (UK).

The project will focus of the future role of MBT as a residual waste treatment technology in Ireland. It will consist of a comprehensive review of developments in MBT to date, as well as an assessment in to the future of MBT with respect to legislative controls, environmental impacts, markets and its ability to assist Ireland in meeting the various diversion targets.

The research programme will be approached in a modular format, whereby the team has identified 16 key tasks or objectives. The research team will also engage in a comprehensive programme for the dissemination of information to encourage 'buy in' and feedback from various aspects of the waste management industry.

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PROJECT TITLE

**Modelling National Emissions to Air and Water
(2006-FS-NE-38-M4)**

LEAD ORGANISATION

Trinity College Dublin

START DATE

21/08/2006

CONTACT

Dr David Styles

STATUS

Ongoing

PROJECT TYPE

Fellowship

TOTAL BUDGET (€)

123,275.00

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PROJECT TITLE

To Develop an Industry-Led Quality Standard for Composted Materials Produced in Ireland (2006-WRM-DS-26)

LEAD ORGANISATION

The Composting Association of Ireland - Cré

START DATE

82,368.00

CONTACT

Mr Percy Foster

STATUS

Ongoing

PROJECT TYPE

Desk study

TOTAL BUDGET (€)

82,368.00

PROJECT DESCRIPTION

It is widely recognised that market development is a key element in development of the composting industry. A key element in market development is the need for a Quality Standard for compost.

Cré proposes to support the development of a *Compost Quality Standard and Guidance Note* by Bord na Móna, with project managers Certification Europe and facility operators Greenstar. Bord na Móna proposes to undertake a technical appraisal of the published compost quality standards and to develop a Standard specification for compost in Ireland. The Standard will recognise lower grade composts from MBT.

Cognisance will be taken of current microbiological techniques; related international standards for testing and analysis and other appropriate normative references. Maturity and stabilisation measurement will be a key element. There will be extensive consultation with all stakeholders including users, producers and regulators. The Standard will be implemented by trial at two facilities by Greenstar. Based on this experience and research, Certification Europe will develop a Guidance Note to assist users to develop required management system elements of the Standard on their site and product.

The Standard will take the form of two project developed documents – one short Standard itself, specifying the actual parameters which must be met. The second document will be a guidance document which will be derived from live experience of application of the Draft Standard at composting facilities.

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PROJECT TITLE

**GIS for Biodegradable Municipal Waste Management
(2005-PHD5-GIS-8)**

LEAD ORGANISATION

University College Dublin

START DATE

01/10/2005

CONTACT

Dr William L. Magette

STATUS

Ongoing

PROJECT TYPE

Doctorate

TOTAL BUDGET (€)

75,000.00

PROJECT DESCRIPTION

Using the Dublin Region as a study area, this project proposes the development and application of Geographic Information System (GIS) technology for the site-specific estimation and management of Biodegradable Municipal Waste (BMW).

Working from analogous concepts in diffuse pollution abatement, GIS technology will be used in these project to:

- Analyse and characterise BMW generation according to socio-economic factors;
- Develop algorithms to optimise collections of BMW, and
- Delineate areas in which targeted intervention strategies should be implemented for maximum effectiveness in diverting waste.

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PROJECT TITLE

Capacity Building for Decentralised Organic Waste Management and Composting in Ireland (2007-WRM-DS-28)

LEAD ORGANISATION

The Composting Association of Ireland (Cré)

START DATE

01/05/2007

CONTACT

Dr Munoo Prasad

STATUS

Ongoing

PROJECT TYPE

Desk study

TOTAL BUDGET (€)

39,452

PROJECT DESCRIPTION

The objective of the study is to define decentralised solutions for the recovery of organic waste. It is build on the premise of source separation of the diverse organic waste streams as an essential pre-requisite of the quality achievement demanded by compost market and the sustainable use of compost and digestate in the diverse areas of use.

Therefore options for capacity building of composting or biogas plants, plant size and regional distribution are developed based on the criteria of

- (i) Settlement structure;
- (ii) Regional industry with recyclable organic residues;
- (iii) Community infrastructure responsible for public garden and park sites, and
- (iv) Agricultural structure and land use patterns as well as landscaping/horticultural enterprises in order to investigate on co-operation possibilities.

In order to obtain the intended objective of the study, the following tasks are defined:

1. Investigation on organic waste potentials from the different sectors;
2. Establishment of options for local, decentralised treatment of the different organic waste streams in small to mid scale composting and/or biogas plants;
3. Estimating number, size and distribution of composting plants/biogas plants;
4. Description of minimum technical options for small scale composting/biogas plants, and
5. Outline of organisational and infrastructure needs for communities and districts in order to achieve an optimised capacity building.

In order to achieve best possible adaptation of the proposed options at local level, draft conclusions shall be consulted with key stakeholders This tender on work package 2.2.3 of the technical description is strongly linked to the tender on work package 2.2.2 *Introducing Cost-Effective Schemes for Separate Collection of Biowaste in Ireland* (applied by Team, Cré/SAPM-Favoino/Amlinger).

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Small-scale studies:

PROJECT TITLE

Development of Analytical Systems for the Profiling of Microbial Biodegradatory Activity in Soils Contaminated by Creosote (2000-SS-3-M1)

LEAD ORGANISATION

University College Dublin

START DATE

01/06/2001

CONTACT

Ms Evelyn Doyle

STATUS

Completed

PROJECT TYPE

Small-scale study

TOTAL BUDGET (€)

7,618.43

PROJECT TITLE

Development of a Database of All Marketing, Educational and Research Activity Developed by Local Councils to Promote Awareness of Waste Issues and Maximise Participation in Waste Reduction Initiatives (2000-SS-5-M2)

CONTACT

Dr Janette Davies

START DATE

04/10/2001

PROJECT TYPE

Small-scale study

STATUS

Completed

TOTAL BUDGET (€)

7,618.43

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PROJECT TITLE

***Microbial Efficacy Testing for Healthcare-Risk Waste Facilities
(2000-SS-6-M1)***

LEAD ORGANISATION

University College Cork

START DATE

05/07/2001

PROJECT TYPE

Small-scale study

STATUS

Completed

TOTAL BUDGET (€)

7,618.43

PROJECT TITLE

***Developing Design and Monitoring Specifications for Landfill Gas Flares
(2003-SS-11-M1)***

LEAD ORGANISATION

Enviros Consulting Limited

START DATE

20/01/2003

CONTACT

Ms Elizabeth Nagel

STATUS

Completed

PROJECT TYPE

Small-scale study

TOTAL BUDGET (€)

7,865.00

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PROJECT TITLE

Preparation of an Historic Review of the Success of Mine Tailings and Other Mine Waste Rehabilitation at the Tynagh Mine in Ireland (2003-SS-13-M1)

LEAD ORGANISATION

Enviroplan Services Limited

START DATE

01/08/2003

CONTACT

Mr Bill Dallas

STATUS

Completed

PROJECT TYPE

Small-scale study

TOTAL BUDGET (€)

7,681.08

PROJECT DESCRIPTION

PROJECT TITLE

A Preliminary Epidemiological Survey of the Cryptosporidium Biotypes in Pig Slurry From Pig Farms of Ireland and Assessments for Reviewing the Potential Environmental Health Risks for Its Safe Disposal (2003-SS-17-M)

CONTACT

Dr John E. Moore

STATUS

Completed

PROJECT TYPE

Small-scale study

TOTAL BUDGET (€)

6,348.00

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PROJECT TITLE

*Recycling and Reuse of Spent Motor Vehicle Coolants
(2003-SS-18-M1)*

LEAD ORGANISATION

University College Cork

START DATE

01/10/2003

CONTACT

Dr Norbert Kelvin

STATUS

Completed

PROJECT TYPE

Small-scale study

TOTAL BUDGET (€)

6,348.00

PROJECT DESCRIPTION

PROJECT TITLE

*The Use of Geosynthetics in Landfills
(2003-SS-19-M1)*

LEAD ORGANISATION

University College Dublin

START DATE

01/09/2003

CONTACT

Dr Catherine O'Sullivan

STATUS

Completed

PROJECT TYPE

Small-scale study

TOTAL BUDGET (€)

7,681.08

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PROJECT TITLE

*Treatment of Toxic Metals in Industrial Wastewaters and Contaminated Groundwaters Using Irish Seaweeds
(2004-SS-29-M1)*

LEAD ORGANISATION

CyberColloids Limited

STATUS

Completed

CONTACT

Dr Mariel Brooks

TOTAL BUDGET (€)

7,681.08

PROJECT TYPE

Small-scale study

PROJECT TITLE

*Green Wheelie Bin Project (GWB) – Achieving Greater Participation and Knowledge in Household Recycling, Utilising an already Existing Service
(2005-SS-31-M1)*

LEAD ORGANISATION

GAP Ballymun

STATUS

Completed

CONTACT

Mr Roger Warburton

TOTAL BUDGET (€)

6,348.00

PROJECT TYPE

Small-scale study

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PROJECT TITLE

*The Effects of Harvesting on Biomass Growth and Nutrient Uptake Rates
in Williamstown Constructed Wetland
(2005-SS-32-M1)*

LEAD ORGANISATION

NUI Galway

STATUS

Completed

CONTACT

Dr Mark Healy

TOTAL BUDGET (€)

6,348.00

PROJECT TYPE

Small-scale study

PROJECT TITLE

*Instrumentation and Monitoring Requirements for Treatment Wetlands
(2005-SS-35-M1)*

LEAD ORGANISATION

University College Dublin

STATUS

Completed

CONTACT

Dr Marinus Otte

TOTAL BUDGET (€)

6,348.00

PROJECT TYPE

Small-scale study

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PROJECT TITLE

*The Potential for Combined Heat and Power Units for Recycled Wood
(2005-SS-44-M1)*

LEAD ORGANISATION

Andrew Moag Consulting

STATUS

Completed

CONTACT

Mr Andrew Moag

TOTAL BUDGET (€)

9,500.00

PROJECT TYPE

Small-scale study

PROJECT TITLE

*Developing a Novel Ecological Footprint (EF) Assessment Model for Schools
(2006-SS-55-M1)*

LEAD ORGANISATION

Green Schools Committee, Ballina NS

START DATE

01/11/2006

CONTACT

Mr Vincent Carragher

STATUS

Ongoing

PROJECT TYPE

Small-scale study

TOTAL BUDGET (€)

6,348.00

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Contributory scholarships

PROJECT TITLE

*Phenylacetic Acid Derivatives to PHA
(2001-CS-3-M1)*

LEAD ORGANISATION

University College Dublin

START DATE

17/12/2001

CONTACT

Mr Paul Ward

STATUS

Completed

PROJECT TYPE

Contributory Scholarship

TOTAL BUDGET (€)

7,618.43

PROJECT TITLE

*Halophenols and their Derivatives
(2001-CS-4-M1)*

LEAD ORGANISATION

University College Dublin

START DATE

17/12/2001

CONTACT

Ms Sarah Brooks

STATUS

Completed

PROJECT TYPE

Contributory Scholarship

TOTAL BUDGET (€)

3,809.21

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PROJECT TITLE

Assessment of the Effect of Surfactants on Microbial Degradation of Xenobiotic Compounds (2001-CS-6-M1)

LEAD ORGANISATION

University College Dublin

START DATE

17/12/2001

CONTACT

Ms Anne Marie Hickey

STATUS

Completed

PROJECT TYPE

Contributory scholarship

TOTAL BUDGET (€)

3,809.21

PROJECT TITLE

High Pressure Combustion of Various Fuels (2001-CS-10-M1)

LEAD ORGANISATION

NUI Galway

START DATE

17/12/2001

CONTACT

Ms Sheila Gallagher

STATUS

Completed

PROJECT TYPE

Contributory scholarship

TOTAL BUDGET (€)

3,809.21

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PROJECT TITLE

*Identifying the Toxicity of Sediments Using an Exotoxicology Hierarchy
as Set by Deplege (1993)
(2001-CS-11-M1)*

LEAD ORGANISATION

University College Cork

START DATE

01/01/2001

CONTACT

Mr Benjamin Coughlan

STATUS

Completed

PROJECT TYPE

Contributory scholarship

TOTAL BUDGET (€)

7,618.43

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End of listing of EPA Waste and Resource Management Projects (2000-2006)