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ERTDI Desk Study

Study: Investigation into why existing environmental technologies are underused

2005- ET- DS- 19- M3

FINAL REPORT

Authors:

Tadhg Coakley
Dermot Cunningham
Mairead Creedon
Colum Gibson
Eileen O'Leary

Clean Technology Centre
Cork Institute of Technology

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ENVIRONMENTAL PROTECTION AGENCY

An Ghníomhaireacht um Chaomhnú Comhshaoil
PO Box 3000, Johnstown Castle, Co.Wexford, Ireland

Telephone: +353-53-60600 Fax: +353-53-60699
Email: info@epa.ie Website: www.epa.ie

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ABBREVIATIONS AND GLOSSARY OF TERMS

AIC	Accredited Inspection Contractor Scheme for implementation of the Solvents Directive in Ireland for non-IPPC installations
BAT	Best Available Technology
BATNEEC	Best Available Technology Not Entailing Excessive Costs
CAP	Common Agricultural Policy of the European Union
CTC	Clean Technology Centre, authors of this report. Established in 1992 the CTC is an independent research and consultancy organisation based in the Cork Institute of Technology with the aim of promoting sustainable development and preventive based approaches to production and consumption in society.
CGPP	Cleaner Greener Production Programme, which began in 2001, provides grant aid to organisations to assist them in preventing and minimising their environmental impact.
DAF	Department of Agriculture and Food
DCMNR	Department of Communications, Marine and Natural Resources
DEFRA	UK - Department for Environment Food and Rural Affairs
DEHLG	Department of the Environment, Heritage and Local Government
DES	Department of Education and Science
DETE	Department of Enterprise, Trade and Employment
DF	Department of Finance
DFA	Department of Foreign Affairs
DME	DME (dimethyl ether) is one of the most appropriate biofuels for power generation including heavy duty trucks
DT	Department of Transport
EI	Enterprise Ireland
ELV	End-of-life vehicle
EMAS	The Eco-Management and Audit Scheme (EMAS) is the EU voluntary instrument which acknowledges organisations that improve their environmental performance on a continuous basis. EMAS registered organisations are legally compliant, run an environment management system and report on their environmental performance through the publication of an independently verified environmental statement.
EPA	Environmental Protection Agency
EPR	Extended Product Responsibility. Extended producer responsibility means that the responsibility of producers for their products is extended to all stages of the full life-cycle of the product or packaging.
ERTDI	Environmental Research, Technological Development and Innovation research programme of the EPA
ESP	Environmentally Superior Products scheme, implemented by Enterprise Ireland, to support indigenous Irish SMEs in examining ways to reduce the environmental impact of an existing product or that of a new product in development
ETAP	Environmental Technology Action Plan. On January 28th 2004 the European Commission adopted an Environmental Technology Action Plan (ETAP) to develop and encourage the use of technologies which boost the competitiveness of companies, in accordance with the Lisbon Strategy, but also to improve the quality of the environment.

GDP	Gross Domestic Product. The total market value of all final goods and services produced in a country in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports.
GHG	Greenhouse Gas. GHGs are components of the atmosphere that contribute to the greenhouse effect and climate change. GHGs occur naturally in the atmosphere, but are also caused by human activities such as energy production, industry, transport, agriculture etc. GHGs include water vapor, carbon dioxide (CO ₂), methane (CH ₄), nitrous oxides (NO _x), ozone (O ₃) and fluorinated gases.
GPP	Green Public Procurement
HEA	Higher Education Authority
IBEC	Irish Business and Employers Confederation. Umbrella body for Ireland's main industrial sectoral groups and associations.
IFA	The Irish Farmers' Association is the largest farm organisation in Ireland, representing approximately 85,000 farm families engaged in agricultural activity.
IPPC	Integrated Pollution Prevention and Control. Licensing system for industry introduced in Ireland in 1994, as Integrated Pollution Prevention Control (IPC) and governed by the Environmental Protection Agency Act, 1992 at that time. The Act was subsequently amended in 2003 by the Protection of the Environment Act, 2003 which gave effect to the Integrated Pollution Prevention Control (IPPC) Directive.
IPP	Integrated Product Policy. IPP attempts to stimulate each part of a product's life cycle to improve its environmental performance. IPP includes measures such as economic instruments, substance bans, voluntary agreements, environmental labelling and product design guidelines.
LAPD	Local Authority Prevention Demonstration Programme. A EPA run funding programme for local authorities to implement prevention based programmes in their regions
MDG	Markets Development Group, set up to support recycling markets in Ireland
MI	Marine Institute
NCDWC	National Construction and Demolition Waste Council. Body set up to implement 66 recommendations by Task Force of C&D industry in order to meet Irish national C&D waste recovery figures of 85% recovery by 2013.
NCCS	The (Irish) National Climate Change Strategy
NO _x	Nitrogen Oxides, compounds of nitrogen and oxygen produced by the burning of fossil fuels.
NSAI	National Standards Authority of Ireland
OEE	Office of Environmental Enforcement set up by EPA to support enforcement of environmental legislation, waste legislation in particular
POPs	Persistent Organic Pollutants (POPs) are chemical substances that persist in the environment and bioaccumulate through the food web. They threaten human health, as well as the health of ecosystems.
REACH	The European Commission proposed a new EU regulatory framework for the Registration, Evaluation and Authorisation of Chemicals (REACH) on 29 October 2003 (COM(03) 644 (01)). The REACH Regulation gives greater responsibility to industry to manage the risks from chemicals and to provide safety information on the substances. Manufacturers and importers will be required to gather information on the properties of their substances, which will help them manage them safely, and to register the information in a central database.
REPS	REPS (Rural Environment Protection Scheme), is a scheme designed to give financial aid to farmers to carry out their farming activities in an environmentally friendly manner and to bring about environmental improvement on existing farms.
RPS	A Renewable Portfolio Standard typically requires retail electricity suppliers to source a minimum percentage of their supply from qualifying renewables in order for a country to meet Kyoto targets and reduce reliance on fossil fuels.

SEI	Sustainable Energy Ireland
SOx	Sulphur Dioxide and other sulphur oxides. These are formed during the incineration of fossil fuels and lead to acidification.
VOCs	Volatile Organic Compounds. A highly evaporative, carbon-based chemical substance, which produces noxious fumes; found in many paints, cleaning agents, stains, and adhesives.
WEEE	Waste electrical and electronic equipment
WRAP	Waste & Resources Action Programme of the UK. Well resourced programme to support recycling and recycles industries and infrastructure

EXECUTIVE SUMMARY

Environmental technologies provide great potential for Ireland and the EU both for economic development in line with the Lisbon Agenda and also to protect and enhance the environment.

Ireland has shown significant commitment, through policies and programmes, to supporting the uptake of environmental technologies. Many initiatives are also in place in other countries. The EU has also implemented several policies and programmes which are symbiotic to the Environmental Technology Action Plan (ETAP).

However, despite the range of activities in Ireland and the spread of agencies and organisations involved, recent studies have shown that this country still has room for improvement on the levels of uptake, particularly in comparison to some EU Member States.

There are many ways to achieve such improvements, through the effective application of regulatory, economic and awareness/information instruments. Many such instruments are outlined in this report. Some of these are already being applied in Ireland, but their implementation could be intensified. Other initiatives have been effective elsewhere, but have not yet been put in place here.

Since environmental technologies cover a wide area of potential application, many public and private agencies are active in their promotion and utilisation. These are listed in this report and have also been detailed in *Ireland's national roadmap for the implementation of the Environmental Technologies Action Plan* published by the DEHLG in 2006. While all of these (and other) organisations have an important individual role to play in the support of environmental technologies, there is a need to harmonise and synchronise their activities. Several programmes are currently in place, some of which have been very successful, and these need to be learned from, built upon and adapted to future trends and needs.

This report recommends several priority actions to increase the uptake of environmental technologies. A National Steering Group for ETAP implementation in Ireland should be set up in order to coordinate the actions of the many organisations involved. An ETAP Secretariat is required to be a focal point for the activities of the Steering Group and implement its action plan on a day to day basis. The specific action points of ETAP should be linked with the most suitable organisations active in that field and formal partnerships are required to develop more efficient action frameworks. The Steering Group should develop *A National Roadmap for Ireland*, targeting specific action points from ETAP which are of special interest or relevance to Ireland. This should be reviewed and revised every 5 years. Current activities in place should be intensified and current ERTDI and other research should be monitored closely and acted upon. There is a need to investigate specific barriers to environmental technology uptake at a detailed level, involving all relevant stakeholders and an all island approach to implementation is also worthwhile. Specific areas of opportunity for Ireland should be considered whereby niche technologies or opportunities can be exploited, as other countries have done. Sectoral fora for SMEs, focusing on specific sectors and/or specific processes should be funded as a high priority to increase uptake and all relevant stakeholder groups should be involved.

Several priority actions are recommended herein for consideration to rectify the current underuse of environmental technologies. These include policy/regulatory initiatives such as new sectoral agreements and producer responsibility schemes (building on previous successes). New preventive based regulations should also be considered to build upon current IPPC legislation in place.

Increased levels of grant aid to support recycling and improved material efficiency are required as well as economic stimuli for more sustainable agricultural based alternatives such as biofuels, biomass, anaerobic digestion etc. Economic incentives are also required in transport, to support more efficient and less emitting alternatives and reverse current trends. Other economic based instruments such as water charges, green public procurement and soft loans are also recommended and these have been effective elsewhere.

Information based incentives such as technical support and training, more intensive research, awareness raising programmes (on a variety of subjects) and better labelling of cars and other products are also worthwhile instruments.

Given the findings of the EPA *Environment in Focus 2006 Report*, the application of instruments is particularly required in the fields of transport, agriculture and energy/climate change, to ensure a greater uptake of environmental technologies in those sectors and to support Ireland's environment and economy into the future.

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1. Introduction

1.1 Project Summary

This is the Final Report of the ERTDI Desk Study: *Investigation into why existing environmental technologies are underused* and, along with its Appendices, it summarises the research carried out in that study. A Synthesis Report is also available. The study was commissioned by the Environmental Protection Agency (EPA) as part of a call for proposals related to environmental technologies made in July 2005. Specifically the study was part of Theme 4 of the call for proposals - *Environmental Technologies: Studies and Support to Aid National Uptake of Environmental Technologies*. The Clean Technology Centre (CTC) carried out this research between January 2006 and December 2006.

The study's main aim was to assist the uptake of environmental technologies in Ireland. More specifically the study intended to aid Ireland in fulfilling its role in the Environmental Technologies Action Programme (ETAP) (particularly in the development of an Irish Roadmap towards environmental technologies) and its continued progress towards sustainable development. In this study CTC:

- assessed the current situation in Ireland regarding environmental technologies, their status and implementation;
- acquired a similar overview of the situation in other countries;
- described the main barriers to the uptake of environmental technologies in Ireland;
- laid out clearly a set of recommended policies and programmes that are required to overcome these barriers with special reference to success stories elsewhere;
- developed an action plan to implement these policies and programmes.

1.2 Structure of the Report

This report comprises 6 main Sections. Section 1 introduces and gives an overview of the report and its background. Section 2 outlines in brief some initiatives of the EU and in other countries regarding the promotion of environmental technologies. This is a summary of more detailed information that is provided in Appendix II to the report. Section 3 describes some Irish initiatives that have been implemented regarding environmental technologies. Again this is a brief summary of more detailed descriptions given in Appendix II. Sections 2 and 3, as well as Appendix II, take a sectoral approach to environmental technologies, dividing them into 10 related subject areas (waste, agriculture, energy, transport, climate change, air, water, products, industry and chemicals).

Section 4 outlines barriers to environmental technologies, both general and specific to Ireland. Section 5 describes policies and programmes in support of environmental technologies, taking a threefold support structure (Legislation/regulation; Economic and Information based) in order to overcome the barriers in place. Section 6 outlines an Action Plan for the implementation of policies and programmes in Ireland, looking at policies and programmes already in place (that can be built upon), the priority actions required to develop ETAP in Ireland, some further policies and programmes that could be used to support ETAP and priority environmental areas for consideration in Ireland. It also relates the recommended actions for Ireland to the 28 Action Points recommended by the EU in its 2004 Communication on ETAP¹.

¹ CEC Communication from the Commission to the Council and the European Parliament: *Stimulating technologies for sustainable development: an environmental technologies action plan for the European Union* Brussels, 28 January COM (2004) final

1.3 Background and Context of ETAP

The European Union, at the Göteborg European Council and subsequently, has made a commitment to sustainable development². As part of this commitment, it has developed policies and programmes in recognition of the need for synergies between environmental protection and economic growth³. The October 2003 European Council committed the EU to the use of Environmental Technologies in order to meet the objective of decoupling economic growth from environmental degradation⁴. On January 28th 2004 the European Commission adopted an Environmental Technology Action Plan (ETAP) to develop and encourage the use of technologies which boost the competitiveness of companies, in accordance with the Lisbon Strategy, but also to improve the quality of the environment⁵.

In order to facilitate the implementation of ETAP all over Europe, and to steer the co-operation between all participants, a High Level Working Group (HLWG) was established in 2004. It is composed of representatives from the Member States and from European Commission services (primarily Directorate General (DG) Environment but with other DGs participating).

A form of the 'Open Method of Co-ordination' is used with the Member States to advance the plan: exchange ideas on best practices, development of indicators, and setting guidelines and timetables.

In order to ensure the participation of all stakeholders in ETAP and thus the mobilisation of relevant business and finance players and technology developers working in the field, a European Forum on Eco-Innovation has been set up. Forum meetings are organised as conference type events.

Relevant players from business, finance, and technology development, as well as non governmental organisations (NGOs), actively involved in eco-innovation and environmental technologies are invited to participate to the Forum. The Forum provides a platform for discussion, debate, and interaction. It fosters the mobilisation towards common objectives and concrete strategies for future action.

To foster experience sharing on eco-innovations and on best practices, EU Member States have also been invited to formalise their national transposition of strategies and action plans towards environmental technologies. The aim of the ETAP roadmaps is to help focus on relevant plans, actions, and achievements (relevant to environmental technologies and eco innovations). Several countries, including Ireland, have now published these roadmaps⁶.

1.4 Environmental Technologies

Environmental Technologies are defined, in short, as all technologies whose use is less environmentally harmful than relevant alternatives. "Environmentally sound technologies protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes. Environmentally sound technologies in the context of pollution are process and product technologies that generate low or no waste, for the prevention of pollution.⁷" They also cover end of the pipe technologies for treatment of pollution after it has been generated. When discussing such technologies, it is important to note that they include both process and product technologies. They also cover end of pipe technologies, though these may not

² CEC *Communication from the Commission: A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development* Brussels, 15.5.2001 COM(2001)264 final

³ Such as the EU's Sixth Environmental Action Plan (6EAP) (Decision 1600/2002/EC of the European Parliament and the Council of 22 July 2002).

⁴ CEC *Brussels European Council 16 and 17 October 2003 Presidency Conclusions*. Brussels, 25 November 2003 (15188/03)

⁵ CEC *Communication from the Commission to the Council and the European Parliament: Stimulating technologies for sustainable development: an environmental technologies action plan for the European Union* Brussels, 28 January COM (2004) final

⁶ These roadmaps and further information about ETAP is available on the European Commission ETAP website: http://ec.europa.eu/environment/etap/index_en.htm

⁷ This definition is based upon that given in Chapter 34 of Agenda 21.

be the most environmentally friendly options. Most importantly, environmental technologies include more than just technologies themselves, but also, “total systems which include know-how, procedures, goods and services, and equipment as well as organisational and managerial procedures”⁸.

In its proposal to build an action plan promoting environmental technologies, the European Commission noted the diversity of such technologies and the need to promote them in all economic sectors, not just, for example, in manufacturing industry. It also noted that, while there is a need to develop new technologies, that many “potentially significant environmental technologies exist, but are underused”⁹.

The importance of environmental technologies regarding environmental protection, the competitiveness of the EU, and for individual enterprises appears to be growing. The world market for such goods and services was estimated at over €500 billion in 2003 alone (comparable to the aerospace and pharmaceutical industries) and it continues to grow at about 5% per annum¹⁰.

While data on eco-industries for most sectors in Europe remain incomplete, a 2006 Ernst and Young study¹¹ quantified this sector economically. The estimated total turnover of eco-industries in the EU-25 is €227 billion, of which €14 billion corresponds to the EU-15 area. In constant prices, the turnover of the ecoindustries grew around 7% between 1999 and 2004 (for the EU-15 area).

The total turnover in 2004 can be split into:

- € 144.9 billion for pollution management activities (64% of the total) and
- € 81.8 million for resource management activities (36% of the total).

The goods and services provided by eco-industries represent approximately 2.2% of GDP in the EU-25 area. The largest national markets for eco-industries are France and Germany which taken together account for 49% of total turnover in 2004. The three following countries (UK, Italy and the Netherlands) represent together another 24% of the EU-25 total expenditures. The 10 new member states represent only 5.7% of total turnover, of which Poland alone accounts for half.

The major eco-industry sectors in terms of turnover by far are water supply, waste water treatment and solid waste management (waste management and waste water treatment each represent approximately one third of the pollution management turnover).

1.5 EU and Irish Initiatives

The EU has also implemented several policies and programmes which are symbiotic to ETAP. These include the Sixth Environmental Action Plan (6EAP); the IPPC and other Directives as well as the forthcoming REACH Directive; support for market based and voluntary instruments such as EMAS, eco-labelling, the Community’s greenhouse gas emissions trading scheme, integrated product policy (IPP); as well as funding for research and demonstration programmes (such as the 5th, 6th and 7th Framework Research Programmes, LIFE etc.).

Ireland has also shown its commitment, through policies and programmes, to supporting environmental technologies. Such policies were iterated nationally through publications such as Supplementary Policy Statement *Delivering Change*, issued in March 2002; the *National Hazardous Waste Management Plan* adopted in July 2001, and 2nd plan currently in development; the National Sustainable Development Strategy *Sustainable Development: A Strategy for Ireland*, issued in 1997, supplemented by *Making Ireland’s Development Sustainable: Review, Assessment and Future Action*, issued in August 2002; and the *National Climate Change Strategy* issued in October 2000 and supplemented by a *Progress Report on the Implementation of the National Climate Strategy* issued in May 2002.

⁸ *ibid.*

⁹ CEC *Communication from the Commission to the Council and the European Parliament: Stimulating technologies for sustainable development: an environmental technologies action plan for the European Union* Brussels, 28 January COM (2004) final

¹⁰ Adrian Wilkes of the European Committee of Environmental Technologies Suppliers Association presentation to Green Week, Brussels, June 2004

¹¹ Ernst and Young *Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU* European Commission DG Environment September 2006

Based upon such policies Ireland has implemented supporting legislation (such as IPPC licensing for industry, several waste related regulations, and legislation protecting air and water, for example); information based programmes (through DEHLG, the EPA, Enterprise Ireland, local authorities et alia); funding mechanisms through Sustainable Energy Ireland, Teagasc, et alia; economic programmes such as the REPS scheme; EPA schemes such as the Cleaner Greener Production Programmes (2000 –), Local Authority Prevention Demonstration Programme (2006 -), several ERTDI research projects as well as this current call among others. All of these instruments further incentivise environmental technologies and pave the way for Ireland's ETAP Roadmap.

Many of these EU, Irish and other country initiatives are described in this report (and developed further in Appendix II) with a view to creating an overview of the present situation, building upon success stories and implementing new policies and programmes where required.

1.6 Quantifying environmental technologies in Ireland and elsewhere

The 2006 Ernst and Young study quantified so called eco-industries across the EU (both EU 15 and EU 25), with Germany and France being the clear leaders. The average eco-industry expenditure per country in the EU-25 is €9.4 billion, yet France spends as much as €45.9 billion and Germany €66.1 billion. The two countries' combined turnover makes up 49% of all EU-25 expenditures.

The three following countries spend €21.2 billion (UK), €19.2 billion (Italy) and €14 billion (Netherlands) and together represent another 24% of the EU-25 total expenditures. The remainder is divided between all the other countries (see Table 1.1), which spend from €10,1 billion (Austria) to €0,1 billion (Cyprus). The 10 new member states make up only 5.7% of total eco-industry turnover although they represent 16.3% of the EU population.

Country	Total Turnover (€ million)	% of EU-25	Pollution Management (€ million)	% of EU-25	Resource Management (€ million)	% of EU-25
Germany	66,114	29%	44,597	31%	21,517	26%
France	45,851	20%	28,264	20%	17,587	22%
UK	21,224	9%	12,103	8%	9,121	11%
Italy	19,269	9%	8,946	6%	10,323	13%
Netherlands	14,039	6%	10,953	8%	3,086	4%
Austria	10,091	4%	9,092	6%	999	1%
Spain	9,044	4%	6,047	4%	2,997	4%
Denmark	8,794	4%	6,542	5%	2,252	3%
Poland	6,557	3%	4,444	3%	2,113	3%
Belgium	5,806	3%	2,785	2%	3,021	4%
Sweden	3,968	2%	3,090	2%	878	1%
Finland	3,543	2%	1,414	1%	2,129	3%
Portugal	2,356	1%	1,069	1%	1,287	2%
Hungary	2,193	1%	1,493	1%	700	1%
Greece	2,054	1%	1,266	1%	788	1%
Czech Republic	1,726	1%	399	<1%	1,327	2%
Ireland	1,211	1%	818	1%	393	<1%
Slovenia	872	<1%	507	<1%	365	<1%
Slovakia	740	<1%	409	<1%	331	<1%
Lithuania	371	<1%	187	<1%	184	<1%
Luxembourg	319	<1%	198	<1%	121	<1%
Estonia	256	<1%	159	<1%	97	<1%
Latvia	159	<1%	92	<1%	67	<1%
Cyprus	139	<1%	39	<1%	100	<1%
Total	226,697	100%	144,915	100%	81,783	100%

Table 1.1: Total Turnover, Pollution Management and Resource Management Expenditures on environmental technologies by country, 2004¹²

As Table 1.1 shows, Ireland is estimated to spend about €1.2 billion per annum on eco-industries, with €818 million of this on pollution management and €393 million on resource management. The breakdown in pollution management is about 14% on air pollution control, 12% on wastewater treatment and 74% on solid waste management. This total comprises about 1% of the overall EU

¹² ibid

spending on environmental technologies. In absolute economic terms, this figure of €1.2 billion appears low and comparatively, it is also about 12% of that for Austria and 13% of that for Denmark.

Turnover of eco industries per capita is shown in Figure 1.1. From this it can be seen that Denmark and Austria are the European leaders with over €1600 per capita in Denmark and over €1200 per capita in Austria. Ireland's turnover per capita is just less than €300.

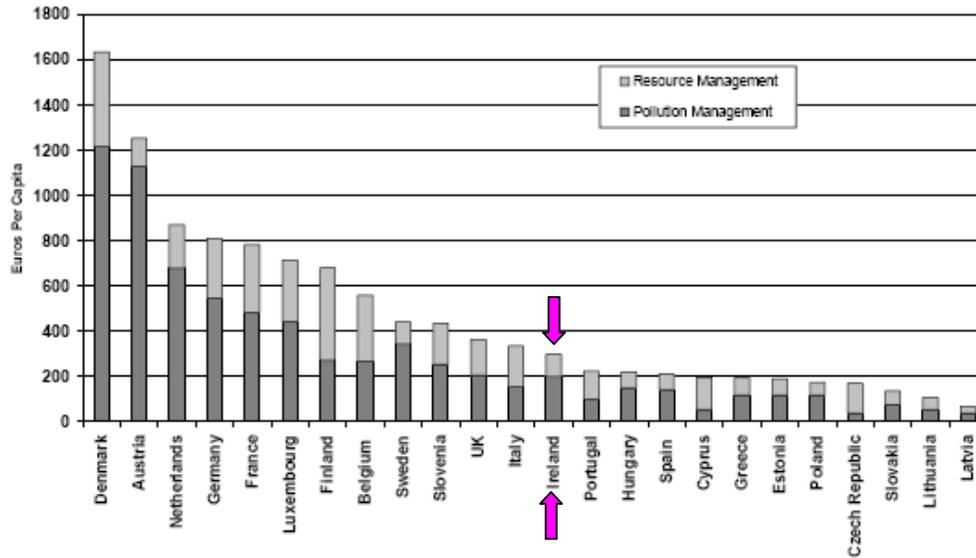


Figure 1.1: Turnover of eco-industries per capita in EU - 25

Eco-industries are a more significant part of the economy in some countries than in others, as seen in Figure 1.2. The turnover of eco-industries as a percentage of GDP has an EU average of 2.3% and is highest in Denmark and Austria.

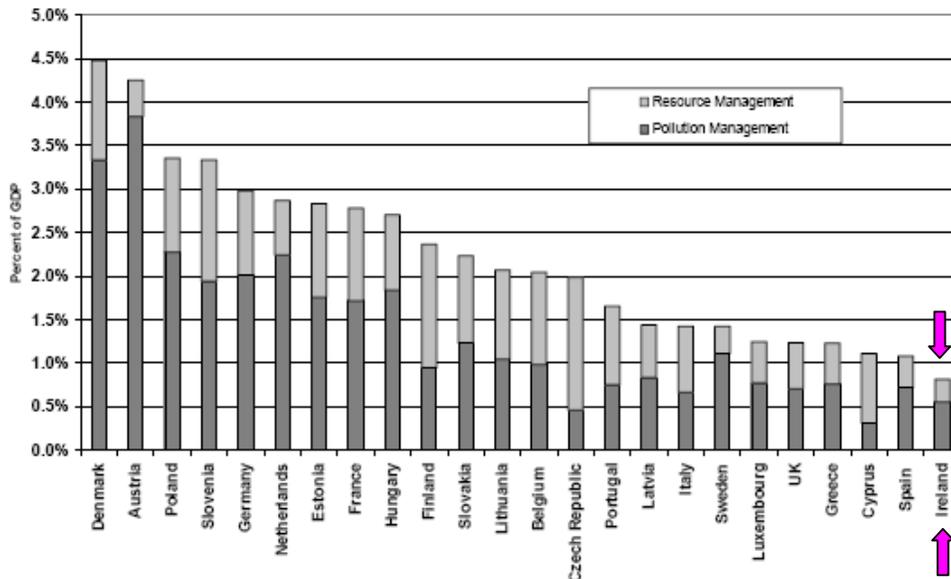


Figure 1.2: Turnover of eco-industries as a percentage of GDP

Although a greater percentage of Denmark's and Austria's economies consist of eco-industries, the impact of eco-industries in these countries is limited because their overall economies are much

smaller than France and Germany. One reason for the very low percentage in Ireland (about 0.8%) is the relatively inflated GDP in Ireland due to high value pharmaceutical and other products.

The relatively low Irish turnover in eco-industries can be partly explained by the small scale of industrial manufacturing in Ireland compared to other countries such as Germany and France. Ireland also does not have a recycling processing infrastructure, nor a high level of manufacture or use of solar energy. Nor do we utilise (or manufacture) municipal waste incineration facilities. Ireland also scores very low in biomass energy, biofuels, and wind energy (80% of all wind energy in Europe is produced in Germany, Spain and Denmark alone).

It should be noted that Ireland currently has the 2nd highest growth rate in eco industries in the EU after Finland, with a growth of 55% noted between 1999 and 2004 (or 27% in constant Euro terms). Ireland also has the highest growth in employment in this sector in Europe with a growth of 42% from 1999 to 2004. It is thus clear that while Ireland still has a lot of catching to do, progress is being made.

2. Initiatives in the EU and other countries

2.1 Introduction

This section summarises the initiatives that have been put in place by the EU and in individual countries (both inside and outside the EU). It gives some examples of best practice and innovative technologies. It looks at some of the best programmes in place to increase the uptake on existing technologies – in particular those that can be replicated in Ireland.

Sections 2 and 3 and Appendix II of this report focus mainly on good example case studies, describing specific current technologies (with examples of future potential technologies also given), giving details of hard technologies (with information also on processes, good practices and materials) and outlining initiatives and programmes designed to ensure that technologies are applied and that their uptake can be maximised. Some of these initiatives will be further discussed in Sections 5 and 6.

2.2 Structure of the analysis

Since the range of environmental technologies is so wide and the potential use of such technologies so varied, it was considered worthwhile by the project team to divide them into logical groups in Sections 2 and 3 of this report and also in Appendix II. This was done according to the use or environmental area at which these technologies are aimed. Thus the team divided the technologies and their related information into 10 subject areas as follows:

- Waste
- Agriculture
- Energy
- Transport
- Climate change
- Air
- Water
- Products
- Industry
- Chemicals

From a regional perspective the analysis of each of these subject areas is divided into information from the European Union generally, then specific to individual countries both inside and outside the EU.

Within each subject area, some core issues were also identified and targeted. Thus for example, within waste, the technologies regarding recycling were highlighted. Similarly, for water there was a focus on eutrophication; for transport it was biofuels etc.

2.3 Approach Taken

When examining the broad scope of environmental technologies, and with a view to recommending policies, programmes and actions later in Sections 5 and 6 of this report, it was necessary to first establish a framework of approach. With this in mind the study has examined initiatives from a threefold perspective: regulatory, economic and information based, as follows:

Regulatory

Regulation and legislation is known to be an effective tool used by national and local government to boost the protection of the environment and promote the practices and technologies necessary for such protection. The research contained in this report focused on both the legislation that has been

applied as well as how it has been applied. It also analyses several policies and programmes in relation to each of the subject areas described. Thus for example in the area of waste policies in Ireland, the subject of enforcement is described, in particular the EPA's Office of Environmental Enforcement. In relation to air, policies and measures are described in relation to different types of air pollution such as SOx, NOx, POPs, VOCs, CO₂ etc.

Economic

Economic instruments such as the plastic bags levy have had success in several countries and form the basis of many supportive initiatives with regard to environmental technologies, especially promoting the concepts of producer responsibility and when trying to improve the performance of the general public.

In order to make environmental technologies and alternatives more attractive it is often necessary to boost the economic attractiveness of such options in comparison with the current and less environmentally friendly but more familiar choices. Thus in relation to energy, for example, incentives such as feed in tariff systems, green certificates, green pricing schemes, carbon taxes, tax based incentives etc. are described.

Awareness/Information

Very often the reason for a low uptake of an environmental technology or approach is the lack of awareness or understanding of better alternatives. That is why the EU and several countries have invested heavily in supporting awareness raising programmes and schemes as well as research. In Australia, to reduce urban water consumption, for example, the national, state and territorial governments have combined to introduce a Water Efficiency Labelling and Standards (WELS) Scheme which applied national mandatory water efficiency labelling and minimum performance standards to household water-using products.

The approach taken in Sections 2 and 3 of this report and also in Appendix II can be shown in Figure 2. 1 below:

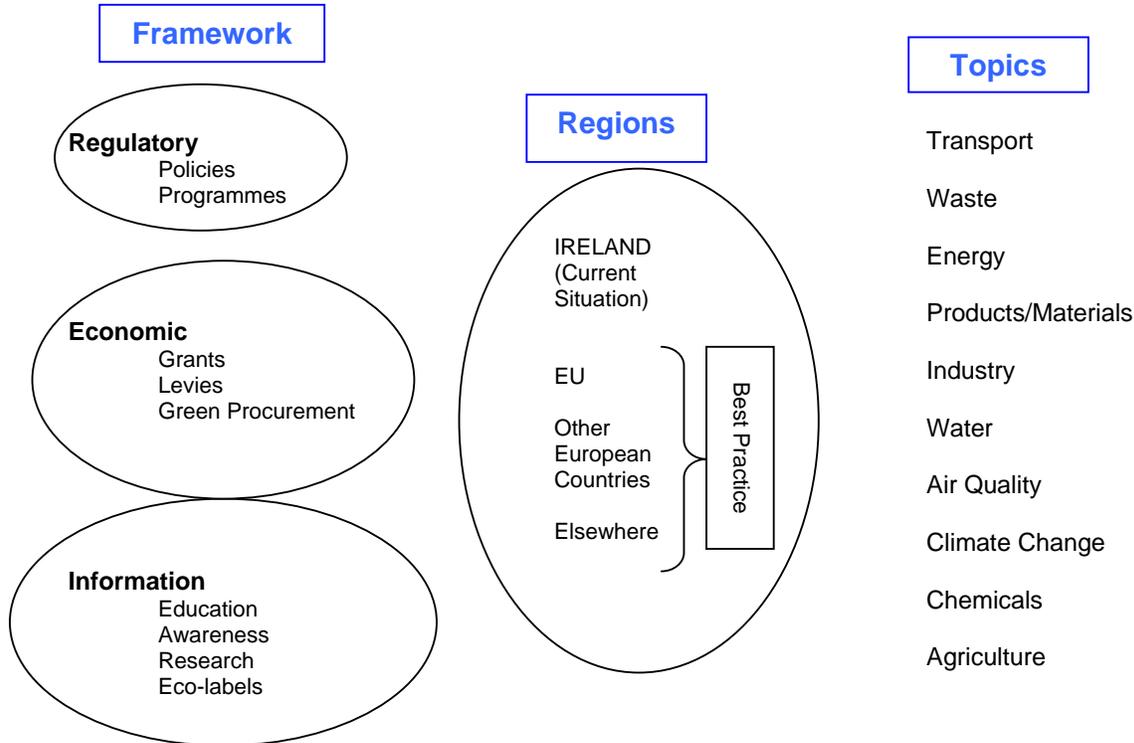


Figure 2.1: Framework, Regional and topical approach taken

2.4 EU initiatives

2.4.1 Regulation and Policy

Regulation and policy are the main areas of support for environmental technologies by the European Union. This is the so called 'push' effect – such policies and regulations push member states, industry and consumers into improved behaviour and the use of more environmentally friendly technologies and practices. This has been shown to be a very effective method for change – for example the implementation of Integrated Pollution Prevention and Control (IPPC) licensing in Ireland has led to the use of Best Available Technologies (BAT) in several industrial sectors.

A wide range of policies, strategies and supporting Directives are in place in each of the 10 subject areas examined. The usual process is that the EU will decide a policy or strategy on a given topic (e.g. Integrated Product Policy is committed to reducing resource use and reduced impact of waste) and this will lead either to a Directive which will be transposed into Member State law, or a voluntary agreement, whereby Member States implement their own measures or programmes to meet the objectives of the EU policy.

In agriculture, for example, the Common Agricultural Policy, and in particular recent reforms of the CAP, will have a major impact on the environment and on changes in practices and technology use in that sector. Similarly in energy, the commitment of the EU to the Kyoto Protocol, and subsequent national targets in that regard will inevitably lead to a higher uptake in renewable energy technologies and technologies that conserve energy.

2.4.2 Economic Supports

The EU provides a high level of economic support for improved environmental behaviour and an increased uptake of environmental technologies. The EU provides infrastructural and structural supports to individual member states, and also directly to agencies and intermediaries through several support programmes.

In the area of environment, the LIFE Environment Programme has provided financial support for environmental demonstration projects since 1992. €400 million have been allocated for the first phase (1992-1995), approximately €450 million were allocated for the second phase (1996-1999), the third phase, "LIFE III" (2000-2004) had a budget of €640 million. LIFE III was extended (2005-2006) by Regulation (EC) No 1682/2004 of 15 September 2004 with a budget of €317 million.

2,478 LIFE projects were supported from 1992 to 2004:

- 876 LIFE-Nature projects,
- 1,404 LIFE-Environment projects,
- 198 LIFE-Third Countries projects

Again these supports have aided the uptake of improved technologies and practices in all of the subject areas considered and there are many examples of new and existing technologies which have entered the mainstream due to this support and co-funding.

2.4.3 Information Support

While policy and regulation may be the starting impetus for change, it is also accepted that such change can be difficult and painful in many cases. It is not possible, for example, to implement a *Thematic Strategy on the Prevention and Recycling of Waste* without making people more aware of the need for composting, for example. But people must be aware of not only the need for composting, they will also need practical and effective information about *how to* compost their biodegradable waste.

Likewise such a strategy acknowledges the need for new and improved technologies for recycling. Thus for example, the Innovation Relay Centres (IRCs)¹³ support the research and development of new technologies. The IRCs provide a Technology Marketplace service so that researchers and

¹³ The IRC Network is made up of 68 innovation relay centres in Europe. Further details available at <http://irc.cordis.lu/>

developers can link with investors and private industry to test and promote environmental technologies and commercialise them.

Again in each subject area considered there is a wide range of awareness raising and information dissemination to support improved practices and environmental technologies. The ETAP programme itself and the large volume of information available on this subject is, in itself, a good example¹⁴.

The EU is active in directly raising environmental awareness through a variety of means. Apart from providing financial support to individual Member States to carry out their own national research and awareness raising campaigns, the EU provides information through means such as

- Conferences and Events (such as Green Week)
- Agencies for gathering and disseminating information (such as the European Environment Agency)
- Websites and Portals
- Databases and Information Gathering
- Publications and Reports
- Research support programmes (such as Framework Programmes)
- Demonstration programmes

2.5 Other Countries

There are several initiatives in place in other countries in each of the subject areas reviewed. These are described in detail in Appendix II and are summarised below. Successful initiatives have been given priority in the study, and in particular those that could be replicated in Ireland. These initiatives are also investigated in greater detail in Sections 5 and 6 to recommend suitable initiatives and strategies to overcome the barriers in an Irish context.

The initiatives in other countries are summarised in Table 2.1 below:

WASTE	
UK	Envirowise: extensive advice and assistance service to business with several supporting guides, a help line, funding mechanism etc.
UK	WRAP: well funded and structured company to support waste prevention and recycling; large number of new recycling standards and technologies supported and co-funded
Canada	Eco-Peinture: producer responsibility compliance programme for paints; small eco-tax applied to paints at point of sale to pay for collection and recovery; high levels of increased recovery noted
Australia	WasteNet: website supports for local authorities to share experiences and successful initiatives
Netherlands Denmark Austria Belgium	Large number of information, economic and regulatory initiatives noted; these have led to a high level of recovery and reductions in volumes of waste produced over several years; high usage of environmental technologies related to waste recovery and recycling in these regions
AGRICULTURE	
UK	Environmental Stewardship scheme provides funding to farmers to improve management techniques
UK	Environmental Sensitive Areas Scheme supporting biodiversity in special regions through funding and other supports
UK	Energy Crops Scheme: grant aid for two energy crops: coppice and miscanthus and producer support groups
UK	Biopesticides Scheme studies to test possible natural alternatives to pesticides in the protection of crops; setting up of champion, guidance and supporting information
UK	Feed Trials: innovative additive to feedstock which reduces methane production in animals
Germany	Agri-environment scheme (the 'MEKA programme') to additionally reward farmers according to the plant diversity of grassland sites.
Denmark	Regulations on fertiliser, crop rotation plans, and manure at farm level, with limits set on nitrogen

¹⁴ Further details about ETAP and the range of information available can be seen at: <http://europa.eu.int/comm/environment/etap/>

Japan	Biomass Nippon Strategy including measures for the inclusion of animal wastes as biomass in the strategy.
Canada	Range of initiatives including research on the development of an anaerobic treatment system that uses biotechnology to deodorize and stabilise swine manure slurry; and a study to minimize the loss of nitrogen during manure composting resulting in a higher value product and reduced air emissions
Austria	Grant aid to organic farmers since 1991. Austria's organic farmers in 2004 received approximately €89 million from the agri-environmental programme ÖPUL for the measure "Organic Farm Management".
ENERGY	
Austria	High growth in biomass heat and power, and solar thermal power due to fiscal incentives & capital subsidies
Germany	<p>"Bright NRW" was a joint energy efficiency programme, initiated and co-funded by the German Ministry of Economics and carried out by 80 utility companies. With different local marketing strategies, but all beneath the same logo, the utilities distributed compact fluorescent lamps (CFLs) among their household customers. Four types of programme were carried out:</p> <ol style="list-style-type: none"> 1. free give away of the CFLs without any condition other than the recipient being a domestic customer; 2. free giveaways with certain condition (e.g. three free CFLs for every energy efficient household appliance bought) 3. vouchers worth different sums which could be redeemed in local shops; 4. a marketing programme to convince householders of CFLs without any financial incentives. <p>Within 6 months half a million CFLs had been distributed with an estimated saving of 553MWh and more than 320,000 tonnes of CO₂ emissions.</p>
Finland	Finland is the leading user of bioenergy in the European Union. Part of Finland's success is due to large availability of biomass contained within the country. Energy from biomass accounts for about 26% of the total energy output, with oil coming in only at about 25%. About 20% of the total electricity output used in Finland comes from bioenergy. The current strategy of the Finns to increase biomass use includes technology funding, availability of grants for new technologies, tax allowances for the production of renewable energies, energy wood harvesting and wide information dissemination. In addition Finland is the world leader in the development and use of biomass combustion technologies.
Switzerland	Switzerland's government approved two fiscal instruments to cut CO ₂ emissions on 23 March 2006. A CO ₂ tax of €23 per tonne was imposed on most fossil fuels from January. A separate climate levy of up to 1.6 centimes (0.09 cent) per litre applies to petrol and diesel. The measures were introduced to bolster Swiss efforts to comply with its Kyoto protocol commitment to limit greenhouse gas emissions. The levy on transport fuels was introduced for a two-year trial period. If it has not helped bring down emissions sufficiently by the end of 2007 it could be extended, though possibly only to diesel.
Sweden	Capital subsidies available for wind and biomass. Energy tax exemptions in place. RPS scheme introduced in 2003.
Denmark	From 1997, a new energy-labelling scheme for large and small buildings took effect. There was a 20% improvement in energy intensity between 1994 and 2005. In June 2005 new energy requirements for the building regulations of small houses and for general building regulations were published. The new requirements came into force January 1, 2006. All new buildings must be labeled to ensure fulfillment of the requirements. The new action plan calls for tightening the energy requirements in the building code by 25-30 % from 2006 and a further 25 % from 2010. The new action plan calls for a general target for reducing energy consumption in all sectors (not transport) of 1.7 % per year until 2013. Grant provisions totaling € 135 million are made each year to improve energy efficiency. There are subsidies for pensioners with low income. Other grants are also in place to promote central heating.
Canada	Canada has a number of federal as well as regional renewable energy promoting incentives. Renewable Energy Deployment Initiative (REDI) (Dec 2003) has a number of incentive programs for businesses to use solar thermal technologies.
Japan	The Energy Conservation Law was revised in June 1998 to reinforce previous standards. It established the Top-Runner Programme in which the energy performances of the most efficient products supplied domestically are used to set up the next efficiency standards. Products included in the Top Runner Programme are passenger cars and trucks, air conditioners, fluorescent lights, refrigerators, TV, VCRs, photocopiers, computers and hard-disk drives.
TRANSPORT	
France	France is the largest producer of biofuels in Europe, accounting for 40% of total European

	production and increased their use by 250 ktoe between 1993 and 1999. They are also one of the few worldwide countries to have placed a high priority on development of biofuels, mainly through support of research and development and the agricultural sector. Oil companies are allowed substitute biodiesel for normal fossil fuels up to a level of 5% for use in private cars, while commercial fleets can replace up to 30%. In France, 55 cities have fleets of buses running on biofuel.
Sweden	In Sweden 10% of all new cars are run on biofuels. The biofuels consist of methane, ethanol, biodiesel and dimethyl ether (DME). DME, which is a by product of the wood industry has been flagged for use in heavy machinery. There are numerous incentives promoting the uptake of these vehicles: E85 (85% ethanol, 15% petrol) is 40 cent cheaper than petrol; biofuel cars are exempt from congestion charges in the major cities; they also receive free parking.
Brazil	In recent years, Brazil offered government credit to the sugar industry to cover 60% of its storage costs in order to guarantee ethanol supplies, mandated their use in government fleet vehicles and pioneered flexible fuel vehicles that can operate on anything from straight petrol to E85.
USA	The development of electric vehicles worldwide has been driven by the Zero-Emission-Vehicle (ZEV) legislation since 1998 in California. Californian automotive emissions legislation is seen as an international trend setter and although the legislation has changed somewhat since its initial inception (due to litigation by manufacturers), vehicle manufacturers are still required to sell a certain percentage of their passenger vehicles as electric and advanced technology vehicles.
Australia	Since September 2004, Perth has been participating in one of the first major trials of hydrogen fuel cell buses in the world. Three Daimler Chrysler hydrogen fuel cell buses were trialed on normal Perth service routes for two years.
UK	The London congestion charge is a fee for motorists entering the Central London area. London was not the first city to adopt congestion charges, but as of 2006 it is the largest city to do so. The aim of the scheme is to encourage travelers to use public transport, cleaner vehicles, bicycles, motorcycles or their own two feet instead of motor automobiles, thus reducing congestion and allowing for faster, less polluting and more predictable journeys. Much of the money raised in the scheme is invested in public transport.
Denmark	From 1999 to 2002, the city of Odense (population: 150,000) was the official National Cycle City of Denmark. The project developed 50 pro-cycling initiatives, which included physical improvements of bicycle infrastructure, changes in regulations and awareness campaigns. During the project period, the citizens of Odense made 35 million new cycle journeys (about 25,000 per day); half of which were previously made by car. The project shows that cycling policy can provide a cost-effective and healthy way to reducing car traffic in cities.
Germany	"Call a bike" is a German Railways bike rental service. The new bicycle-hire scheme is mainly designed for one-way trips. Bicycles do not have to be returned to departure stations. They can be left at the nearest major crossing within the core area. People, who are registered as Call a Bike client, can use the bikes by calling the number on the bike they want to rent. The client receives a four digit code which he enters on a touch screen to release the lock. Each CallBike is protected by an electronic lock that can only be opened with a numerical code. The Call a Bike system has been highly appreciated by railway customers, but also by other city visitors. In Berlin and Munich more than 20,000 persons are currently registered as Call a Bike clients. More than 1,100 individual bike rides are recorded every day. Call a Bike shows how the combined use of bicycles and public transport in cities can be promoted successfully.
CLIMATE CHANGE	
Japan	Three Methods to achieve cost-effective and real emissions reduction were identified in Japan: <ul style="list-style-type: none"> • Subsidies for companies/facilities for introducing the facilities and measures to reduce greenhouse gas (GHG) emissions (cost-effectiveness of their plans will be the basis for selection) • Voluntary commitments for a certain amount of GHG emissions reduction (in case of non-compliance, companies need to return the subsidies – higher incentives for them to make serious commitment) • Emissions Trading (Flexible mechanism that enables its participants to deal with the risks, such as the increase in GHG emissions. Also, in case of over-achievement, they can sell the excesses to others.)
UK	The UK has one of the best records of any country in tackling greenhouse gas emissions. The measures to reduce emissions target every sector of the economy and include: <ul style="list-style-type: none"> • A stricter emissions cap for industry; • Measures to encourage the uptake of biofuels in petrol;

	<ul style="list-style-type: none"> • Tighter building regulations; • Measures to improve household energy efficiency; • A renewed emphasis on encouraging and enabling the general public, businesses and public authorities to help achieve the Government's targets • Increased levels of microgeneration
Germany	Germany has been another of the major success stories within the EU in reducing its GHGs. Greenhouse gas emissions were brought down by as much as 18.5 per cent by the year 2003 as against 1990 levels. Emissions were brought down by 15 million tonnes between 1999 and 2003 in Germany (after a sustained period of growth from 1990 to 1999), which bucks the trend within the European Union. Instruments by which this was achieved include an ecological tax reform and the strengthening of the public transport system (e. g. Law on the Regionalisation of Public Transport). The Kyoto targets for 2008-2012 are laid down in the Emissions Trading Allocations Act (ZuG 2007) and are thus legally binding. A new instrument, emissions trading, guarantees that the targets in the energy and industry sectors will be met.
AIR	
UK	The "CATCH" project aims to demonstrate the kinds of practical measures that can be implemented to improve air quality in a major UK city, i.e. Liverpool. A strong focus is given to the city centre air quality management zone. The project aims to foster cooperation between transport planners, land use planners and environmental health officers and should establish a new agency to promote widespread introduction of clean fuels, the implementation of green travel plans, and promotion of environmental objectives within regeneration plans.
Canada	Canada has committed itself to a 10 year programme called The Clean Air Agenda in response to growing scientific evidence demonstrating that further actions were necessary to protect the health of Canadians. This program focuses primarily on smog but recognizes linkages to other air issues, such as acid rain, climate change, persistent organic pollutants (POPs), hazardous air pollutants (HAPs) and stratospheric ozone depletion. Over the last five years, the government has announced significant investments in this program totaling \$210 million to deliver on key elements of the Clean Air Agenda.
UK	The Beacon Scheme, which was introduced in 1999, is intended to recognise excellence amongst local authorities, facilitate the spread of best practice and in turn drive up local authorities' performance. Round 8 of the Beacon Scheme is being launched on 20 March 2006. In Round 8, Defra has a beacon theme, entitles "Delivering Cleaner Air".
Australia	Australia continues to succeed in phasing out and managing ozone depleting substances. The Government supervises the orderly phase-out of these substances in accordance with Australia's commitments under the Montreal Protocol on Substances that Deplete the Ozone Layer. For example, the National Halon Bank collects and safely disposes of surplus halon, formerly widely used in fire extinguishers, while maintaining a reserve of halon until the year 2030 for essential uses.
Germany	A number of initiatives have been undertaken by the German government in relation to air pollution control. It is a policy of the government to create economic incentives rather than introducing bans to tackle air pollution. This can be seen in the success of the reduction of the sulphur content of fuel. Since 1 January 2003 the mineral oil tax rate for sulphur-free fuels that contain a maximum 10 milligrams of sulphur per kilogram of fuel is 1.5 cent cheaper.
WATER	
Canada	Water pricing initiatives in selected areas where the bill to the consumer rises uniformly with the volume used or where successively higher prices are charged if larger volumes are used. Roughly 45% of the population is subject to these pricing schemes. Public awareness campaigns are utilized to inform the consumer of the measures.
Canada	A comprehensive water conservation program was established to deliver pollution management at source in Collingwood, Ontario. Economic incentives, including a water-metering system and increasing the unit cost of water, were combined with an educational program to promote water conservation and pollution prevention. Water use dropped 33%. Reduction of wastewater meant reduced energy, chemical requirements, and phosphorus loading to the harbour and improved water quality. Collingwood Harbour is no longer an "Area of Concern" under the Great Lakes Water Quality Agreement.
Australia	To help to reduce urban water consumption on a national scale, the Australian Government, in collaboration with State and Territory governments, has introduced a Water Efficiency Labelling and Standards (WELS) Scheme, which applies national mandatory water efficiency labelling and minimum performance standards to household water-using products. The WELS Scheme will help to address the issue of high domestic water consumption by providing nationally consistent water efficiency information to consumers at point of purchase and by encouraging manufacturers to design more water-efficient products.

USA	The <i>National Pollutant Discharge Elimination System (NPDES) Permit Program</i> controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Sectors covered under this programme include agriculture, industrial and commercial facilities and waste water treatment plants. Under NPDES, all facilities which discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit provides two levels of control: technology-based limits (based on the ability of dischargers in the same industrial category to treat wastewater) and water quality-based limits (if technology-based limits are not sufficient to provide protection of the water body).
PRODUCTS	
UK, USA, Canada	While taxation in most countries is still based on engine size, alterations have been suggested to change this to emission based. The UK is one of the first countries to introduce CO ₂ based taxation for automobiles. In the United States tax credits are available for many types of home improvements including adding insulation, replacement windows, and certain high efficiency heating and cooling equipment. Sweden is to appoint a committee to evaluate the possible introduction of new taxes on raw materials as a step to reducing environmental impact in connection with resource extraction.
EU, Japan, Korea	Commitments have been concluded with the European (European Automobile Manufacturers' Association – ACEA), the Japanese (Japan Automobile Manufacturers' Association – JAMA) and Korean (Korean Automobile Manufacturers' Association – KAMA) automobile industries. All three Commitments are equivalent having the following main features: <ul style="list-style-type: none"> • The CO₂ emission objective: The three Commitments contain the same quantified CO₂ emission objective for the average of new passenger cars sold in the European Union, i.e. 140 g CO₂/km (to be achieved by 2009 by JAMA and KAMA and by 2008 by ACEA). In other words the fleet of new passenger cars put on the market in 2008/2009 will consume on average about 5.8 l petrol/100 km or 5.25 l diesel/100 km. • Means of achievement: ACEA, JAMA and KAMA have to achieve the CO₂ target 'mainly' by technological developments and market changes linked to these developments.
Sweden	Swedish industry has initiated and established an official Type III environmental declaration programme called the Environmental Product Declaration (EPD) system based on ISO TR 14025 – a pre-standard in the ISO 14000 series. The EPD system is applicable worldwide for all interested companies and organisations. Currently companies and organisations in seven countries have joined the EPD system in various stages (Canada, Japan, South Korea, Norway, Germany, Denmark and Italy).
UK	Increasingly, there is a demand to assess and measure the environmental performance of products sold in the UK. Published Performance Standards offer benchmarks with which to compare the environmental performance of a range of products and help inform the decision making process of policy makers, manufacturers and consumers when promoting, manufacturing or purchasing products. The PSIB, drawn up by DEFRA's Market Transformation Programme (MTP), mainly aims to provide information on benchmarks for the environmental performance of household appliances and traded goods, supporting green procurement.
Wales	Established in 1994, Design Wales is funded by the Welsh Assembly Government (WAG) to provide free and independent advice on all aspects of design to Welsh industry and to offer strategic design advice to the WAG. Practical support is provided by a team of eight advisors via one-to-one advice and a programme of seminars and workshops to help companies realize and achieve their design related objectives. In 2004 Design Wales were commissioned by the WAG and the Welsh Development Agency (WDA) to develop a detailed proposal for a Welsh ecodesign initiative.
Japan	Canon, Sony, NEC and numerous other Japanese based companies have created lists of approved products that were developed based upon each products environmental attributes. Before making a purchase the purchasing department must first consult the list of approved products to determine if the supplying company has established a product of a suitable standard and environmental character.
INDUSTRY	
UK	The WRAP Capital Grants Scheme; The WRAP Business Development Service; The Carbon Trust's Low Carbon Innovation Programme and Enhanced Capital Allowance Measure; Envirowise
Austria	The City of Vienna advisory services
Germany	The KfW Bank's ERP Environmental Protection and Energy Saving Programme; The KfW Bank's Environmental Protection Programme; The KfW Bank's Programme to Promote

	Renewable Energies
Netherlands	SenterNovem's CO ₂ Reduction Plan; SenterNovem's Energy Investment Tax Relief Scheme; The Green Financing Measure
France	The Fideme Investment Fund
Denmark	The Programme for Cleaner Technology
CHEMICALS	
Denmark	The Danish List of Undesirable Substances contains the names of substances that have effects on health and the environment, and are used in large quantities or are considered problematic by the Danish EPA for some other reason. Monitoring and information gathering on the most problematic substances is carried out continuously, so new substances can be added to the list and others can be removed, based on criteria such as toxicity, carcinogenicity, ability to cause genetic damage or impair fertility, allergenic features or negative environmental impact. The fact that a substance appears on the list does not necessarily mean that it should be banned altogether, but it should be seen as a hint to either restrict the use to the lowest possible level or find a more viable substitute.
Czech Republic	The Czech Republic will ban production and sale of laundry detergents containing more than 0.5% phosphates (excluding dishwasher detergent tablets) from 1 st July 2006 in a bid to combat eutrophication of watercourses, since a voluntary agreement with industry proved ineffective.
Sweden	A charge on emission of nitrogen oxides (NO _x) from energy generation at combustion plants was introduced in Sweden in 1992. The charge has been seen by the Swedish EPA as a crucial factor in the considerable reduction in emissions of nitrogen oxides that has taken place from these plants during the 1990s.
Germany	Germany has banned the use of ozone-depleting hydrochlorofluorocarbons (HCFCs) in medical applications which includes metered-dose inhalers since January 2006, making it one of the first in the world to do so. Under the UN Montreal protocol on ozone layer protection HCFCs can still be used in certain applications such as metered-dose inhalers despite a general ban on the gases.

Table 2.1: Overview of environmental technology initiatives in other countries

3. Initiatives in Ireland

3.1 Introduction

Just as it is clear that there are initiatives in other countries on each of the subject areas in order to promote better environmental behaviour and the use of environmental technologies, so also can such initiatives be seen in Ireland. This Section summarises these initiatives.

Support and policy instruments as well as regulatory pressures have been put in place in all the subject areas covered in the study. Substantial efforts in staff and resources have been invested in Ireland, in several areas, to support the uptake of environmental technologies by government departments, state agencies and private organisations. These include:

- Environmental Protection Agency
- Enterprise Ireland
- Sustainable Energy Ireland
- Forfás
- Geological Survey of Ireland
- Marine Institute
- Department of the Environment, Heritage & Local Government
- Department of Enterprise, Trade and Employment
- Department of Agriculture and Food
- Department of Education and Science
- Department of Transport
- Department of Communications, Marine and Natural Resources
- Higher Education Authority

Many of the instruments and incentives implemented by these agencies are listed in the Irish National Roadmap for the implementation of ETAP¹⁵.

This Section also points out some of the challenges being faced by Ireland, in particular the need to improve performance in comparison to some other countries, whose policies and initiatives have been more successful.

3.2 Waste

A large number of initiatives (Policy/Legislation, Economic and Awareness) can be seen, for example, in the area of waste and these can be summarised in Table 3.1 below.

Several important policy and legislative initiatives have been implemented from the 1992 EPA Act onwards. Stricter licensing and management of waste was required since the Waste Management Act of 1996 and its related regulations. National strategies on particular streams such as biodegradable waste and hazardous waste have also been developed, as well as waste management plans on a local authority and regional level.

Several economic instruments have also been implemented, particularly to boost the recovery of waste. The plastics bag and landfill levies and the ring fencing of this income into the Environment Fund has aided the development of infrastructure and facilitated greater waste recycling. Use related charges (or 'pay as you throw' costing structures) implemented by local authorities has also boosted recycling levels greatly. Producer responsibility schemes for packaging, electronic and other waste streams have been implemented.

Greater awareness is also apparent regarding waste due to the regulatory and economic instruments, and as a result of focused information campaigns such as the *Race Against Waste* and local programmes. The levels of research and demonstration programmes implemented by the EPA and others have also greatly increased. Agencies such as Enterprise Ireland, the EPA, ENFO

¹⁵ Department of Environment, Heritage and Local Government *Ireland's national roadmap for the implementation of the Environmental Technologies Action Plan (ETAP)* DEHLG, 2006 – available at the ETAP website: http://ec.europa.eu/environment/etap/index_en.htm

et alia., and independent organisations such as the Clean Technology Centre and others have also been active in information provision.

Basis	Instrument
Policy/ Legislation	Preventing and Recycling Waste – Delivering Change National Waste Prevention Programme Markets Development Group National Strategy on Biodegradable Waste National Hazardous Waste Management Plans (1 and 2) Local/Regional Waste Management Plans (2 editions) Waste Management Acts, 1996, 2001 Several Waste Management Regulations Environmental Protection Agency Act, 1992 Protection of the Environment Act 2003 IPPC Licensing North-South Co-Operation for Waste Management Waste Permitting and Licensing Current and future EU legislation Local Authority Landfill Bans
Economic	Plastic Shopping Bags Levy Landfill Levy Landfill Charges Environment Fund Use related waste charges Producer responsibility initiatives for packaging, WEEE, ELVs, Farm Films, C&D waste etc.
Awareness/ Information	Race Against Waste It's Easy to Make a Difference Local Authority programmes Environmental non governmental organisation (ENGO) local programmes Enterprise Ireland programmes (www.envirocentre.ie) ENFO ERDTI Programmes CGPP Programmes DEHLG Reports on LA21 etc. EPA National Waste Databases 1996 - EPA Reports and Documents CTC Reports and Documents Forfás Reports etc.

Table 3.1: Initiatives related to waste in Ireland

3.3 Agriculture

In agriculture, the implementation of the Nitrates Directive will have an effect on water quality and lead to a reduction in over-fertilisation. The reforms of the Common Agriculture Policy (CAP) and decoupling should also have environmental impacts and may reduce the use of environmentally unfriendly technologies and practices.

Other initiatives such as the Water Pollution Act, and the IPPC Licensing of Intensive Pig and Poultry Farms have all led to an uptake of environmental technologies and in the case of IPPC the use of BAT.

Economic supports such as the Farm Waste Management Scheme and Rural Environment Protection Scheme (REPS) have encouraged best practice and there has been a widespread uptake of these programmes – REPS especially in the Borders, Midlands and Western regions. The Waste Plastic (Films) Recycling Programme has led to the recovery of some of this agricultural waste stream.

Awareness raising programmes through the Department of Agriculture and Food, the IFA, the EPA and Teagasc have a good target audience. Research programmes implemented by Teagasc can also have a major effect if the uptake on results is built upon. There is a high potential for alternative crops and organic farming in Ireland – especially since the demise of the beet industry and the reforms of CAP.

3.4 Energy

So also in the field of energy, there has been an increase in support systems and initiatives. For example, from Sustainable Energy Ireland alone the following support systems have been set up for a variety of sectors:

Research

- Renewable Energy Research Development & Demonstration (RERDD)
- Large Industry Energy Network (LIEN)
- Irish Energy Management Standard (IS 393)

Public Sector Support

- Low Income Housing
- House of Tomorrow

Other Funding:

- Combined Heat and Power
- Bioethanol Refinery
- Bioheat Boilers
- Domestic Renewable Energy Grants

Awareness/Information

- Funding scholarships for 3rd level research activities
- Project dissemination – publication of case studies
- General information on Sustainability – national advertisement campaigns
- Schools information awareness campaigns
- Presentation to third level students

Regulation, in the form of the EU Energy Performance of Buildings Directive (EPBD) is due for implementation in 2007. This will ensure an energy rating for buildings as well as improving the efficiency of boiler systems and air conditioning systems.

However, despite these and other initiatives, IBEC has stated that Ireland is more vulnerable than any other country in Europe to a future energy supply crisis¹⁶. This is due to three major factors:

- the scale of current reliance on imported energy,
- our inadequate infrastructure and
- our lack of a national energy strategy.

For example Irelands contribution to its Total Primary Energy Requirement (TPER) by renewables grew from 1.8% in 1990 to only 2.2% in 2004 (in 2003 it was 1.9%)¹⁷. Though the absolute

¹⁶ <http://www.ibec.ie/ibec/press/presspublicationsdoclib3.nsf/wvEconNews/73EE4D3F8B12FD8B80257106003A02D0?OpenDocument>

¹⁷ Sustainable Energy Ireland *Renewable energy in Ireland: 2005 Update*. SEI, 2005. <http://www.irish-energy.ie/index.asp?locID=70&docID=-1>

renewable capacity increased by 94% over that time (from 168 ktoe to 325ktoe), due to the increase in TPER the overall market share only increased by 0.4%.

This relatively low level of renewable energy in Ireland and also the improvements necessary with regard to energy efficiency make this subject area a high priority for the implementation of environmental technologies.

3.5 Transport

In Ireland, the main instruments in place to mitigate greenhouse gas emissions from transport, and promote environmental technologies, are fiscal and information instruments. These instruments have generally two objectives, to:

- Influence behaviour or the utilisation of public and private transport so that the energy intensity of transport activity is reduced
- Affect purchasing decisions in order to encourage increased market penetration of low carbon technologies (fuels and vehicles) and hence affect the fleet composition by lowering the energy intensity of transport.

One major economic incentive for biofuels is the excise relief scheme. The level of excise relief aimed to start at €20 million in 2006 and will be increased to €35 million in 2007 and to €50 million in each of the following three years. This relief, when fully operational, is expected to support the use and production in Ireland of some 163 million litres of biofuels per year, representing 2% of transport fuels by 2008.

In 2004, the Department of Communications, Marine and Natural Resources secured an amendment to the Finance Act 1999, which provides for the introduction of a pilot scheme for mineral oil tax relief for biofuels which is designed either to produce biofuel or test the technical viability of biofuel for use as motor fuel.

A scheme under the Act was drawn up in 2004 and received State Aids clearance from the Commission in March 2005. Under the scheme, the mineral oil tax relief is proposed in the following categories:

- Six million litres per annum of pure plant oil produced from oil seed rape for use in modified diesel engines. The minimum project size in this category is 50,000 litres of biofuel per year.
- One million litres per annum of biodiesel or other biofuel blended with mineral diesel such that the blend complies with diesel standard EN 590. The minimum project size in this category is 100,000 litres of biofuel per year.
- One million litres of bioethanol, which is blended with petrol to a maximum of 5% (bioethanol), and used in standard petrol vehicle engines. This category also allows higher blends, up to 85%, for use in flexible fuel vehicles (FFV's). The minimum project size in this category is 100,000 litres of biofuel per year, except where the fuel is to be used in a flexible fuel vehicle application where smaller limits may be considered.

A significant quantity of research has been done in Ireland into the use of biofuels. In addition to the experimental research conducted by Teagasc at their research station in Oak Park, Co Carlow, the EPA is also funding research through ERTDI and the potential of the biofuels industry has also been extensively investigated by Sustainable Energy Ireland (SEI).

While several initiatives are noted, and described in greater detail in Appendix II, transport is another area in Ireland where there is significant scope for the use of environmental technologies. Despite Irish commitment to GHG emission limits under the Kyoto protocol, the increase of CO₂ emissions from the transport sector by 130% between 1990 and 2003 is a matter of concern¹⁸. Energy use by the transport sector accounted for 26% of the energy related CO₂ emissions in 2002 with an annual growth rate of 7.5%¹⁹. The transport sector is currently almost completely dependant on oil. The amount of oil required by this sector has almost tripled since 1973²⁰. In the early 1990s Ireland used less oil per capita for transport than the average of the EU 25, however by 2002 Ireland had consumed at least 50% more oil per capita for transportation.

¹⁸ European Environment Agency *Transport and environment: facing a dilemma*, EEA, 2006

¹⁹ *Irish Times*, 3/4/2006

²⁰ Forfás *A baseline assessment of Ireland's oil dependence*, Forfás, 2006

3.6 Climate Change

In October 2000 the government released the National Climate Change Strategy (NCCS) which set out the main strategies to be used in tackling Ireland's greenhouse gas emissions. It recognised that serious action needed to be taken in all sectors. Reductions of emissions were to have been achieved through an integrated approach, using the full range of instruments and policy options. These included in broad terms:

- the use of economic instruments (including taxation and emissions trading) with broad sectoral and/or cross sectoral application,
- a broad range of policies and measures tailored specifically to relevant sectors,
- a vigorous and appropriate pursuit of common and coordinated policies and measures implemented at EU and wider international levels, and,
- participation in international emissions trading.

Some of the more specific policy aims were:

- Taxation on the generation of greenhouse gases (GHGs) in any activity. It was proposed to phase these in so that sectors could adjust incrementally;
- A change in energy policies to support the phase out of coal use at Moneypoint towards less carbon rich fuels; a large switch towards the use of renewables; improved energy efficiency and an increased use of waste heat in district heating;
- A change in taxation to favour more fuel efficient cars; investment in public transport and general shift towards more sustainable national transport
- Improved building energy efficiency – both residential and commercial – through regulations, the introduction of energy labelling (energy efficiency certificates) and support for the introduction of renewable energy sources;
- A range of measures to assist industry reduce their GHGs – emissions trading, tax benefits for emissions compliance and supports through SEI promoting energy efficiency and renewables.

Many of the commitments in this original strategy have not been implemented (such as phasing in CO₂ charging measures, rebalancing of vehicle registration tax (VRT) and linking motor tax with emissions) despite the problems regarding meeting Kyoto targets. The NCCS's most notable success has been in the commitment to introduce an emissions trading scheme to set a cap on the amount of emissions industry is allowed to produce, and which is being implemented in full.

The European Commission unconditionally approved a National Allocation Plan (NAP) for Ireland for the 2005-2007 trial trading period in July 2004. Under the EU Emissions Trading Scheme, 105 Irish installations have been given allowances to emit a certain amount of CO₂; the reduction from previous levels varies from case to case depending on the circumstances of the industry. The Scheme only covers activities that give rise to emissions of CO₂, subject to certain thresholds. These installations include all fossil fuel power generation facilities and large industrial energy users such as cement manufacture, paper and pulp manufacture and food processing. Collectively, these installations would account for an estimated 35% of forecast emissions for the Kyoto commitment period, had there not been an emissions trading scheme.

In Ireland a total of 22.32 million tonnes per year has been allocated to the emissions trading sector for the three-year period.

In preparation for the second phase of the EU Emissions Trading Scheme for the Kyoto Protocol Commitment Period (2008 - 2012), the Irish government announced in 2006 that Ireland's projected 'distance to target' for Kyoto compliance in 2008-2012 has been reduced from 9.2 million tonnes per annum to 7.174 million tonnes²¹. The Government has agreed that the responsibility for bridging this gap will be shared between the Emissions Trading Sector (the 105 installations in the electricity and large industry sectors which have significant emissions) and the rest of the economy. The Trading Sector will meet about 3 million tonnes of the reduction, leaving about 4 million for the

²¹ Department of Environment, Heritage and Local Government *National Allocation Plan 2008-2012*. DEHLG, 2006

rest of the economy. The second phase is intended to involve tighter caps and may be expanded to other GHGs and additional sources and sectors.

3.7 Air

Many initiatives have been implemented in Ireland to promote cleaner air, reduce dependence on old technologies and in support of more environmentally friendly technologies. Generally these have been successful, with an emphasis on legislation as a major force for change. Overall the quality of air in Ireland is good with some pressures still apparent due to transport in built up areas.

These initiatives include:

- Reduction in the sulphur content of transport fuels facilitates the introduction of cleaner engine technologies such as de-NO_x catalysts, lean burn/direct injection etc., which are critical to the achievement of reductions in NO_x from vehicles.
- Euro III standards for cars and light commercial apply from 2001, reducing NO_x and hydrocarbon levels from petrol cars by 70% below the Euro I standard, and diesel by 36%. Euro IV standards have already been agreed for passenger cars for 2005, halving emissions of NO_x and VOC from their 2000 levels and reducing them by 70% on 1992 levels. For HGVs, Euro IV and V for 2006 and 2008 are expected, resulting in an eventual reduction in NO_x emissions of over 85% and hydrocarbon emissions of over 70%.
- The car scrappage scheme operated in 1996 and 1997 and in total some 60,000 cars were scrapped; there is evidence that the scheme skewed the market towards smaller cars for a time, which reduces air pollution.
- In 1998 substantial reductions in motor tax were applied for categories of vehicle used as public transport vehicles and in 2001 provision was made for the VRT on hybrid engine cars (petrol/electric) to be refunded by 50% to incentivise the purchase of these vehicles with lower NO_x emissions.
- Vehicle Registration Tax (VRT) has always been banded on the basis of engine size. The 1999 Budget further differentiated VRT to encourage consumers to purchase smaller cars, and Budget 2003 reduced the threshold for the top rate of VRT from 2,000cc to 1,900cc. This encourages smaller cars.
- A range of measures (removal of heavy goods vehicles (HGVs) from major urban areas, traffic management schemes, air quality management plans, and integrated public transport investment under the National Development Plan) is being implemented with the overall objectives of reducing the relative attraction of commuting by car, reducing congestion and making public transport more attractive.
- For VOCs, controls have been in place since 1997 to reduce fugitive emissions from transport fuel depots, tankers and new petrol stations during loading, unloading and storage of the fuel. By 2005, these controls (i.e. Stage I VOC controls) will be in operation at all petrol stations.
- The only fuel where reductions in sulphur content have not been applied regarding diesel is agricultural diesel, and a limit of 1,000ppm from January 2008 will apply to motive fuel as well as heating fuel.
- Ireland has opted to develop a National Emissions Reduction Plan (NERP) under Article 4 (6) of the Large Combustion Plants directive (2001/80/EC) to address emissions from 'existing plant' as defined in the directive. The NERP provides flexibility for plant operators to identify the most cost effective abatement options available, across a portfolio of plant, while still achieving the environmental objective of directive 2001/80/EC. The NERP developed by Ireland sets limits for emissions of SO₂ and NO_x from existing plant which are significantly more ambitious than the minimum requirements of directive 2001/80/EC. In the period from 2008 - 2016, the NERP is 27 % more ambitious for SO₂ and 46 % more ambitious for NO_x emissions.
- The Commission for Energy Regulation awarded contracts for additional electricity generation capacity to be delivered by two new state of the art gas fired plants, a 400 MW combined cycle gas turbine plant and a 150 MW CHP plant, both due to be operational by early 2006. The 400 MW plant will be located in the west of the country which will help to address existing geographic network constraints and the CHP plant will largely replace the existing oil fired boilers at the largest industrial emitter of both SO₂ and NO_x in Ireland.

- The voluntary agreement to reduce the sulphur content in coal and petcoke was signed by the Minister for the Environment, Heritage and Local Government in 2002. To date the agreement has been working well with sulphur levels for coal in the 2003/4 heating season 0.48 %, below the 0.7 % required by the agreement.
- Ireland is a signatory to the 1998 (Aarhus) protocol on Persistent Organic Pollutants to the UNECE Convention on Long-Range Transboundary Air Pollution. This protocol applies to the UN Economic Commission for Europe area and deals with 15 substances to be eliminated from production and use with restrictions on the use of a number of others.
- On 23 May 2001, Ireland signed the UNEP Convention on POPs in Stockholm. The new treaty (dealing with 12 of the 15 POPs covered by the Aarhus Protocol) encompasses a far broader global geographical scale and with an added element dealing with assistance (financial, technology transfer, capacity building etc.) for the developing world. The Convention will enter into force when ratified by 50 signatories.
- Regulations made in November 2002 entitled "Emissions of Volatile Organic Compounds from Organic Solvents Regulations 2002" (S.I. No. 543 of 2002) introduce controls on emissions of VOCs from various sectoral activities ranging from dry cleaning and vehicle respraying to pharmaceutical manufacture.
- A ban on the marketing, sale and distribution of bituminous coal applies in sixteen towns and cities around the country (Dublin from 1990, Cork 1995, Arklow, Drogheda, Dundalk, Limerick and Wexford 1998, Celbridge, Galway, Leixlip, Naas and Waterford 2000, Bray, Kilkenny, Sligo and Tralee 2003).
- On 29th March 2004 Ireland became the first country in the world to completely ban smoking in all workplaces. This includes office blocks, various buildings, public houses/bars, restaurants and company vehicles (cars and vans). This has been a major success, leading to a reduction in smoking sales in pubs and also to greatly improved levels of air quality in many indoor areas.
- The EPA has spent in the region of €2 million on a number of projects in the area of air quality. Overall these projects are based in the area of emissions reductions and emissions monitoring improvements so as to more accurately identify those areas on which future environmental policies must be focused. Emissions from road traffic are now the primary threat to the quality of air therefore a number of these projects are focused on the emissions from this sector.
- Backyard burning has been found to be a significant issue in relation to illegal waste management. Local Authorities have increased their enforcement of this issue through on the spot fines and mobile air monitoring. However the aspects of this practice in regard to the rural context and difficulties in obtaining proof for enforcement means that prosecutions are often few. Increased public awareness campaigns through local authority websites, Waste Management Initiative websites and the media have been undertaken to inform the public of the environmental and health effects of the practice.

3.8 Water

Water quality has received significant attention over the years in Ireland and several initiatives have been implemented for its protection. Overall water quality is good, but there are still some pressures associated with agriculture and housing developments. The main initiatives for water quality are regulatory in nature. Several pieces of legislation are in place to protect ground water, surface waters, drinking water, estuarine water etc. from a variety of pollutants and pressures. *The Water Policy Regulations (S.I. No. 722 of 2003)*, were put into law. In summary the Regulations provide for:

- the protection of the status of all waters (i.e. no deterioration to be allowed) and the achievement of at least "good status" by 22 December 2015 for all waters
- the establishment of "river basin districts" (RBDs) as the administrative areas for implementation of the Directive (including international RBDs in relation to cross-border river basins)
- the co-ordination of actions by all relevant public authorities for water quality management in an RBD including cross-border RBDs
- the characterisation of each RBD

- the establishment of environmental objectives for each RBD
- the development of a programme of measures to achieve those objectives and subsequently its review / updating every six years
- the development and adoption in each RBD of a river basin management plan (RBMP) and subsequently its review / updating every six years.

The regulations assign responsibilities to the EPA, local authorities and other public authorities for implementation of the Water Framework Directive and lay down deadlines for the delivery of the main tasks as required by the Directive. Eight RBDs have been established in Ireland, north and south (including three crossborder RBDs).

Other regulations include:

- *The Local Government (Water Pollution) Act, 1977* (Water Quality Standards for Phosphorus) Regulations, 1998 (S.I. 258 of 1998) protect water against phosphate pollution.
- *The Urban Waste Water Treatment Regulations 2001* (S.I. No 254 of 2001) revoke and generally re-enact in consolidated form the Environmental Protection Agency Act 1992 (Urban Waste Water Treatment Regulations, 1994, as amended, and prescribe a further 30 water bodies as sensitive areas.
- *The Drinking Water Regulations* introduced in December 2000 brought all group schemes serving 50 persons or more within the remit of the Drinking Water Directive and set a compliance date of end December 2003. The Regulations impose more severe penalties than was previously the cases for non-compliance.
- *The Dangerous Substances Regulations, 2001*, prescribe water quality standards in respect of 14 dangerous substances in surface waters, e.g., rivers, lakes and tidal waters.
- In Ireland the primary legislation governing the quality of bathing waters is set out in the *Quality of Bathing Waters Regulations, 1992* (S.I 155 of 1992) and amendments which transposed the EU Directive 76/160/EC concerning the quality of bathing water.
- *The Nitrates Directive (91/676/EEC) – Council Directive of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources* was adopted in 1991 and has the objective of reducing water pollution caused or induced by nitrates from agricultural sources and preventing further such pollution, with the primary emphasis being on the management of livestock manures and other fertilisers. It is hoped that this Directive will shortly be transposed into Irish law, though the process has been difficult and long in completing.

In 1997, the Government published a strategy document *Managing Ireland's Rivers and Lakes – A Catchment Based Strategy Against Eutrophication* which set out Ireland's pollution reduction programme in respect of phosphorus.

Several significant research programmes have taken place regarding water and these have led to a greater knowledge base upon which to develop worthwhile initiatives. The EPA water quality research program is focused in two main areas of research: eutrophication from agriculture and forestry and water quality. The former topic has four main aspects: sources and pathways of nutrient losses; seasonal variation of phosphorus losses from soil; field management; and nitrate leaching from soils.

The DEHLG has launched a Performance Management System (PMS) for waste water treatment plants (WWTPs) in 2002, which was developed by the Water Services National Training Group. This is a management tool for local authorities to manage the "Operation and Management" phase of Design Build Operate contracts.

The cooperation of the government authorities with representative public groups such as farmers, fisheries and residents groups is essential in order to ensure the awareness of the general public.

A National Rural Water Monitoring Committee (NRWMC), which is representative of the local authorities, the Federation of Group Water Schemes and the rural organisations is now in place to advise on policy and oversee the implementation, by local authorities, of the annual Rural Water Programme.

The Blue Flag is a well-recognised, well respected eco-label, awarded to beaches and marinas with excellent environmental management and the system currently operates in twenty four countries. *An Taisce* is the responsible body in Ireland for the administration of the Blue Flag scheme.

All local authorities have also been active in water protection and quality improvement through enforcement, programmes and projects such as WWT developments, increased staffing levels and testing, awareness raising, prosecutions etc.

3.9 Products

Independent of the European legislation, the promotion of Integrated Product Policy (IPP) or Extended Producer Responsibility (EPR) at a policy level is at an early stage in Ireland. With regard to the current European legislation the status in Ireland is summarized in Table 3.2 below.

Directive	Status	Success
Packaging and Packaging waste	Well established in Ireland in terms of major producer scheme, The aspect in relation to packaging nature and use requirements (reducing packaging waste at source) would appear to be slower. Some self compliers though most larger organizations have joined REPAK.	Volume of packaging waste diverted from landfill to recycling increased from 14% in 1998 to close to 25% in 2001 and over 56% in 2004. This exceeds the EU target of 50%.
End of Life Vehicles	Draft Waste Management (End-of-Life Vehicles) Regulations 2006 which are intended to facilitate the transposition and implementation in Ireland of Directive 2000/53/EC on end-of-life vehicles were published on 22 February 2006. Originally meant to be transposed in 2002.	According to the directive the date for achieving an 85% target was the 1 Jan 2006.
WEEE and RoHS	The two directives came into force in 2003 and were transposed into Irish law in August 2005.	Ireland has surpassed its WEEE targets, collecting over 14,500 tonnes of electrical waste in the first seven months. Under EU targets, Ireland is required to produce 4kg of WEEE per person by 2008, but is currently exceeding this by 50 per cent with an annual collection rate of 6.7kg per person.
Energy using Products	Framework Directive 2005/32/EC on Eco-design of Energy Using Products (EUP) must be implemented in national law by 11 th August 2007.	Too early yet. Requirements are general only at this stage – specific implementing measures to come at the EU level.

Table 3.2 Status of some European legislation in Ireland regarding products

Environmentally Superior Products (ESP): This scheme, being implemented by Enterprise Ireland since 1999 is designed to support indigenous Irish SMEs in examining ways to reduce the environmental impact of an existing product or that of a new product in development. The ESP grant supports a life cycle assessment to examine where environmental improvements can be made, undertake market research, determine the technical feasibility of the proposed changes and make an assessment of costs associated with the changes. The maximum value of the grant is €31,740 and it can be used to cover up to 50% of the cost of evaluating the feasibility of developing an environmentally superior product.

Successful projects have been completed in the following sectors:

- Plastics
- Packaging
- Furniture
- Electronics
- Information Technology
- Construction
- Timber

Other initiatives relating to products include:

Cleaner Greener Production Programme (CGPP) launched by the Environmental Protection Agency (EPA) in 2001. Under the programme, the National Development Plan 2000-2006 has provided €3.7 million in grant aid, to encourage companies in Ireland, particularly SMEs, to adopt a high standard of environmental performance by adapting or improving production processes and services in order to minimise negative impact on the environment.

The second phase of the CGPP, which started in May 2004, is currently supporting an innovative green computer ecodesign project. There is another project looking at supplying pre-manufactured chimney systems in a returnable crate rather than the supply of chimney systems in single use packaging. Apart from the saving in packaging there is also reduced materials required for construction.

Green procurement: In an EU report in 2003 it was noted that the percentage of Irish public procurement was about 5% compared with an EU average of 19% and compared with 50% for Sweden²². In Ireland the Department of Finance has responsibility for public procurement policy and though they have disseminated information about environmentally based procurement (www.etenders.gov.ie) it is clear from the above statistics that environmentally aware purchases rarely extend past buying recycled paper. This is an area for great potential in the development of environmental technologies in Ireland.

A National Action Plan related to GPP in Ireland is planned in order to reach the levels of the so called 'Green 7 countries' (Austria, Denmark, Finland, Germany, Netherlands, Sweden and UK) that "appear to have consistently more tenders with green criteria than the 'Other-18'"²³.

Ecolabels: Many countries, and even areas within countries (Catalonia), have their own ecolabels which they often coordinate with the European ecoflower scheme. There is currently no Irish scheme for products which highlights a lack of promotion of environmentally superior Irish products.

3.10 Industry

Irish industry is a major consumer of products and resources and in its many sectors utilises a wide variety of technologies. There is great potential for environmental technologies in industry and a wide spread of such technologies is coming on stream. Generally speaking, the utilisation of environmental technologies appears to be at a higher level in larger scale and high-tech industries, rather than small to medium sizes enterprises (SMEs).

Many incentives, from a policy, economic and information or awareness perspective have been and are being implemented at national and international levels. However most of these (e.g. IPPC licensing) promote better environmental practice and improved technologies in larger scale and advanced sectors. It is often the case that the uptake of improved technologies and practices happens first in larger industry and then filters down to small and micro enterprises.

However, it is also clear that the uptake of environmental technologies by industry in general and SMEs in particular is still unnecessarily low in Ireland. It should also be noted that many of the environmental technologies that are discussed in other sections of this report, for example in relation to air, water, waste etc. have industrial applications and so are also relevant to this section. However, such overlap is inevitable.

Several initiatives have been implemented in Ireland at a variety of levels. IPPC licensing is a stringent and innovative system supporting Best Available Technologies (BATs) and cleaner production methods. However it only applies to about 700 enterprises so its overall impact is limited.

Ireland has taken a unique approach in implementing the Solvents Directive using the so-called Accredited Inspection Contractor (AIC) Scheme for non-IPPC installations. This will affect several sectors who use solvents in their processes, for cleaning, painting etc. and lead to the uptake of improved technologies and materials.

Several support structures are in place for Irish industry through the EPA (CGPP), Enterprise

²² ICLEI European Secretariat, *Eco-Procurement Programme Survey on the state of play of green public procurement in the EU - Final Report* Freiburg, July 2003.

²³ Virage et alia *Green Public Procurement in Europe 2006 Conclusions and recommendations (Take 5 Report)* EU, 2006

Ireland (www.envirocentre.ie), SEI etc. Local authorities have made commitments in their new waste management plans to appoint Green Business Officers and some of these (for example in Limerick Kerry Clare and Dun Laoghaire Rathdown) have been in place for some time to good effect.

Award schemes such as the IBEC Environment Awards for industry and the Green Fáilte Award for hotels and restaurants are also providing incentives to promote best practice and give added value to businesses who can claim credit and get positive publicity by their actions.

3.11 Chemicals

The numbers of chemicals are growing steadily in products and in the environment. However there are initiatives and pressures in Ireland to manage these effectively and in some cases substitute them with less harmful materials.

IPPC licensing requires all licensees to address List I and II substance reductions. Ireland has also transposed other EU legislation in this regard regarding the Classification, Packaging and Labelling (CPL) of dangerous substances and this system is well controlled by the HSA.

Some chemicals are being phased out such as lead paint. Further work is necessary in this area with the 2nd National Hazardous Waste Management Plan and the implementation of the REACH Directive expected to have a major impact in this regard.

3.12 Summary and Conclusions

Considerable progress is apparent in Ireland over the past 15 years in the field of environmental protection and in the uptake of environmental technologies. In waste management, for example, the quality of collection, disposal and recovery of waste has greatly improved. Air quality continues to be high in Ireland and water quality appears to be improving (though there are still significant issues in relation to eutrophication). The performance of industry, especially that regulated by IPPC, is improving and new regulations under the Solvents Directive are expected to reduce emissions from a number of sectors. The performance of SMEs is mixed, however, and a greater level of uptake of environmental technologies is required at that level.

It is clear that much of this progress is due to the policies, strategies and instruments that are being applied by a range of actors at national, regional and local levels. Considerable investment has been made and continues to be made in the environment and in the use of better technologies across a spread of sectors. These have been summarised above and are described in greater detail in Appendix II and there is a considerable number of them.

We are continuing to build a worthwhile knowledge base in this regard and the levels of research funding by the DEHLG, EPA, SEI and others will generate know-how and information that will undoubtedly have significant effects in the years to come.

Despite all these many instruments and initiatives, however, the relative performance of Ireland with regard to environmental technologies still currently leaves room for improvement – this was outlined in Section 1.6 above. We still have a long way to go and the recent affluence in Ireland is leading to greater levels of consumption that can lead to further environmental pressures. Progress is especially required in the areas of transport, energy, climate change and agriculture.

In relation to waste generation, for example, Ireland still compares unfavourably with many other Member States. The 2003 waste generation per capita in Ireland, for example, was 735kg – the highest in the EU and the 2nd highest in Western Europe after Iceland (1049 kg). This generation continues to grow.

This is not to say that the waste management situation in Ireland is not improving – it certainly is and the level of recycling in Ireland in recent years has substantially increased. However, Ireland was perhaps starting from a lower level and thus has farther to go in order to meet best practice. Our dependence on exporting waste and recyclates is also a matter of concern and a higher level of recycling environmental technology use *in Ireland* would be beneficial.

With regard to other environmental technology fields, in agriculture, the levels of nitrate and phosphate usage in Ireland is still very high and in 2003 only 0.65% of Irish land was under organic farming (less than all other EU countries except Cyprus and Poland) compared, for example to 13.5% in Austria. Organic technologies and practices could have a huge environmental and economic benefit to Ireland if properly supported and nourished. With recent changes in the CAP, this is an area of considerable potential for environmental technologies which is being underused.

Major strides have been made in Ireland in recent years to promote renewable energies and Sustainable Energy Ireland is investing heavily in this area. However, Figure 3.1²⁴ shows Ireland's performance in comparison to other Member States in 2003 and the need for a higher level of environmental technology is urgent and acute.

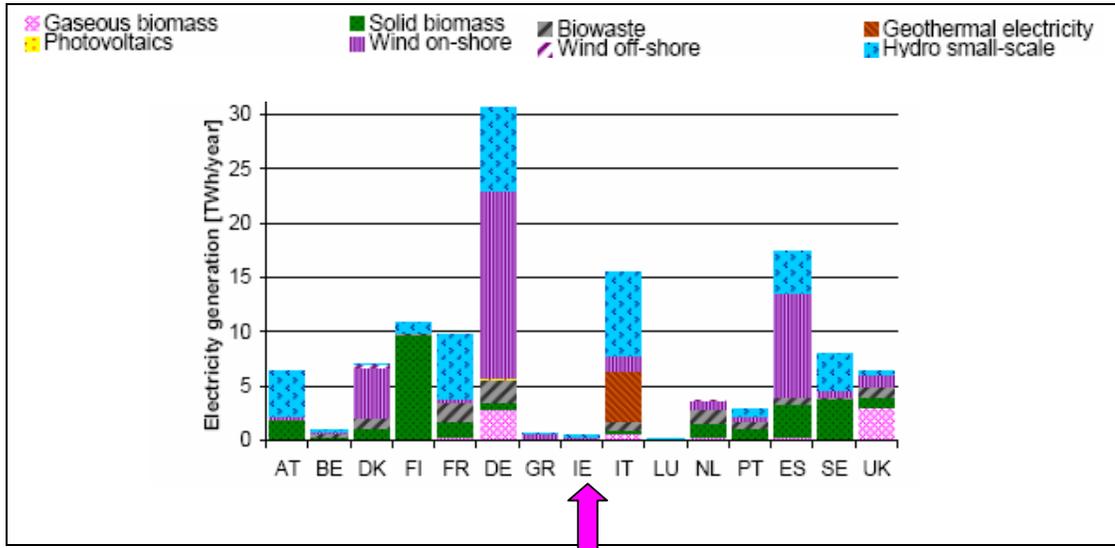


Figure 3.1: Increased electricity generation from renewables between 1990-2003

In the field of transport, Ireland's dependency on cars and fossil fuels in particular is a matter of concern. In the early 1990s Ireland used less oil per capita for transport than the average of the EU 25, however by 2002 Ireland had consumed at least 50% more oil per capita for transportation relative to other European countries and despite the supports for biofuels, hybrid cars etc. in place.

In light of the Irish commitment to greenhouse gas (GHG) emission limits under the Kyoto protocol, the increase of CO₂ emissions from the transport sector by 130% between 1990 and 2003 (shown in Figure 3.2 below²⁵) poses a serious problem. Ireland is performing poorly in the area of transport and the need for more environmentally friendly technologies in this area is urgent.

²⁴ Ragwitz, Mario et al. *FORRES 2020: Analysis of the renewable energy sources' evolution up to 2020* Fraunhofer Institute 2005

²⁵ European Environment Agency *Transport and environment: facing a dilemma TERM 2005: indicators tracking transport and environment in the European Union* EEA 2006

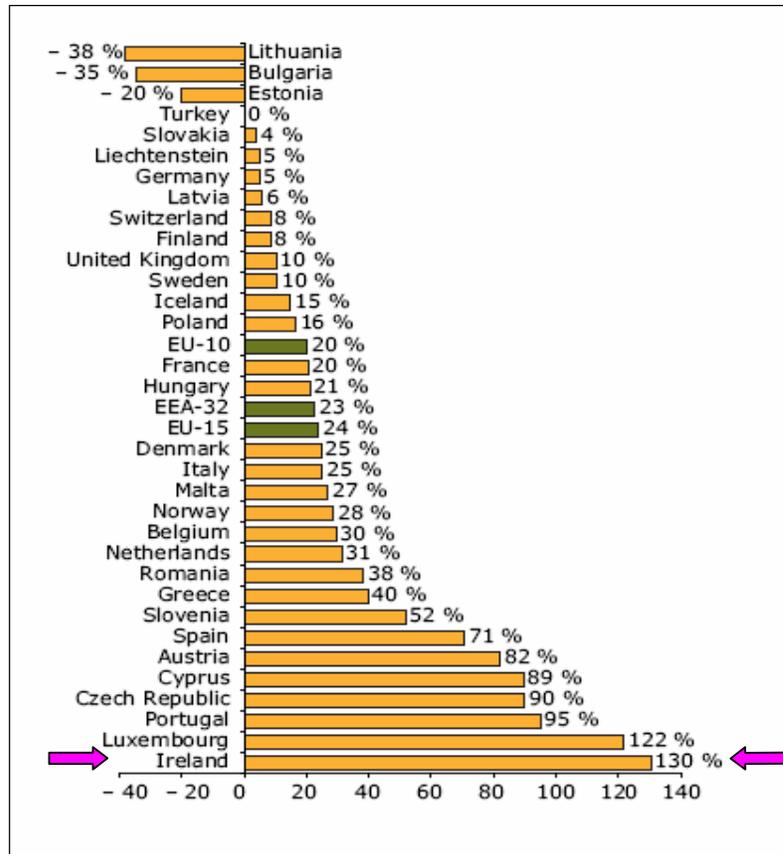


Figure 3.2: Increases in CO₂ emissions between 1990 and 2003

4. Barriers to Environmental Technologies

4.1 Introduction

There are several barriers to the uptake of environmental technologies in Ireland as in other regions. These are described below.

These barriers and the drivers to overcome them need to be understood at both micro and macro levels to stimulate social change²⁶. While it will always be necessary to improve upon what we have and to develop new technologies, it is also a fact that a wide and comprehensive range of excellent environmental technologies already exist. If these were used to their full potential the human impact on the environment would be greatly reduced and current dependence on carbon based fuels would be minimised.

However, no matter how dramatic or important the environmental technology, there are barriers to its uptake and the lock-in to current, more polluting technologies must be broken, using suitable instruments. These barriers include cultural, economic, organisational and psychological obstacles²⁷. Thus the nature of the most immediate problem is one of *diffusion* of the clean technologies that already exist and the development of appropriate policy supports and instruments in that regard²⁸.

4.2 Barriers in industry

With respect to industry, for example, a major barrier is the lack of senior management commitment²⁹. If that commitment is present, the other barriers (organisational, economic, technological etc.) all fall away. This was noted even in the chemical industry – which is commonly regarded as the leading exponent of putting environmental action into practice³⁰. This industry is also very profitable and multi-national in nature with a high level of access to technological and economic information.

The position of SMEs is not as advantageous and the barriers to environmental technology uptake are more considerable³¹. These barriers include a lack of awareness, education and training on environmental technologies. SMEs also do not have the capital to invest in alternatives and financial credit is not always forthcoming when current inferior technologies are 'doing the job'. SMEs are also frequently not well informed by agencies and government bodies and they slip through the information net. Furthermore, as mentioned below, SMEs are frequently not under sufficient legislative or regulatory pressure to even consider such technologies.

Several surveys of industry have been carried out to measure approaches to environmental technologies and perceptions of barriers to their uptake. The results of one such survey are shown in Figure 4.1 below. As can be seen from this survey, the barriers are broken into three categories (General, Financial and Uncertainty) and are given a scale of importance from 1 (totally unimportant) to 5 (very important).

²⁶ Reason, Peter et alia *Unlocking Low Carbon Potential: Integrating action research to enable adoption of existing low carbon technologies (Project Proposal)* 2005

²⁷ Meadows, D.H., J. Randers, and D.L. Meadows, *Limits to Growth: The Thirty-Year Update*. 2004, White River Junction, VT: Chelsea Green.

Stern, P.C., Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues*, 2000. **56**(3): p. 407-424.

Meadows, D., *Change is not Doom*. ReVision, 1991. **14**(2).

²⁸ Carrillo-Hermosilla, Javier A policy approach to the environmental impacts of technological lock-in. *Ecological Economics* 58 (2006) 717 - 742

²⁹ Gibson, M.T. *Environmental sustainability* Oxford: Chandos 2000

³⁰ Gibson Martin The work of Envirowise in driving forward UK industrial waste reduction. *Resources, Conservation and Recycling* 21 (2001) 191 – 202

Chemical Industries Association *Responsible Care Report* CIA London 2000

³¹ Thiruchelvam, M., Kumar, S., Visvanathan, C. Policy options to promote energy efficient and environmentally sound technologies in small and medium scale industries. *Energy Policy* (2003) 977 – 987

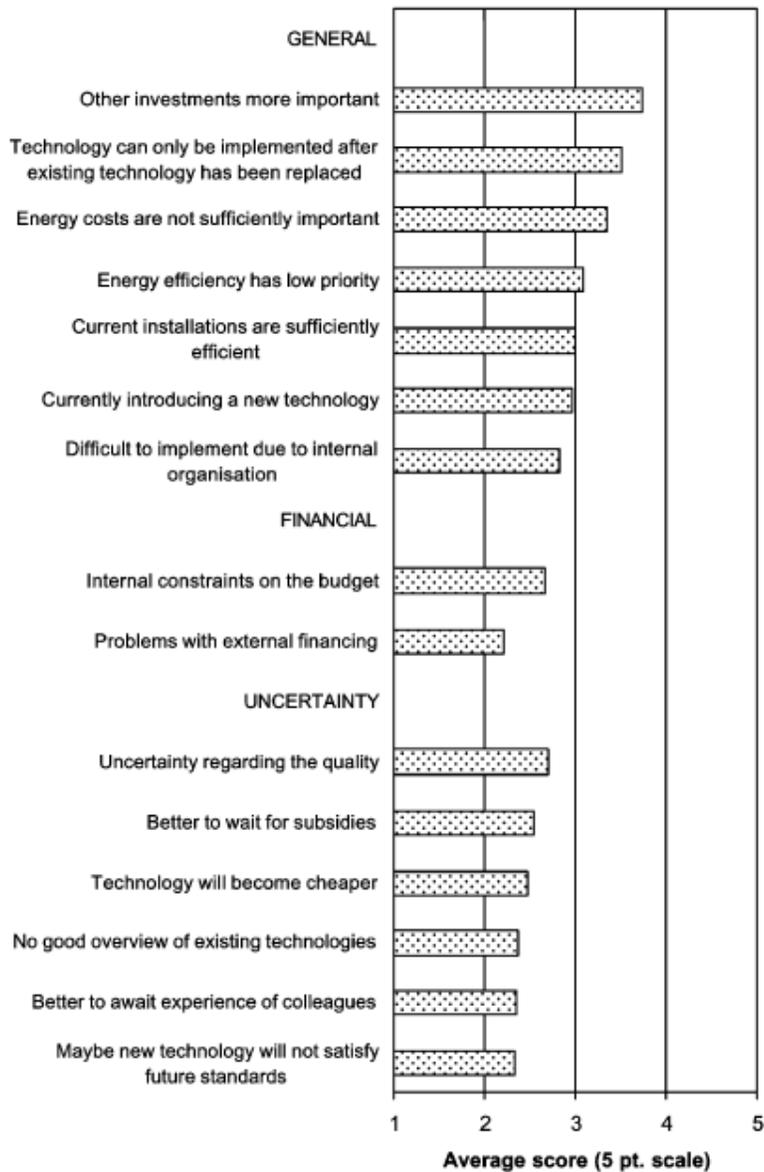


Figure 4.1: Barriers confronting firms when introducing new technology

Figure 4.1 (based on a study in the Netherlands) shows that the main barriers for companies to invest in new technologies (and environmental technologies) are general in nature and include the fact that other investments have a higher priority, the need to ‘use up’ the existing technology, the fact that energy costs are not sufficiently important and that energy efficiency has a low priority. It also appears that companies are ‘happy’ with the technology in place and are reluctant to change it for newer and less familiar alternatives.

Systems in industry and society are complex and entrenched and this hinders change and innovation. There is generally an emphasis on short term profits over long term sustainability and the need for short term economic growth is a major driver in economic systems (as well as a barrier to sustainability). The organisation and culture of individual firms are rigid and set – it takes time

and strong drivers to change them³². Stakeholders in society have divergent agendas and there is still a lack of knowledge about the environment, in particular relating to best practice³³.

4.3 Externalities not considered

Another important issue to consider when examining the economic systems that perpetuate technological lock-in is the fact that externalities are not considered when costing less environmentally friendly technologies and comparing them to better options. For example, despite all the recent concerns relating to climate change linked to the combustion of fossil fuels, the severe energy constraints in developing countries, the widespread concern over the security of oil lines including associated conflicts and terrorism - despite all of these - 95% of the world commercial energy still comes from fossil fuels or nuclear power with oil continuing to play a major role. If policy makers really considered such externalities as costs due to damage to health and the environment and the costs due to climate change, would such dependencies continue? It is unlikely, but the fact remains that nationally, regionally, or locally (and at industry level), these externalities are not costed into economic systems relating to energy and production³⁴.

In agriculture, for example, the negative externalities due to pesticide use include damage to land, fisheries, fauna and flora, as well as to human health. There are innumerable examples of this damage and it is well documented³⁵. The reasons for the continued use are manifold and include short term economic gain, ignorance about pesticide effects and a lack of information about viable alternatives³⁶. But there is also a psychological reluctance in people to change, unless it is 'forced' upon them by significant drivers.

4.4 Psychological and Attitudinal factors

Nowhere do such psychological and cultural factors have such an impact as in the choice of transport that people use (particularly it would seem in Ireland, given recent trends). The car has taken on a much broader meaning than simply a form of transportation³⁷. Larger, more powerful cars (and so called Sports Utility Vehicles (SUVs)) appear to be a choice that currently positively reflects status. Countering such trends is difficult and complex, from economic, legal and social perspectives. Public transportation, smaller cars and bicycles are viable cheaper and environmentally friendly options for many people but require significant policy supports to compete with the larger sized, less sustainable alternatives. In the case of environmentally sound fuels for transport, a major barrier is the lack of a sufficiently developed infrastructure, and the lack of sufficiently strong economic supports to move us away from fossil fuels³⁸.

The uptake of environmental technologies among householders and consumers is mainly driven by economic factors (cost, availability etc.) but another motivation can be the level of environmental awareness. The success of eco labels in some regions of Europe (in particular the Nordic regions) is due to the fact that consumers in those regions value the environment and are willing to make purchasing decisions based on environmental criteria. A low level of environmental awareness and concern is therefore a barrier to the uptake of environmentally friendly products and technologies³⁹. This is discussed further in an Irish context below.

³² Moors, Ellen H.M. et al Towards cleaner production: barriers and strategies in the base metals producing industry *Journal of Cleaner Production* 13 (2005) 657 -668

³³ Dijkema, G.P.J. et al. Trends and opportunities framing innovation for sustainability in the learning society *Technological Forecasting and Social Change* 73 (2006) 215 - 227

³⁴ Owen, Anthony D. Renewable energy: externality costs as market barriers *Energy Policy* 34 (2006) 632 - 642

³⁵ Pimental, D. Greiner, A. *Environmental and socio-economic costs of pesticide use* in Pimental, D (Ed.) Techniques for reducing pesticide use: economic and environmental benefits. John Wiley and Sons, Chichester pp 51 – 78 1997

³⁶ Wilson, Clevo and Tisdell, Clem Why farmers continue to use pesticides despite environmental, health and sustainability costs *Ecological Economics* 39 (2001) 449 - 462

³⁷ Hall, J. Kerr, R. Innovation dynamics and environmental technologies: the emergence of fuel cell technology *Journal of Cleaner Production* 11 (2003) 459 - 471

³⁸ Tseng, Phillip et al A hydrogen economy: opportunities and challenges *Energy* 30 (2005) 2703 - 2720

³⁹ Faiers, Adam. Neame, Charles Consumer attitudes towards domestic solar power systems *Energy Policy* 34 (2006) 1796 – 1806

Georg, Susse The social shaping of household consumption. *Ecological Economics* 28 (1999) 455 – 466

4.5 EU approaches

One major study has been carried out by the Joint Research Centre (JRC) of the European Commission as part of the Environmental Technologies Action Plan (ETAP)⁴⁰. As well as investigating general barriers and drivers to environmental technologies, this study examined specific issues related to several industrial sectors.

This study identified a number of different categories of barriers as follows:

- Regulation and Public Intervention
- Economics
- Markets
- Communities and Social Pressure
- Attitudes and Social Values
- Technological Opportunities and Capabilities
- Organisational Capabilities

The report from this study recommended the need for policy intervention to boost the market for environmental technologies. The report stated:

“The market may not provide a satisfactory distribution between present and future benefits and this thus requires environmental policy and a stimulus for a faster diffusion of clean technologies. Moreover, the market may not yield a geographically satisfactory distribution of benefits and here support for technology diffusion on a regional basis becomes important.

The reasons for why the actual diffusion path differs from the one optimal for society are normally three sources of market failures: imperfect information/uncertainty, market structure/power and externalities.”

In the Communication on ETAP⁴¹ another breakdown of barriers to environmental technologies was also given. These barriers were broken down to those relating to:

- Economic barriers
- Regulatory barriers and standardisation
- Technological barriers
- Diffusion barriers

4.6 Specific sectoral and regional barriers

As well as such ‘general’ barriers to environmental technologies, there also exist specific barriers to individual sectoral groups as well as to individual environmental technologies. While it is outside the scope of this project to examine all such technologies and sectors in great detail, this fact should nevertheless be noted. In one study in Sri Lanka for example⁴², the main barriers to wind power and dendro thermal energy (wood fired plants) were completely different (with one exception – financing) as the following table shows:

Stern, Paul C. Toward a coherent theory of environmentally significant behaviour *Journal of Social Issues* 56, 3 (2000) 407 - 424

⁴⁰ Joint Research Centre *Promoting environmental technologies: sectoral analyses, barriers and measures A report from the Sustainable Production and Consumption Issue Group as a contribution to the Environmental Technologies Action Plan* European Commission 2004

⁴¹ European Commission *Communication from the Commission to the Council and the European Parliament Stimulating Technologies for Sustainable Development: An Environmental Technologies Action Plan for the European Union* COM(2004) 38 final

⁴² Wijayatunga, P.D.C. et al Strategies to overcome barriers for cleaner generation technologies in small developing power systems: Sri Lanka case study *Energy Conservation and Management* 47 (2006) 1179 - 1191

Wind Energy	Dendro thermal
High overall unit cost of energy	Lack of feedstock assurance
Seasonal variations in wind speeds	Lack of financing instruments
Lack of financing instruments	Lack of awareness about the technology
High initial cost	Insufficient knowledge about energy plantations
Lack of wind measurements	Unclear government policy

Table 4.1: comparison of barriers to two renewable energy power sources

As well as sector specific barriers, there are also regional specific barriers. Ireland, for example, is an island economy located a long way from the main European markets. Due to economic and market constraints there are no major paper, steel or glass recycling facilities in the Republic of Ireland. One study in Cyprus⁴³ noted that the main barriers for innovation in that region differed greatly from the EU in general as shown in the table below:

Top five barriers in Cyprus	Top five barriers in EU
Innovation too easy to copy (83.6%)	Effect of education and training upon employment in enterprises
Governmental bureaucracy (76.5%)	Effect of action by banks upon the financing of innovation
Lack of government assistance (72.9%)	Effect of action by venture capital companies upon the financing of innovation
Shortage of skilled labour (71.4%)	Norms and standards—product controls—effect upon the manufacture of new products
Bank policies on credit (71.4%)	Norms and standards—product controls—in other Community countries; action on exports to those countries

Table 4.2: comparison of barriers to innovation in SMEs in Cyprus and the EU in general

4.7 Barriers to environmental technologies in Ireland

As mentioned above, there are different approaches to grouping barriers to environmental technologies. For the purposes of this study, the barriers in Ireland are divided into three categories: Legislative/Regulatory; Economic/Market; and Social/Information/Awareness. While some of these barriers may be specific to Ireland, most are endemic when examining the resistance to innovation, change and new technologies.

4.7.1 Legislative/Regulatory Barriers

Good environmental regulation has long been recognised as a driver for environmental change and the use of environmental technologies⁴⁴. The implementation of Integrated Pollution Prevention and Control (IPPC) legislation, for example, has led to the use of Best Available Technologies (BAT)

⁴³ Hadjimanolis, Athanasios. Barriers to innovation for SMEs in a small less developed country (Cyprus.) *Technovation* 19 (1999) 561 – 570

⁴⁴ Coakley, Tadhg, Cunningham, Dermot *Assessment and Development of a Waste Prevention Framework for Ireland* EPA 2003; Coakley, Tadhg *et al. A strategy for developing recycling markets in Ireland*. EPA, 2002

and cleaner production as a prerequisite. IPPC and its precursor IPC legislation has been implemented in Ireland since 1995. However it only applies to about 700 enterprises so its overall impact is limited.

As was shown in Section 3 above, the uptake of environmental technologies by industry in general and SMEs in particular could be higher in Ireland. The lack of an integrated and innovative licensing system for SMEs in Ireland is a barrier to the uptake of environmental technologies.

In some other countries, there is more stringent and widespread legislation supporting environmental technologies. In Austria, for example, all companies with more than 100 employees are required by law to nominate an adequately trained 'waste officer' with responsibility for in-house waste prevention and recycling. Each of these companies must then develop a waste minimisation and management plan for approval by the regulators.

The regulatory situation in Ireland with respect to SMEs is improving, however. Ireland has taken a unique approach in implementing the Solvents Directive using the so-called Accredited Inspection Contractor (AIC) Scheme for non-IPPC installations. This will affect several sectors who use solvents in their processes, for cleaning, painting etc. and lead to the uptake of improved technologies and materials. It will, in particular, lead to improved practices and technologies in smaller companies.

Other pending legislation, for example in relation to the Nitrates Directive is also to be welcomed and this will have an effect in supporting environmental technologies in the agricultural sector. Similarly, implementation of the Directive on the Energy Performance of Buildings will improve energy conservation levels in homes and non-residential buildings. The European Communities (Energy Performance of Buildings) Regulations, 2005 and the Building Regulations (Amendment) Regulations, 2005 will set performance standards and lead to a higher uptake of energy related environmental technologies.

While such innovative and progressive legislation is growing in Ireland, there is still resistance to change from various stakeholders and interest groups. This barrier needs to be tackled also. Such regulation should not be seen as a challenge but rather as an opportunity. Several economic studies have exposed the myth that regulation leads to competitive disadvantage⁴⁵. Michael Porter has noted⁴⁶, for example, that 'the data clearly shows that the costs of addressing environmental regulations can be minimised, if not eliminated, through innovation that delivers other benefits'. Companies innovative (and become more resource efficient) in response to tighter waste regulation, and to changes in products and processes. These facts should be properly recognised and provide a stimulus to further useful environmental regulation.

But it is not just a case of *more* legislation but *better* legislation which will lead to improved standards, innovation and protection of the environment.

While improved legislation is a prerequisite for higher uptake levels in environmental technologies, the enforcement of such legislation is also vital. The Office of Environmental Enforcement (OEE) was set up in the EPA in 2003 and its work with local authorities has led to a much improvement level of waste related legislation compliance. However, Ireland still has a long way to go in relation to many stakeholders meeting regulatory requirements and further initiatives such as the OEE are required in several sectors.

It should also be noted that legislation is not always the best instrument to lead to change and improved levels of environmental technologies. In transport, for example, economic and awareness related instruments may offer greater scope and higher levels of effectiveness.

4.7.2 Economic/Market

One of the main factors in deciding upon a product or technology is cost and it is still the case in Ireland that many more environmentally friendly alternatives are more expensive than their older, more polluting alternatives. While this initial cost may be higher, when taken over the period of the

⁴⁵ Network of Heads of European Environment Protection Agencies *The contribution of good environmental regulation to competitiveness* 2005

⁴⁶ Porter, M. and Van der Linde, C. Towards a new conception of the environment: competitiveness relationship *Journal of Economic Perspectives* 9, 4 (1995)

product's life cycle the full product cost may, in fact, be lower. A good example of this is the long life light bulb, which uses less energy and therefore costs less during its lifetime than the older more energy consuming alternative. However, it is still the case that these older light bulbs are more popular, due to the lower initial cost – this is one economic barrier to higher uptake of environmental technologies.

However, when it comes to other products, such as vehicles, it is always clear that the less environmentally friendly alternative (the large SUV) is more expensive to purchase and to run. This does not currently appear to be a deterrent to their purchase, such is their social attractiveness. The current cost difference is not sufficiently high to be a deterrent, and this is a barrier to the uptake of the more environmental options.

This is also the case when it comes to fuels for transport. 40% of all European biofuels are made in France for example. This is due to very high levels of research and development over a long period of time. The lack of such intensive research in an Irish agricultural perspective is a barrier to the manufacture of higher amounts of biofuel. Such a low level of production is then a barrier to car owners changing over to biofuels.

In Section 2 it was pointed out that 10% of all new cars in Sweden run on biofuels. This is due to the high number and type of incentives in place there such as free parking, exemptions on congestion charges and the fact that biofuel is 40% cheaper than petrol. The lack of such economic incentives in Ireland is a barrier to higher levels of uptake.

When it comes to industry, it is also often the case that environmental technology is not chosen on price reasons. The externalities of the alternative are not taken into account in current pricing or taxation structures and this is another barrier to uptake. Subsidies for more environmentally friendly options and tariffs on the more polluting technologies are currently insufficient to ensure radical change. Such subsidies are growing in number and type, as is described in the first report for this project – however they are still not sufficiently high and widespread to ensure high uptake levels. Domestic economic supports can also be effective. The uptake of the recent SEI Domestic Renewable Energy Grants Scheme has been extremely high, and has led to a major boost in the introduction of this type of environmental technology in homes.

Studies have also shown that the levels of green procurement in Ireland are still quite low, both in the private and public sectors. The public sector in particular has a huge spending power, but national agencies, local authorities and other major purchasers do not have green procurement policies in place and this makes it difficult for environmental technologies to compete. In the private sector green procurement is even easier to achieve and can have very worthwhile effects down the product chain.

Levies are already in place in Ireland for plastic bags and landfill charges and these have been successful in the increased use of reusable bags and the increased level of recycling. However, the lack of such levies on other packaging and single use products is a barrier to the replication of this effect. Countries such as Denmark have many different product charges and levies and this has led to a reduction in single use packaging and waste disposal as well as ensuring better resource efficiency.

4.7.3 Social/Information/Awareness

Studies have shown that the environmental awareness levels in Ireland are lower than those of comparable EU Member States. A 1998 survey of environmental attitudes, perceptions and behaviour by the Environmental Protection Agency⁴⁷ noted that “In comparison with the other survey populations (U.K., Germany, Italy and The Netherlands) Irish respondents performed relatively poorly in many of the domains. This was particularly apparent in relation to knowledge of environmental items.” Even of those respondents with environmental awareness, 47% agreed with the statement “it is just too difficult for someone like me to do much about the environment”.

A more recent study⁴⁸ notes that Irish people mistakenly felt that they were performing well with regard to waste management: “While recognising that waste management is a problematic area of

⁴⁷ Faughnan, Pauline and McCabe, Breda University College Dublin *Irish citizens and the environment: a cross national study of environmental attitudes, perceptions and behaviours*. EPA, Dublin, 1998

⁴⁸ Davies, Anna et al. *Environmental attitudes and behaviour: Values, Actions and Waste Management* (2001-MS-SE2-M1) Synthesis Report EPA 2006

environmental policy, most people felt that they were doing a good job at managing their waste in their homes. On further examination, it was found that most householders benchmark their waste management behaviour against the requirements of the door-to-door collection services they receive. Few participants actively sought out ways to reduce or recycle their waste if facilities were not on their doorstep. This explains, in part, the apparent mismatch between views of waste management performance and low levels of recycling.”

While there are several local and national campaigns to improve this situation, such a low level of environmental awareness is a major barrier to improved uptake of environmental technology.

Another barrier to the uptake of environmental technologies in industry is the perceived risk of such technologies and the lock-in to the older and more polluting equipment in place. Standards are necessary as a driver to industry to push them towards more environmental technologies. Further demonstration programmes, and the dissemination of newer, cleaner technologies are necessary to overcome the attitudinal barriers in place in Ireland.

While a great deal of effort and funding is now being invested in research into new technologies and environmental options, this also needs to be increased and prolonged. Ireland has begun such research much later than some other EU Member States and has a lot of catching up to do. The lack of further funding into environmental technologies is another barrier to levels of uptake. In general the level of environmental knowledge in Irish industry outside the IPPC sectors is low and this is another barrier to higher levels of environmental technology uptake.

Several social factors are also apparent in Ireland which are barriers to more environmentally friendly purchasing habits. The recent upsurge in affluence is a new phenomenon and Irish people are not yet used to their new found wealth. This has led to huge levels of consumerism, whereby unnecessary and wasteful purchasing is common. Perfectly useful and effective goods and products are discarded for fashion reasons and waste levels are unnecessarily high. There is a tendency to purchase new, larger and more extravagant products unnecessarily.

5. Policies and Programmes in Support of Environmental Technologies

5.1 Introduction

As can be seen from Sections 2 and 3 (and Appendix II) many environmental technologies are being utilised in Ireland and other regions. These are apparent in many different environmental fields and sectors of society.

Several policies and programmes at various levels have been implemented in support of these technologies. However it can also be seen that in some areas, Ireland still has some progress to make on implementation, in comparison to some other countries – this is due in no small part to the barriers to environmental technologies described in Section 4 above.

In order to maximise the uptake of environmental technologies and thus support the implementation of the Environmental Technologies Action Plan (ETAP) in Ireland, it will be necessary to build upon previous successes and to both intensify current policies and programmes in place, as well as begin implementation of new programmes.

A threefold supporting framework is required, providing a regulatory, economic and information based foundation upon which any action plan can be built. Within each of these elements, a number of potential types of policy instruments and programmes are potentially effective, especially when regulatory, economic and information based programmes overlap or are combined. This is shown in Figure 5.1 below:

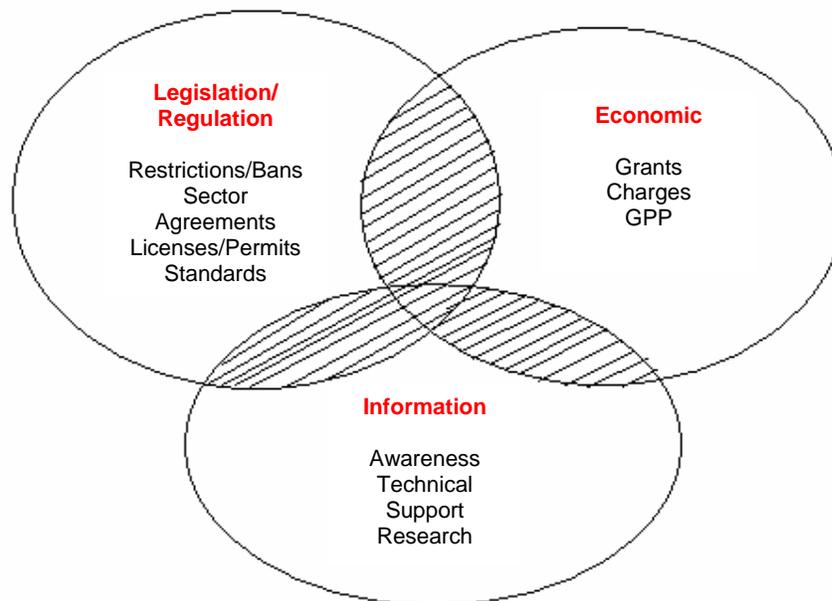


Figure 5.1: Supporting framework for environmental technologies

5.2 Regulation/Legislation Based Programmes

There have been significant developments in recent years in Ireland's environmental legislative framework. 15 separate legislative/regulation policy instruments were identified for the waste sector alone in Ireland in Section 3 to this project.

In particular the implementation of the IPPC Directive has had a major impact on larger and potentially polluting industries and has led to the use of Best Available Technologies (BAT) and cleaner production as a prerequisite of the legislation.

An increase in the numbers and types of companies covered by BAT requirements would build upon this success and boost environmental technologies in other sectors and in small to medium sized enterprises (SMEs). The recent use of Accredited Inspection Contractors (AICs) for implementation of the Solvents Directive could have a beneficial impact on environmental technologies and less hazardous materials regarding solvent use.

Four main regulatory policy instruments are discussed herein, namely: restrictions and bans; sectoral agreements, industrial permits and licenses; and standards.

5.2.1 Restrictions and bans

Authorities are often reluctant to implement restrictions and bans to products, processes and activities, for fear they would interfere with the free market and become a target of litigation. However there are many precedents to well placed and effective legislative restrictions, which can have a positive impact on environmental technologies.

Several local authorities in Ireland, for example, have banned certain sectors from sending waste to their landfills. In Cork City, for many years, commercial waste has not been accepted at the Kinsale Road landfill site. This has forced this sector to seek out potentially more expensive locations to send their waste – which in turn may have created a higher level of recycling in that sector.

Other landfill sites have also banned certain easily recyclable materials from their sites, such as paper, cardboard and glass. Again this has undoubtedly led to a higher level of recycling of these streams and the use of related environmental technologies. The Landfill Directive will drive further material bans, but to immediately promote the use of environmental technologies in recovery, reuse, recycling etc. they can be implemented sooner.

Waste is not the only area in which bans and restrictions can stimulate environmental technologies. In the field of transport, for example, the development of electric vehicles worldwide has been driven since 1998 by Californian Zero-Emission-Vehicle (ZEV) legislation. Californian automotive emissions legislation is the international trend setter and although the legislation has changed somewhat since its initial inception (due to litigation by manufacturers), vehicle manufacturers are still required to sell a certain percentage of their passenger vehicles as electric and advanced technology vehicles. Since most vehicle manufacturers sell vehicles in California, nearly all have been forced to develop some electric vehicles in order to comply. The legislation has also spurred on the development of other advanced technologies that qualify for partial credits under the ZEV-rule. There are now several electric vehicles available in California, which are competitive in terms of price and performance with conventional petrol cars. Electric vehicles in Europe have in recent years found more use as public service delivery vehicles in urban transport programmes such as CUTE (Clean Urban Transport for Europe), but these programmes could be developed for the private sector also.

Such restrictions, if implemented gradually and with co-operation of product manufacturers, can be applied to many different technologies and industrial sectors. The construction sector in Ireland, for example, could be encouraged to use more environmentally friendly materials and processes if phased in restrictions and bans were implemented.

In agriculture, stricter use of nitrates in terms of how and when they can be spread on land, will undoubtedly have a beneficial impact on water quality and stimulate environmentally friendly technologies and techniques in farming. For several years in Denmark, regulations on fertiliser, crop rotation plans, and manure application at farm level, as well as nitrogen limits have been implemented to support environmental protection.

Over the years several substances and products have been banned across Europe, due to their impact on health and/or the environment, damage to the ozone layer etc. As far back as 1985, Italy introduced a restriction of 4% Sodium tripolyphosphate (STPP) content in household detergents (a low enough proportion to prevent effective use of STPP) in negotiation with industry⁴⁹. This was followed by regulatory bans on phosphates in household detergents in Switzerland and Norway and subsequently Austria in 1994. Many US states introduced bans in the early 1990s and Japan also discontinued the use of STPP in detergents. In most other European countries, and in some EU

⁴⁹ Köhler, Jonathan Detergent Phosphates: an EU Policy. Assessment *Journal of Business Chemistry* Vol. 3, Issue 2 May 2006

Accession countries, voluntary agreements are in place limiting detergent phosphate levels to the minimum necessary for phosphates to play an effective role in the detergent.

Ireland has also implemented smoking bans for health reasons. Lead has been banned from fuels since 2000. Bituminous coal has been banned in several urban areas (Dublin from 1990, Cork 1995, Arklow, Drogheda, Dundalk, Limerick and Wexford 1998, Celbridge, Galway, Leixlip, Naas and Waterford 2000, Bray, Kilkenny, Sligo and Tralee 2003) – this has led to significant improvements in air quality and reductions in smog. The smoking ban in the workplace introduced in 2004 is an exceptionally successful initiative protecting indoor air quality.

While readily available alternatives should be in place if any restriction and bans are to be implemented, this policy instrument, if applied properly and over a suitable time period, can be a very effective tool to support environmental technologies.

Investigations of bans and restrictions into technologies and products in several sectors should be considered by government in order to support environmental technologies.

5.2.2 Sector Agreements (producer responsibility)

Many industrial sectors have approached governments to enter into agreements regarding environmental technologies and practices in order to prevent the imposition of regulations. In The Netherlands and Belgium there is a long history of successful agreements and covenants, with industry as well as municipalities.

One recent agreement in Ireland involved the construction sector and the setting up of the National Construction and Demolition Waste Council. The NCDWC is an industry body set up to promote construction and demolition waste prevention, reduction, reuse of materials and recycling. The NCDWC has been given an objective of voluntarily achieving compliance with targets for recycling set by the Minister for the Environment in the government *Changing Our Ways* policy document (50% Recycling of C&D Waste by 2003 with a progressive increase to at least 85% by 2013). This was to avoid the necessity for setting up legislation to meet these waste targets.

The Council has produced a number of handbooks, guides, best practice guidelines, lists of permits and facilities etc. in order to assist those working in this field to meet the targets laid out. It has set up several subcommittees to work on relevant subjects such as: infrastructure & facilities; markets for recycled materials & specifications; project best practice & waste management; review of the regulatory framework; information, public awareness & funding.

Thus the construction and demolition industry is working voluntarily to increase the use of environmental technologies in an agreement with the government. A recent agreement has also been entered into with the producers and importers of chewing gum.

Agreements with industrial sectors have also been made on an international and EU scale. For example in the field of transport commitments have been concluded with the European (European Automobile Manufacturers' Association - ACEA), the Japanese (Japan Automobile Manufacturers' Association - JAMA) and Korean (Korean Automobile Manufacturers' Association - KAMA) automobile industries. All three Commitments are equivalent having the following main features:

- The CO₂ emission objective: The three commitments contain the same quantified CO₂ emission objective for the average of new passenger cars sold in the European Union, i.e. 140 g CO₂/km (to be achieved by 2009 by JAMA and KAMA and by 2008 by ACEA). In other words the fleet of new passenger cars put on the market in 2008/2009 will consume on average about 5.8 l petrol/100 km or 5.25 l diesel/100 km.
- Means of achievement: ACEA, JAMA and KAMA have to achieve the CO₂ target 'mainly' by technological developments and market changes linked to these developments.

While it currently appears that these manufacturers may not meet these specific targets, improvements have been made.

There are a number of issues in relation to such voluntary agreements, one of which relates to the possibility that such agreements may not meet their targets. One method of dealing with this issue is to base such agreements upon regulation and in the event of targets not being met, the regulation will then come into place to ensure they are met by other means.

Another means of promoting best practice and environmental technologies is the use of producer responsibility initiatives. One example of this method was used in Ireland to implement the requirements of the EU Waste Packaging Regulations by the setting up of REPAK. This has led to a major increase in commercial waste packaging being recycled and in Ireland going beyond its

agreed targets. A similar scheme is now in place for WEEE and this has achieved some early success.

In Finland, almost 100% of used vehicle tyres are now recycled because of one such scheme. Thirty thousand tonnes of used vehicle tyres (equivalent to 2.4 million car tyres) are produced every year in Finland. Almost all of these are now recycled due to the creation and operation of Finnish Tyre Recycling Ltd. This company was set up by the tyre manufacturers and importers in the mid 1990s, with the cooperation of the Finnish Tyre Association. The company was created as a result of the Finnish manufacturers' and importers' obligation to take responsibility for the used tyres in the country, according to the relevant Decision of the Council of State.

This Decision set the goal for the recycling of 90% of used tyres by 2000; a goal which was achieved by 1999. The recovery process starts with users bringing used tyres to their local tyre dealer, free of charge. The tyres are then collected and transported to seven nationwide terminals where the best tyres are separated for retreading (about 4-5%) and the rest are cut into tyre chips and delivered for further utilization, mostly as raw materials (about 85%).

A 'tyre recycling fee' (about €1.80), charged by manufacturers, is paid when new tyres are purchased. This fee creates the financial base required for the logistical and processing operation of Finnish Tyre Recycle Ltd and since the users can return their tyres for free at the end of life, the take up of this scheme was extensive.

An organisation called *Eco-Peinture* was formed in Canada by members of the paint industry in 1997 and began by funding paint and paint container recovery in 1998 on a voluntary basis. This was expanded to meet the mandates of new legislation in 2001. The legislation applies to paints sold in retail outlets, but does not include paint used by artists. The programme is mandated to meet specific recovery and reclamation targets; the long-term target is a 75% recovery rate and 100% reclamation (of paints collected) through the reuse and recycling of used paints and containers. A fee of \$0.25 on containers sold in the Quebec market funds the programme. These funds are used to process the paints for recycling and reuse, to pay for a small amount of disposal, to perform research and development activities, and to support the development of municipal collection programs. The following figure shows the growth of paint recovery in this region since 1994, in particular since the inception of the legislation in 2000/2001⁵⁰:

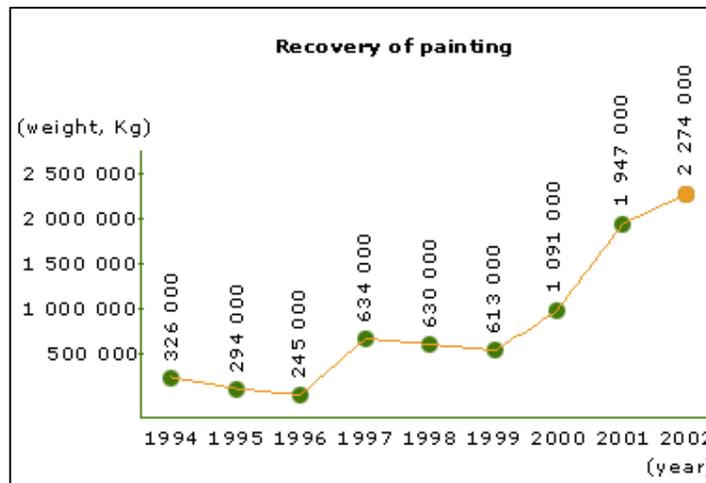


Figure 5.2: Paint recovery levels in Canada, 1994 – 2002

Such agreements can work, especially when implemented properly and when backed up by legislation that can bring penalties and sanctions to bear in the event of non-implementation or not meeting agreed targets. These and other industrial sectors and ranges of products should be targeted by government to enter in to producer responsibility agreements so that a higher take up in environmental technologies and products can be ensured. While producer responsibility

⁵⁰ www.ecopeinture.ca

programmes are essentially economic instruments, they should be combined with extensive information campaigns and they should also have a legislative backing to support effective implementation.

Government should enter discussions with suitable industrial and commercial sectors in order to implement producer responsibility programmes to support environmental technologies.

5.2.3 Permits and Licenses

The issuing of well thought out and innovation based permits and licenses can have a worthwhile effect on the take up of environmental technologies, best available technologies, clean technologies and less hazardous products.

At present in Ireland air and water emission regulations for industry not covered by IPPC set limit values but this can reduce innovation by removing the incentives for companies to go beyond such targets⁵¹. Nor is this legislation integrated, but rather deals with single media. This hinders take up in environmental technologies, especially cleaner technologies.

In Ireland the waste audit and waste reduction legislation proposed in the 2002 policy document *Delivering Change* could have a useful effect in the promotion of environmental technologies. Since such an Environmental Reporting Scheme would aid companies to reduce their material flows and subsequent waste, and since it would affect many more companies than the IPPC system, it has major potential for early and widespread effect. Such legislation should not be based on limit values, but rather support innovative and environmental technologies.

In order to facilitate such a legislative shift, the issue of implementation and enforcement must also be considered. It is not enough just to generate new regulations, the infrastructure and resources required for enforcement must also be put into place. An immediate study should be carried out to examine how best it could be implemented (either by the EPA alone (with an allocation of suitable resources), by local authorities (again with the proper training and resources), or through a semi-private methods such as that for the AIC programme of the Solvents Directive).

It is also necessary when drafting new legislation to ensure that it is clear and does not contain very detailed technical specifications – again this can deter innovation and cleaner techniques and technologies. Such legislation should also be implemented consistently across the EU as a whole. Otherwise the Single Market can be affected and market penetration of new and innovative technologies can be hindered.

New legislation for industry should also be designed to promote innovation and support environmental technologies. The proposed changes in the classification of hazardous mixtures and wastes to the Globally Harmonised System (GHS)⁵², for example, is a deterrent to environmental technologies. Since it will declassify many substances and wastes from hazardous to non-hazardous, it will reduce industry and consumers' motivation to seek out more environmentally friendly options. While this is intended to aid SMEs and reduce their legal requirements regarding such substances, it will have a detrimental environmental affect and hinder the diffusion of newer cleaner technologies and products.

In the issue of licensing in Ireland the whole process of planning law should also be considered. This is especially true with regard to transport and other sectors where environmental technologies can have a large market share. It is difficult, for example, to ensure an uptake in environmental transport technologies as long as people have to commute long distances in small numbers due to poor spatial planning. If large numbers of houses continue to be built alone and in remote regions far away from schools, shops, amenities, and employment, then the use of transport related environmental technologies is hindered.

Planning legislation also needs to be streamlined and made less cumbersome when considering environmental technologies supporting infrastructure in waste, energy etc. For example, at present it is proving difficult to develop composting centres in Ireland though this is a more environmentally friendly technology than landfill. Ireland is required to divert biodegradable waste from landfill and without such centres will have difficulty in meeting its Landfill Directive targets. Public hostility to renewable energy generation from wind is also considerable and localised. Current planning

⁵¹ This is explicitly stated in Annex II to the *Communication from the Commission to the Council and the European Parliament: Stimulating technologies for sustainable development: an environmental technologies action plan for the European Union* Brussels, 28 January COM (2004) final

⁵² See http://ec.europa.eu/enterprise/reach/ghs_en.htm for further information

systems can deter and significantly delay implementing environmental technologies for waste management, composting, renewable energies etc.

New permitting and licensing systems should be investigated by government in order to promote environmental technologies in SMEs, not only in support of European Directives, but (as was the case in the workplace smoking ban) across a wide range of sectors.

5.2.4 Standards

The greater use of standards is an explicit action recommended in Communication on ETAP (Action 5: Ensure that new and revised standards are performance-related). The Communication gives one example how the lack of standards hinders uptake of an environmental technology, membrane bio-reactors.

“The lack of European standards for wastewater reuse is one of the main barriers to the market uptake of membrane bio-reactors for municipal waste water treatment. Membrane bio-reactors have several environmental advantages over conventional activated sludge plants: they remove recalcitrant micropollutants more effectively and they reduce the amount and toxicity of the resulting sewage sludge. They are currently more expensive but provide an effluent that is ready for reuse. However, as this reuse is not encouraged by any kind of regulation or standard, the market is not as developed as it could be.⁵³”

Standards can be voluntary, for example, to stimulate confidence and security for investors. Or they can be regulatory based, explicitly laid out in the legislation governing the use of a process or product. Thirdly they can be a combination of both voluntary and regulatory – one good example of this is in the Top Runner programme of Japan.

The Top Runner Program was introduced in 1999 as a part of the revision of the Law concerning the Rational Use of Energy (Energy Conservation Law)⁵⁴. It also served as a means to tackle climate change. The aim was to address energy use in the transport, commercial and private sectors, which have shown significant increases in the past 30 years. Eighteen product groups – selected electrical and electronic equipment, cars and gas-using equipment – are currently included in the Program, and its scope is being expanded.

In principle, among the targeted products available on the market, the use-phase energy efficiency of the “top runner” (the one that achieves the highest energy efficiency) becomes the basis of the standard. The standard setting takes into account the potential for technological innovation and diffusion. This means on one hand that in some cases an outstandingly energy-efficient product does not become a standard setter, especially when achievement of the standard would require the usage of a unique technology applied to the product. On the other hand, when potential technological development is perceived to be great, the level of standards becomes higher than what the top runner product achieves. Within the same product group, differentiated standards are set reflecting one or more parameters that affect energy efficiency in the respective product groups. These parameters include function, size, weight, type of technologies used, type of fuel used and the like.

Differentiated timeframes, ranging from 3 to 12 years, are set for the respective product groups. Producers (manufacturers and importers) that place more than a certain number of products on the market must make sure that weighted average of energy efficiency of the products placed on the market meets the standard. The standards, as well as timeframes, are reviewed when the target year arrives, or when a substantial portion of the products meet the standards prior to the target year.

Both mandatory and voluntary information tools are employed to disseminate information on the achieved energy efficiency of the products under the Program. The standards set in the Top Runner Program are utilized in a couple of policy instruments, such as the Green Purchasing Law and the green automobile tax scheme. There has also been an annual award provision for energy efficient products and systems since 1990.

⁵³ *Communication from the Commission to the Council and the European Parliament: Stimulating technologies for sustainable development: an environmental technologies action plan for the European Union* Brussels, 28 January COM (2004) final (page 13)

⁵⁴ Swedish Environmental Protection Agency *The Top Runner Program in Japan – its effectiveness and implications for the EU* SEPA 2005

The Top Runner Program takes a name and shame approach for enforcement. Regarding monitoring, although there is an information provision requirement on the energy efficiency of individual models, the aggregate results are officially collected only when the target year arrives.

While voluntary standards for products may have a beneficial impact (these are currently in place in Ireland for the energy ratings of some household appliances) unless there is some official or regulatory basis, the impact is lessened. Thus for example in April 2006 in the UK, updated Building Regulations came into force to further raise the energy standards of new and refurbished buildings and help to improve compliance. Taking into account the changes in 2002 and 2005, new building standards demanded a 40% improvement in energy efficiency standards for new buildings and the opportunity for householders moving into new homes to see a similar cut in the size of their fuel bills, saving 0.4Mt carbon (1.3Mt CO₂).

In August 2006 Ireland also announced that it will begin implementing the EU Energy Performance of Buildings Directive (EPBD) in 2007. The implementation will be threefold involving

- Building Energy Rating (BER) of Buildings;
- Improving the energy efficiency of larger Boiler systems; and
- Mandatory inspections of Air Conditioning systems.

The objective of building energy rating is twofold-

- Firstly, to give prospective buyers and tenants information about the energy performance of buildings before they buy or let; and
- Secondly, to give builders/developers of new buildings, and owners/landlords of existing buildings, an incentive to upgrade energy performance in order to improve the marketability of buildings. The Building Energy Rating (BER) certificate which will issue will incorporate an Advisory Report on what actions can be taken to improve energy efficiency (many of them at relatively low-cost) which will save consumers money in the long term. This is particularly important in the case of existing older buildings.

These standards are expected to improve the energy consumption of buildings and to promote environmental technologies in the construction sector as well as relating to households.

A wide range of standards have been implemented in several countries in the transport sector, in particular relating to air emissions. In Canada, for example, the On-Road Vehicle and Engine Emission Regulations of 1999 introduced more stringent national emission standards for on-road vehicles and engines and a new regulatory framework. These Regulations for controlling emissions from on-road vehicles and engines came into effect on January 1, 2004.

Standards are also an important feature of water usage and quality. In Australia, to reduce urban water consumption, for example, the national, state and territorial governments have combined to introduce a Water Efficiency Labelling and Standards (WELS) Scheme which applied national mandatory water efficiency labelling and minimum performance standards to household water-using products.

In agriculture, particularly relating to rural development policy, compliance with minimum environmental standards above Good Farming Practices (GFP) is compulsory in the EU in order to obtain any agri-environmental payments. Good Farming Practice is the type of farming that a reasonable farmer would follow in the region concerned. This includes at least compliance with the Community and the national environmental legislation. GFP entails, for example, compliance with the requirements of the Nitrates Directive and the use of plant protection products. Good farming practice would obviously involve the use of environmental technologies that reduce environmental impact.

In waste management, particularly to support new markets for recyclables, the UK WRAP programme has developed several standards designed to raise confidence in such materials and the products produced from them.

Such standards need to be transparent, well communicated, verifiable and, if possible, backed by regulatory and economic instruments.

Government should investigate how best to develop a wide range of standards related to environmental technologies, with support and advice from suitable stakeholder groups.

5.3 Economic Based Programmes

Economic instruments are being widely used to stimulate improved environmental behaviour in Ireland and other countries. These can take three main forms: grants and award schemes to support environmental technologies; levies or taxes to penalise less environmentally friendly options; and producer responsibility programmes, involving specific industrial sectors or products.

5.3.1 Grants

Financial constraints are a frequent barrier to the move to environmental technologies as was seen in Section 4. Once off grants or supports by government can overcome that initial inertia and lead to higher uptake levels. Several examples of this type of policy instrument, and how they can be applied, have already been outlined.

Grants can be applied in almost any industrial sector, or in support of any range of products. Economic grants for research, demonstration programmes etc. will be covered in the next section: Information.

In agriculture, in the UK, the Environmental Stewardship programme has provided funding to farmers to improve farming techniques. In Ireland the REPS programme has also been providing such funding. The UK has also provided grant aid in relation to Environmental Sensitive Areas and Energy Crops. Austria is the leading proponent of organic farming due to the extensive and wide ranging financial support they have awarded to their farmers since 1991.

Funding for new technologies is also quite common in the energy field. In Austria capital subsidies and fiscal incentives have led to a high growth in biomass heat and power, as well as solar thermal technologies. In Germany the "Bright NRW" energy efficiency programme involved free giveaway of CFLs to households. In Finland (the leading bioenergy producer in the EU) grants for new technologies and tax allowance are widespread to support this environmental technology. In Ireland Sustainable Energy Ireland are offering grant aid to householders who invest in energy efficient equipment for heating and energy.

Transport is another area where such grant aid can be effective. In Sweden E85 (85% ethanol, 15% petrol) is 40 cent cheaper than petrol. In Brazil the government gave credit to the sugar industry to cover 60% of its storage costs to guarantee ethanol supplies.

Environmentally friendly products can also be co-funded. In Ireland a number of economic instruments have been applied to encourage consumers to change to more environmentally friendly means of transport.

- A car scrappage scheme was implemented in 1996 and 1997 whereby car owners were given a guaranteed (good) price for any cars scrapped and replaced with a newer (more efficient) alternative. In total some 60,000 cars were scrapped. While this was not an environmental measure per se, there is evidence that the scheme also skewed the market towards smaller (more environmental) cars for a time, accentuating the benefits of fleet replacement.
- In 1998 substantial reductions in motor tax were applied for categories of vehicle used as public transport vehicles and in 2001 provision was made for the vehicle registration tax (VRT) on hybrid engine cars (petrol/electric) to be refunded by 50% to incentivise the purchase of these vehicles with lower NOx emissions.
- VRT has always been banded on the basis of engine size. The 1999 Budget further differentiated VRT to encourage consumers to purchase smaller cars, and the 2003 Budget reduced the threshold for the top rate of VRT from 2,000cc to 1,900cc. However, since the growth in sales of larger cars in Ireland continues, this measure appears not to have been strong enough.

In the USA tax credits are available for many types of home improvements including insulation, replacement windows and efficient heating and cooling equipment.

Industry can also receive grant aid to improve processes and technologies. In the UK, the WRAP Capital Grants Scheme was used to increase recycling levels from industry. In Austria free advice and consultancy is given to companies from the City of Vienna Advisory Service. Germany the KfW

bank has several programmes of support for energy saving, environmental protection, renewable energies etc. Similar programmes are available in the Netherlands, France and Denmark.

While once off grants can reduce the hesitancy to move to new technologies, long term subsidies are not as cost-effective. Experience with industries such as agriculture means that governments are slow to commit to long term ongoing grant aid – especially if it not performance related.

It is vital that grants are well monitored and in line with EU funding parameters. Clear objectives and goals must be laid down in any scheme and the benefits to society (and not only the recipient of the aid) must be real and tangible. It is also important that receipt of such aid be relative simple for the recipient, without too much red tape or bureaucracy.

However, there have been some problems regarding uptake of other grant aid programmes⁵⁵, and it appears that such aid should be focused on support for companies and local authorities to meet new pressures, or to support new legislative or economic requirements. It also appears that some companies are not adequately stimulated to accept such grant aid, and grants are often only 50% of costs, in accordance with EU grant aid regulations. These factors should be taken into account when developing and delivering grant aid in Ireland.

One finding of the series of PRESTI support programmes in Flanders was that it can be more effective to use intermediaries in the allocation of such support. This may also be one reason for the poor uptake of the UK Department of the Environment (DoE) government grant aid scheme, 'SCEEMAS' (the Small Company Environmental and Energy Management Assistance Scheme).

Relevant agencies should investigate further opportunities to apply grant aid in support of environmental technologies across a wide range of industrial and service sectors.

5.3.2 Taxes and Charges

Another method of implementing economic programmes is to increase costs or taxes for non-environmental technologies and products in comparison with better alternatives. As was seen in Section 4, economic systems and costing structures rarely allow for the full externality costs related to products. These include health, environmental and climate issues and such costs are usually paid by society in general and not the producers who created them.

So for example, the full costs of disposing of or cleaning up plastic bags in Ireland was not apparent in the cost of such packaging until a levy was imposed upon them. And, since an alternative (long life bags) was readily available to the consumer, at a relative cheaper cost (with multiple use), this programme led to a 90% reduction in plastic bag usage.

And while this levy has been successfully imposed on plastic bags, the full externalities of many other types of consumer packaging and products are not paid by the producer or consumer, but by society at large.

Charges can be applied in several ways, for example on products or packaging themselves, based upon the types of material being used, its harmfulness to the environment, its recyclability, its usefulness or importance to the society, the difficulty of disposing of it, etc. Thus any such taxation system should be differentiated, with different levels applied to different materials and products. This is a form of producer responsibility, but it is often applied at the point of sale, which means that the extra cost is paid for by the consumer, rather than the manufacturer. However, as long as more environmental alternative technologies or products are readily available, such charges lead to improved diffusion of these alternatives.

Such costs are often applied in the form of taxes. Denmark has a long history of environmental taxes applying to many different products and services⁵⁶. And while these could be considered punitive, the income tax levels in Denmark were adjusted to allow for this. Thus only those who repeatedly used non-environmental technologies and products were penalised – a much fairer system.

This fairness also applies to the new growing 'pay as you throw' waste collection systems in Ireland – whereby the amount paid is adjusted to the amount of waste produced. Most local authorities have waiver or reduced charge schemes exempting low-income households from paying these

⁵⁵ Clean Technology Centre *Research project to investigate factors influencing take-up by Irish enterprises of funding for research into sustainable production, technology, innovation and practices* Department of Enterprise, Trade and Employment 2003

⁵⁶ Danish Environmental Protection Agency *Economic Instruments in environmental protection in Denmark*, DEPA 1999

waste charges. The waivers usually apply to households whose sole income is a Department of Social, Community and Family Affairs allowance or pension and households whose total income is exempt from income tax. People on low income may also qualify.

Previously small waste producers and large scale recyclers paid the same as those who did no recycling and produced large quantities of household waste. This new cost system has been a major contributory factor in the large increase in household recycling apparent in Ireland. However, once again it must be stressed that such systems will only work if an alternative is readily and easily available – in this case the alternative is the collection of dry recyclables, at a cheaper cost to the waste disposal.

The UK's current Vehicle Excise Duty (VED) and company car taxation policies are designed to reward vehicles with lower CO₂ emissions. This system is intended to encourage motorists to choose more environmentally-friendly vehicles and to continue the shift towards taxing usage rather than ownership

Since 2001, the annual tax on vehicle ownership, VED, has been charged on new cars according to their CO₂ emissions and type of fuel used. VED rates for vehicles are divided into five bands, ranging from £100 (€150) to £160 (€240). Each band, with a successively higher rate, corresponds to a successively higher band of CO₂ emissions.

There is an adjustment upwards to the VED rates for diesel vehicles, and an adjustment downwards for clean fuel vehicles. In the 2002 Budget, the Government froze VED rates for cars and introduced a new low-carbon band offering a £30 (€44) discount for cars with CO₂ emissions not exceeding 120 g/km.

Company cars are taxable at a percentage of the new value of the vehicle. The percentage rises with greater CO₂ emissions. The minimum tax rate is 15% of the vehicle's new value, for CO₂ emissions of 165g/km or less. The maximum rate is 35% of the vehicle's new value, for CO₂ emissions of 265g/km or more. These rate bands will tighten in increments of 10g/km in each of fiscal years 2003/4 and 2004/5 respectively.

Both the VED and company car taxation scales provide incentives for the purchase of new vehicles with lower CO₂ emissions. This in turn has led to a significant effort by manufacturers to produce vehicles of lower CO₂ emissions. The graduated VED scheme is an example of a successful pricing signal affecting the UK's vehicle fleet for the better. The European Commission now wants CO₂ based vehicle taxation, similar to that in the UK, to be adopted by other states in the EU.

The current taxation regime also provides some incentive for the purchase of lighter vehicles. A benefit of these vehicles is that they inflict less damage on people, other vehicles and property, in crashes at any given speed. At the very least, the tendency for weights to increase with each new generation of vehicles has been slowed. The graduated schemes have made employers and motorists more aware of the economic and environmental impact of their vehicles.

Another factor in the UK is the relatively high cost of fuel due to carbon taxation – something that is causing a high level of 'fuel tourism' in the border region of Northern Ireland. Of course the larger and more inefficient a car is, the more fuel it will use per kilometer – again a major incentive for the uptake of more environmental technologies.

Transport is an area especially suited to economic charges to change behaviour and stimulate a move to environmental technologies. This is because this instrument can be aimed at the general public more easily than, for example, bans. Another good example of a charge to alter behaviour relating to transport is the use of congestion charges in towns and cities. As mentioned previously congestion charges are widely used in Sweden but it is not charged for those vehicles using biodiesel. Congestion charges have also been very effective in London. Such charges, while encouraging more sustainable use of vehicles also has the added value effects of reducing traffic jams as well as air pollution. However, such charges may cause economic damage to urban centres unless good public transport or other alternatives (such as park and ride schemes) are offered to commuters and travellers.

While legislation is a more common disincentive for industry, charges can also be applied. For example in Sweden a charge on emission of nitrogen oxides (NO_x) from energy generation at combustion plants was introduced 1992. The charge has been seen by the Swedish EPA as a crucial factor in the considerable reduction in emissions of nitrogen oxides that has taken place from these plants during the 1990s

In comparison with several comparative EU states, Ireland's use of environment-related taxes and charges is quite low. While, generally, taxes (such as VAT) are applied on products and goods and

the relative cost of products is high, most charges are not environment-related in Ireland – this deters the diffusion of more environmental technologies and sustainable alternatives. In the case of petrol, for example, Figure 5.3 below⁵⁷ shows that Ireland is behind several other EU Member states.

It is also arguable that the 50 cent tax that is applied to petrol in Ireland is not an environmental charge at all – rather it is a road charge. However, such a comparatively low rate deters consumers from using environmental technologies for transport rather than their individual, and increasingly large cars.

A range of environmental related levies and taxes in several sectors should be considered by government in order to support environmental technologies. Such environmental taxes (as is already the case with the plastics bags and landfill levies) should also be ring fenced to support the promotion of environmental technologies.

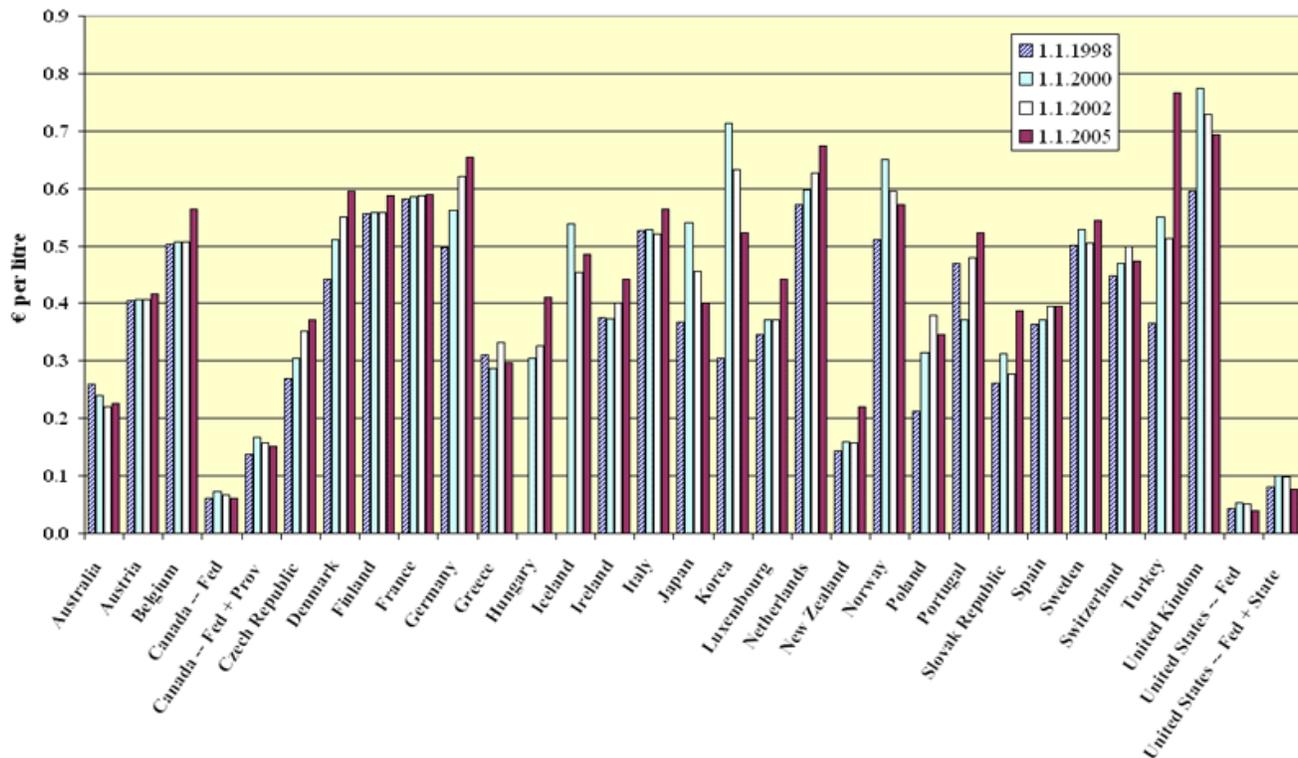


Figure 5.3: Environmental taxation levels on petrol from 1998- 2005

5.3.3 Green Public Procurement

Green public procurement (GPP) policies and programmes are widespread in regions such as Austria, Denmark, Finland, Germany, Netherlands, Sweden and UK but have yet to be developed on a large scale in Ireland⁵⁸. Austria in particular has formalised such policies in legislation and has developed guidelines and support documents to aid public agencies to green their purchase chain - this has led to a large increase in the use of environmental technologies and products. While this instrument could also be described as information or regulatory based, and it should be enforced by regulation in the short term, its implementation on a practical level is through the economic systems of organisations.

One of the main barriers to green public procurement in public bodies and local authorities is the lack of integration among different departments, especially in large organisations. (This is also true of the private sector.) A major benefit of green procurement is that it involves all departments in an

⁵⁷ OECD and European Environment Agency database of economic instruments in environmental policy http://ec.europa.eu/environment/enveco/database_env_taxation.htm

⁵⁸ See Section 3.9 above

organisation and affects all their purchasing policies. It is most important that environmental issues are thus integrated, at all levels in an organisation both horizontally and vertically. The finance department is especially important since so many decisions and issues critical to the environment are taken by finance departments, both in the private and public sector. However, support from the top managers in such organisations is a prerequisite for the correct policies to reduce consumption of unnecessary and harmful materials and the creation of waste.

Another barrier to GPP is the common perception that it is in breach of procurement legislation to give preference to products or services 'just' because they are environmental in nature. Some procurement professionals also feel that it is necessary to select tender offers on economic grounds only (however as the Helsinki Bus case study below shows, environmental criteria can be used when calculating the 'most economically advantageous tender'). It is also difficult for those involved in public procurement to draw up tender specifications with an environmental element and also they do not have the knowledge to environmentally assess technologies or services.

However, despite these difficulties, as stated above, GPP is being widely practiced in some EU regions and its benefits are substantial.

Public agencies have a very large purchasing power. This has been estimated to account for up to 16% of GDP⁵⁹ (€25.8 billion in the case of Ireland), which could obviously include many products utilising environmental technologies. In particular extensive levels of construction work are carried out by or on behalf of local authorities, involving huge volumes of materials. Energy, water and other material consumption is also at a very high level and the technologies involved in this sector use large volumes of oil. Transport and energy are other significant public procurement areas where environmental technologies can play a major role.

Government agencies are currently not leading the way and providing sufficient exemplary behaviour. The environmental record of government offices and agencies, schools, universities, health boards, local authorities etc. can be significantly improved. It is vital that these offices and authorities are seen to be acting responsibly, rather than just preaching good practice to the general public. In order for people to trust the information and advice they are getting from authorities, these organisations must be seen to be implementing best environmental practice. This will have a major spin-off effect on the uptake of follow-on initiatives by the general public and business.

Some guidance has already been made available from the European Commission in the form of a guide book regarding public procurement⁶⁰. However, there are still real and perceived difficulties in implementing greener policies without breaching purchasing legislation and free market requirements. Since Austria, for example, has succeeded in overcoming such problems, it obviously can be done. But the guidelines and supporting information required and the beneficial effects of such initiatives are also required. Public agencies can thus develop and provide such guidelines to the public sector so that they are not only leading by example, but also aiding business by providing practical experiences to implement such policies. Another spin off is that as part of green procurement policies, public agencies can demand that private companies who supply to them have, at the very least, some environmental policies and programmes in place. Since so many private companies depend on public contracts for their existence, this could provide a very effective tool to spread better environmental performance on a very wide scale.

The "Helsinki Bus" case ⁶¹

In 1997, Helsinki City Council decided to gradually put out to tender for the entire bus network of the City.

The tender notice stated that the contract would be awarded to the economically most advantageous tender overall to the City. That was to be assessed by reference to the following three categories of criteria: a) the overall price of the operation; b) the quality of the bus fleet (including low nitrogen oxide emissions and low external noise levels); c) the operator's quality and environmental management.

The Commercial Services Committee of the City awarded the disputed lot to HKL, as its tender was regarded as the economically most advantageous overall, although Concordia had proved to be best in relation to price. Both tenderers received equal points for their quality and environmental certification.

⁵⁹ <http://ec.europa.eu/environment/gpp/index.htm>

⁶⁰ CEC *Buying Green: a handbook on environmental public procurement* Luxembourg: Office for Official Publications of the European Communities, 2004 <http://ec.europa.eu/environment/gpp/pdf/int.pdf>

⁶¹ <http://ec.europa.eu/environment/gpp/legal.htm>

Legal interpretation

One of the questions on which the European Court of Justice was asked to rule upon, concerned the extent to which environmental requirements, specifically low nitrogen oxide emissions and low noise levels, can be taken into consideration at the award stage of a contract and extra points awarded for them. In case of a positive reply on this question, it was further asked whether it would be discriminatory, and hence contrary to the general principles of the EC Treaty, for a contracting authority to use an award criterion which could only be satisfied by a few service providers including the in-house tenderer.

The Court stated that 'It cannot be excluded that factors which are not purely economic may influence the value of a tender from the point of view of the contracting authority' and that, taken into account the purpose of the Community public procurement rules to eliminate barriers to the free movement of services and goods and Article 6 of the EC Treaty, laying down that environmental protection requirements must be integrated into the definition and implementation of Community policies and activities, 'Article 36(1)(a) of Directive 92/50 does not preclude the possibility of taking into consideration award criteria relating to the preservation of the environment when assessing the most economically advantageous tender'. The Court however put four conditions to the use of such criteria : 1) they should be linked to the subject matter of the contract; 2) they should not confer 'unrestricted freedom of choice on the contracting authority', considering that in the case at stake the award criteria (in relation to emission and noise levels) did not confer an unrestricted freedom of choice on the contracting authority, since they were specific and objectively quantifiable environmental requirements; 3) they should be expressly mentioned in the contract documents or in the tender notice; and 4) they have to comply with the general EC Treaty principles.

Furthermore, the Court ruled that the fact that only a small number of undertakings, including the contracting authority's own, could satisfy the award criteria (the additional points for 'greener' emissions and noise levels) was not in itself a breach of the principle of equal treatment.

Green public procurement should be a statutory requirement in all public purchasing in Ireland. Suitable mechanisms (information and economic based) should be put in place to support such legislation.

5.4 Information Based Programmes

As shown in Section 4 some of the strongest obstacles to new and environmental technologies are social, attitudinal and information based. Studies have shown that environmental awareness levels in Ireland are lower than comparable EU Member States. Some campaigns to change this have been apparent recently (see below), and these have had some beneficial effect.

As well as awareness, however, a lack of technical information and confidence in new technologies can also prevent change. Environmental technologies are often new and are sometimes perceived as unreliable and untested, or inferior to the tried and tested older alternatives. Again information and demonstration are useful tools to overcome this lack of confidence. Standards are another requirement and these have been discussed above.

Research into newer and more innovative technologies and how they can be applied is the third type of information discussed here. Again while there has been much progress in environmental research in Ireland, but there is still room for improvement.

5.4.1 Awareness Raising

When it comes to environmental issues, there is a need for awareness raising at several levels in Ireland. While there have been high profile waste related campaigns for the general public for several years (It's easy to make a difference, Race against waste), more recently water (taptips.ie) and energy (powerofone.ie) related campaigns have also begun.

These will, over time, have an impact on the public subconscious and may lead, with the application of other instruments, to behavioural change.

However, media campaigns and advice on their own are not enough and other awareness related instruments are being widely applied in a variety of sectors. One such tool is the use of eco labels. There are many examples of eco labels being widely applied such as the EU Eco Flower and the Nordic Swan which cover several products. Other labels are applied to one specific sector (for example the Sustainable Forestry Initiative for paper and wood products). One study estimated that there were at least 104 eco labels related to the tourism industry alone⁶².

⁶² World Tourism Organization *Voluntary Initiatives for Sustainable Tourism* WTO, 2002

These labels, as long as they are properly managed and audited for accuracy, are a worthwhile tool for consumers to decide on products or services using environmental criteria.

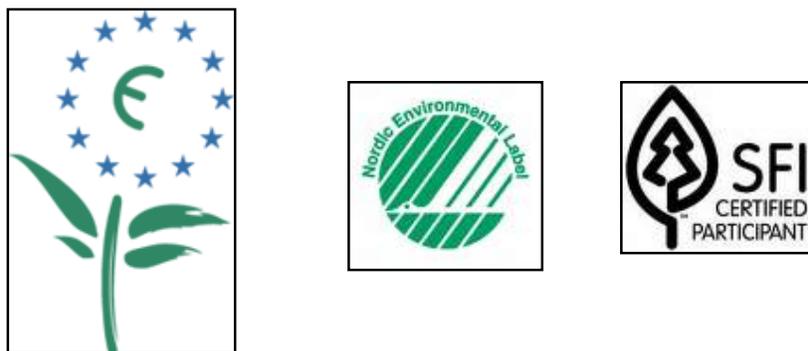


Figure 5.4: Examples of eco-labels

Irish or international eco labels to boost environmental technologies might be worthwhile, but these must be developed with support from the industries involved, consumer groups and other stakeholders - the uptake of the EU Eco Flower, for example, has not been as widespread as intended.

In Sweden there was a perceived demand on the market for life cycle assessment (LCA) based, quantified information about environmental performance of products and services, so-called Type III environmental declarations. The environmental product declaration (EPD) system is a system for science-based, verified and comparable environmental information open for all products and services to support continuous improvements based on flexible in-company product development processes. Such information is needed in several market places, e.g. in the raw material supply-chain, within the framework of an environmental management system and for green purchasing and procurement.

Swedish industry has initiated and established an official Type III environmental declaration programme called the EPD system based on ISO TR 14025 - a pre-standard in the ISO 14000 series. The EPD system is applicable worldwide for all interested companies and organisations. Currently companies and organisations in seven countries have joined the EPD system in various stages (Canada, Japan, South Korea, Norway, Germany, Denmark and Italy)⁶³.

Also in Sweden the Environmental Code Committee is to look into how to clarify National legislation to emphasise that all manufacturers/importers or all those taking action have an obligation to limit the environmental impact of products and services throughout their entire lifecycle. However such declarations are only worthwhile if the motivation exists to utilise them.

A more worthwhile approach in Ireland might be the use of energy and other ratings that are regulatory or semi-regulatory in nature. The Japanese Top Runner programme and the EU energy rating programme for electrical appliances are two examples of such rating schemes. Moves are also underway now in some countries to put energy and emission labels on cars. Whereas in all Member States the label includes mandatory data on CO₂ emissions and fuel consumption and / or fuel reach, several countries propose additional data such as noise or fuel cost. Energy efficiency rating and clear labelling systems have been introduced by 7 countries. These are coloured scales that rank cars according to their CO₂ emissions in an easily understood way – see Figure 5.5 below. Very often these labels are based on the same principle as the coloured energy efficiency labels that appear on electrical appliances and with which consumers are already familiar. This is the case for the UK (left image below). Denmark, France, Spain, the Netherlands, Austria and Belgium (right image shows a Dutch label) use horizontal coloured scales, but still going from green (good) to red (bad) and also offering a clear means for benchmarking different models. Emissions labels for cars have also been obligatory in Australia since 2003.

⁶³ <http://www.environdec.com/international/programs.asp>

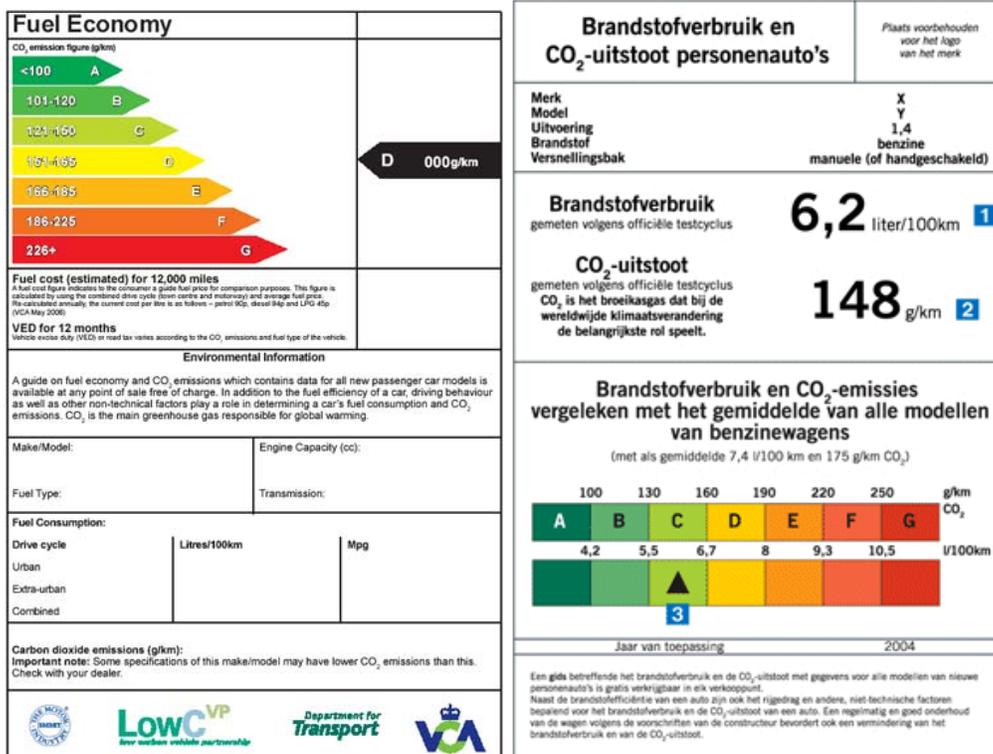


Figure 5.5: Examples of fuel economy and emission labels for vehicles

However, as the ETAP showcase on environmental technologies states⁶⁴, such labels are of no value if consumers are not willing to choose the greener options. In one UK Study⁶⁵ 83% of car buyers said they were concerned about the environment, but only 3% professed that emissions had a significant effect on their purchasing decision - windscreen sticker price being the key consideration for 27%. However half of all consumers now say that they will check the vehicle's emissions before they buy the next one.

In order to influence consumers' behaviour towards more environmentally-friendly passenger cars, several countries have chosen to base car taxes on the vehicle's consumption - or to add specific taxes. Recent examples include:

- In the UK, the Vehicle Excise Duty (VED) (also discussed in the regulation section above) is an annual road tax. It is displayed on the car label shown below. The VED depends on the CO₂ emissions (with the same bands as those of the coloured car label) and on the vehicle's fuel type. In March 2006, the tax was revised with the introduction of a new G band including vehicles with CO₂ emissions over 225 g/km, which are submitted to a maximum VED of £215 (€372) per year.
- In France, from 1 July 2006, cars registration certificates will be more expensive for vehicles with CO₂ emissions above 200 g/km. For example, a Cayenne 4x4 would be submitted to an additional €380. Based on 2004 car sales, 8% of new cars would be affected by this additional tax according to the French environmental protection agency, ADEME.
- On 1 July 2006, the Netherlands introduced a tax break in the form of a discount on the Private Motor Vehicle and Motorcycle Tax (the BPM). Effective as of the same date, taxes on fuel inefficient cars were increased. This tax break is based on the energy bands which are already used in the country's energy labels. A-labelled vehicles have a €1000 discount (€6000 if hybrid) whereas G-labelled vehicles have a €540 additional charge.

⁶⁴ http://ec.europa.eu/environment/etap/showcase_en.htm

⁶⁵ RAC. RAC Report on Motoring 2006 *The Future of Motoring: A clear road map or collision course?* RAC, 2006

Such economic instruments, backed up with a good information campaign (including labelling) could boost environmental technologies in transport in Ireland.

The rating schemes for houses being developed in Ireland and the UK are also worthwhile, but any such programmes must be preceded by focused awareness raising campaigns and there should be some economic support at the initial stages to stimulate and facilitate change.

An energy rating scheme has been applied in Denmark for large and small buildings since 1997. There was a 20% improvement in energy intensity between 1994 and 2005. In June 2005 new energy requirements for the building regulations of small houses and for the general building regulations were published. The new requirements came into force in January, 2006. All new buildings must be labeled to ensure fulfillment of the requirements. The new action plan calls for a tightening of the energy requirements in the building code by 25-30% from 2006 and a further 25% from 2010. The new action plan calls for a general target for reducing energy consumption in all sectors (not transport) of 1.7% per year until 2013. Grant provisions totaling € 135 million are made each year to improve energy efficiency. There are subsidies for pensioners with low income. There are other grants to promote central heating.

Three elements of this Danish system are vital for success. Firstly it is not a voluntary scheme whereby some building will take part and others won't. All buildings must have a label. Secondly, it is not just a labelling programme – rather there are standards that must be met and energy conservation and efficiency must be improved. Thirdly there are economic supports to make such improvements and subsidies are provided for pensioners etc. This is an excellent example of how an awareness labelling programme should be implemented - not on its own but as part of a multi-faceted approach including information, economic and regulatory elements.

The awareness campaign carried out by the DEHLG for the implementation of the plastic bags levy in the year 2002 is another good example of such a specific and focused campaign. It targeted the most relevant people (shopkeepers and shoppers); it had a high profile and was made visible by posters and leaflets; it used different media such as the Internet, television, and radio; it was initiated early and gave consumers notice; it involved the print media with articles and press releases. Again this combined information, economic and regulatory elements.

Detailed information about environmental technologies, what they are and where they can be found should be widely available to potential users and consumers. Databases of environmental technologies by their sector and with enough information for potential users should be developed and put on the internet. A support team for those interested in either developing or utilising such technologies should be set up and adequately funded, with a hotline, website and the resources to provide adequate support.

At present in Ireland there is a great deal of promotional work being done by several organisations across the country. The Irish Roadmap for ETAP detailed all of this worthwhile work. However, all these activities and supports are not being sufficiently coordinated and each organisation is busy carrying out its own programmes independently. A formal grouping of these organisations, with regular meetings and fora, whereby a coordinated programme of awareness and information based support for environmental technologies, would be helpful to maximise results.

A detailed and long term awareness raising programme for environmental technologies should be initiated in Ireland. Several eco labels for a variety of products and services should be put into place, on an obligatory basis.

5.4.2 Technical Support/Training

A lack or perceived lack of technical knowledge will deter organisations from changing processes or technologies to more environmental alternatives. One major study⁶⁶ by the Joint Research Centre (JRC) on ETAP showed that technological opportunities and capabilities as well as organisational capabilities were issues of concern in several sectors with respect to the diffusion of environmental technologies.

There are many good examples of such support structures in Ireland and other Countries, as well as from the European Commission itself. In the UK the Envirowise programme has been supporting environmental technologies and processes, providing extensive advice and assistance to business, publishing many guidebooks, with a help line, detailed website, as well as funding opportunities. It

⁶⁶ Joint Research Centre *Promoting environmental technologies: sectoral analyses, barriers and measures A report from the Sustainable Production and Consumption Issue Group as a contribution to the Environmental Technologies Action Plan* European Commission 2004

estimates that it has saved British industry £1 billion since 1994⁶⁷. The UK WRAP programme has been providing similar technical support regarding new outlets and markets for recyclables. In Australia, the WasteNet resource supports local authorities to share experiences and opportunities. In Wales, the Design Wales programme has been providing advice and expertise to industry and business regarding eco-design since 1994. Training, workshops, one-to-one advice, and consultancy are being given to Welsh companies regarding their environmental design needs.

The City of Vienna provides knowledge based support to companies with a grant aid of maximum €1m per company per year. A notable feature is its "OekoBusiness Plan"⁶⁸ support programme. With a current annual budget of approximately €800,000 per annum, it has supported nearly 500 companies since its inception in 1998 - implementing more than 9,000 environmental projects and actions, involving many different environmental technologies. These represent about 10% of enterprises in Vienna (excluding sole traders). Cost savings in excess of €30 million are attributed to the programme. 60% of improvements are recorded as having a payback of less than one year, 75% with a payback of less than three years.¹⁷

There are five sub-programmes:

- OekoBonus
- OekoProfit
- ISO 14001
- EMAS
- OekoTourism

The individual companies are assisted by consultants who provide advice and consultancy – capacity building within the industries. Grant aid of 60% - 70% is available for external costs. The combined set of programmes can be viewed as scalable support for performance reviews and environmental management systems, with a local recognition award for participation.

In Ireland the CGPP programmes have been providing technical support and advice to many businesses from a variety of sectors and now local authorities are supported through the LAPD programme. Through grant aid and consultancy, companies and regions have been able to invest in or research new technologies for environmental improvements. There are several good case studies of changes in environmental techniques and technologies now available to other businesses through the CGPP programme⁶⁹.

In order to overcome the lock in effect to older technologies, organisations have to be confident and secure in environmental alternatives. This can only be achieved through technical support and training, combined with strong standards. Detailed and independent information must be provided to companies, SMEs in particular, in order to stimulate the changeover to newer technologies. Uncertainty hinders investment.

Information and independent support are especially necessary in the event of new legislation, restrictions or bans that affect small companies. Very often those targeted are not fully knowledgeable regarding new regulations nor know how they can be met - this very situation was encountered by some local authorities when examining the performance of the SMEs in their regions with regard to waste⁷⁰.

Very often companies receive technical information only from their current technology suppliers and this adds to the lock in effect for older technologies. More independent information is required to stimulate change and also as a means whereby newer and more innovative technology suppliers have access to the market. While government agencies have to be careful not to be seen to endorse specific companies or technologies, if they are happy with the environmental credentials of such technologies, they can support suitable mechanisms for their diffusion.

⁶⁷ <http://www.envirowise.gov.uk/>

⁶⁸ www.oekobusinessplan.wien.at

⁶⁹ www.cleanerproduction.ie

⁷⁰ This was noted in the development of Regional Waste Management Plans 2001- 2006 by some local authorities

The successful take up of new technologies being achieved in some regions is due in no small part to the high level of technical support available, whereby companies receive expert proactive support, specific to their needs, by picking up a phone, attending a local event, or going to a website. The Envirowise programme in the UK, and the Viennese OekoBusiness Plan are two examples of such provision. The level of support available in Ireland is not as widespread as it could be, so that companies, small companies in particular, feel isolated and unsure about what to do, even when the will to make changes is already there. Thus the setting up of a well-resourced and expert environmental technology information agency or agencies, with free-phone lines, a website, email access etc. is necessary. This should be put in place on a permanent basis with guaranteed funding and support. It could also carry out specific ETAP based research and develop guidelines and support material for a wide range of target groups. It need not necessarily be a stand alone group, it could, for example tie in with current support agencies such as Enterprise Ireland, DEHLG, the EPA etc.

These agencies or units could also co-ordinate and facilitate training programmes with general information (for example on new developments or legislation) or geared to specific industrial groups, regional groups, for the support of new initiatives etc. Such training would be made available cheaply and widely. This material should also support and give assistance regarding new legislative requirements for small and medium sized enterprises (SMEs), in order to aid compliance. Roadshows around the country could be organised to support groups of environmental technologies, either related to certain sectors or of a more general nature. A database of environmental technologies should be developed, widely disseminated and kept up to date.

The ETAP website⁷¹, set up by the European Commission, is a good example of how support information and knowledge can be provided. This site provides up to date technical information on environmental technologies by sector (agriculture, construction, energy, industrial processes, resource management and transport) as well as by function (eco-products and eco-design, energy production, new services and business models, pollution reduction and resource efficiency). While the main purpose of this site is also to disseminate general information about the ETAP process, it is also a very useful resource in support of new environmental technologies and innovations across Europe.

A programme of technical support and training for the diffusion of environmental technologies should be set up in Ireland, with government backing. This could be run through an existing agency (EPA, Enterprise Ireland, SEI etc.) by setting up a new unit, with cooperation and input from the many current organisations supporting environmental technologies at present⁷².

5.4.3 Research

The strategic importance of investment in research and development (R&D) for the Lisbon Strategy and sustainable development was recognised at the 2002 Barcelona European Council, where it was agreed that overall spending on R&D in the EU should increase and approach 3 % of Gross Domestic Product (GDP) by 2010. Investing in research, from both private and public sources, is vital for the EU economy, including eco- industries⁷³.

The ongoing implementation of the European Research Area (ERA) will also create favourable conditions for the emergence of environmental technologies with wide market applications and will enhance the possibility to develop lead markets for innovative “green” products or processes. The Seventh Framework Programme (FP) for Research, Technological Development and Demonstration (2006-2010) will also present opportunities to further environmental technologies. These can take advantage of the results of earlier Framework Programmes and other EU policies and initiatives where significant resources have been invested, such as the European Investment Bank’s “Innovation 2010” initiative and the Biotechnology, eEurope and Innovation action plans. The LIFE Environment Programme is ongoing, providing significant funding for demonstration projects utilising many environmental technologies. The Competitiveness and Innovation framework Programme (CIP) is another major scheme to support the Lisbon Strategy. Running from 2007 to 2013, it has a budget of approximately EUR 3.6 billion.

⁷¹ http://ec.europa.eu/environment/etap/index_en.htm

⁷² See Department of Environment, Heritage and Local Government *Ireland's National Roadmap for the Implementation of the Environmental Technologies Action Plan* DEHLG, 2006

⁷³ *Communication from the Commission to the Council and the European Parliament: Stimulating technologies for sustainable development: an environmental technologies action plan for the European Union* Brussels, 28 January COM (2004) final

Thus there is a high level of commitment at EU level on the need for research in support of environmental technologies. However, individual member states are also required to support research at a regional level.

In Ireland a series of ERTDI programmes, in particular the ETAP specific call in 2005, have provided significant information regarding innovation and environmental technologies in a variety of fields. Several other Irish programmes were highlighted earlier in this study – these are covering programmes from Teagasc for agriculture, SEI on energy, Forfás on industry, the Marine Institute on marine issues etc.

The Strategy for Science, Technology and Innovation 2006 – 2013 is another major step in building upon previous research programmes “both for economic competitiveness, and to yield innovations in areas such as healthcare and environmental technologies which make tangible improvements to our quality of life.”⁷⁴

For example, a significant quantity of research has been done in Ireland into the use of biofuels. In addition to the experimental research conducted by Teagasc at their research station in Oak Park, Co Carlow, the potential of the biofuels industry has also been investigated by Sustainable Energy Ireland (SEI)⁷⁵. The EPA has spent in the region of €2 million on a number of projects in the area of air quality. The EPA’s water quality research program is focused in two main areas: Eutrophication from agriculture and Forestry and water quality. The former topic has four main aspects, sources and pathways of nutrient losses, seasonal variation of Phosphorus losses from soil and field management and nitrate leaching from soils. The Forestry water projects are being funded in partnership with the Council for Forest Research and Development (COFORD). In addition, the ERTDI Programme 2000 – 2006 has funded a suite of projects specifically to address the research requirements for the Water Framework Directive in Ireland. The total funding awarded was of the order of €2.0 million.

Thus it is apparent that a wide range of environmental research programmes are taking place in Ireland. These should all be continued and intensified, with specific programmes on environmental technologies.

As well as ‘pure’ or ‘theoretical’ research, applied and demonstration focused research is also a significant tool. This would include funding programmes in Ireland such as CGPP and in EU programmes such as the LIFE Environment and the Factory of Tomorrow programmes. These are a ‘mixture’ of grant aid, research and information provision with great potential for diffusion and high take up levels.

An expanded and focused research programme on environmental technologies should be set up within the ERTDI programme. This should be long term and well resourced whereby existing technologies can be disseminated and new technologies can be tested and further developed across a spectrum of sectors.

⁷⁴ <http://www.entemp.ie/science/technology/sciencestrategy.htm>

⁷⁵ Hamelinck, Carlo et al. *Liquid Biofuels Strategy Study for Ireland* SEI, 2004. Available at http://www.senternovem.nl/mmfiles/149974_tcm24-124366.pdf

6. Action Plan for implementation

6.1 Introduction

From Sections 2 and 3 it can be seen that there are many different types of policy instrument in place both in Ireland and abroad that can effectively lead to a greater take up of environmental technologies. From Section 4 it can be seen that these instruments are necessary in order to overcome the barriers which have caused underuse of these technologies.

In developing a plan to strategically implement such policies and programmes it is useful to prioritise the most effective instruments that can tackle the main environmental challenges that Ireland is facing. It is also worthwhile to build upon past success and proven programmes that have been or are being already implemented.

One of the main challenges in the development of any such action plan is coordination. As can be seen in Ireland's ETAP roadmap document⁷⁶, there are several agencies active in the implementation of ETAP supporting instruments. These include:

- Environmental Protection Agency
- Enterprise Ireland
- Sustainable Energy Ireland
- Forfás
- Geological Survey of Ireland
- Marine Institute
- Department of the Environment, Heritage & Local Government
- Department of Enterprise, Trade and Employment
- Department of Agriculture and Food
- Department of Education and Science
- Department of Transport
- Department of Communications, Marine and Natural Resources
- Higher Education Authority

While all of these (and other) organisations have an important individual role to play in the support of environmental technologies, there is a need to harmonise and synchronise all these activities.

A range of suitable policy instruments are recommended herein, including current policies and programme which can be intensified and new initiatives which have been successful elsewhere. The instruments recommended are also linked with the 28 ETAP action points outlined in the EU Communication on ETAP of 2004. Several priority actions relating to the practical implementation of ETAP in Ireland are also suggested, outlining structural issues, the agencies that should be involved, the formalisation of the process etc.

The implementation of ETAP should be based upon a solid legislative/policy foundation and achieved through the application of a range of interacting information and economic based instruments at sectoral and process levels. It should be reviewed after 5 years of implementation where new and more appropriate targets and directions can be set. This process, incorporating the application of instruments in support of ETAP Actions, is outlined in Figure 6.1 below.

This figure shows the proposed action plan or roadmap as outlined herein. From the current position, a Framework of Legislative, Information and Economic instruments need to be applied. Regarding Legislation, this includes sectoral agreements, improved licensing and other policy and regulatory measures. These are also listed later in Table 6.2 (Actions 2.1 and 2.2). A range of information and Economic based instruments is also necessary (again these are linked to Actions 2.1 to 2.14 in Table 6.2. These should be applied both on Sectoral levels (S1, S2, S3,...Sn) and Process levels (P1, P2, P3,...Pn). These initiatives are also graphically linked to the ETAP Action Numbers recommended in the EU ETAP Communication (these are also shown in Appendix I). There is also a level of Interaction required between the information and economic based instruments and this will ensure further R&D, demonstration, and supporting programmes. The Framework should be reviewed in 5 years (in 2012), and the process can then be repeated and improved upon in each cycle.

⁷⁶ Department of Environment, Heritage and Local Government. *Ireland's national roadmap for the implementation of the environmental technologies action plan (ETAP)* DEHLG, 2006.

ETAP ROADMAP FOR IRELAND

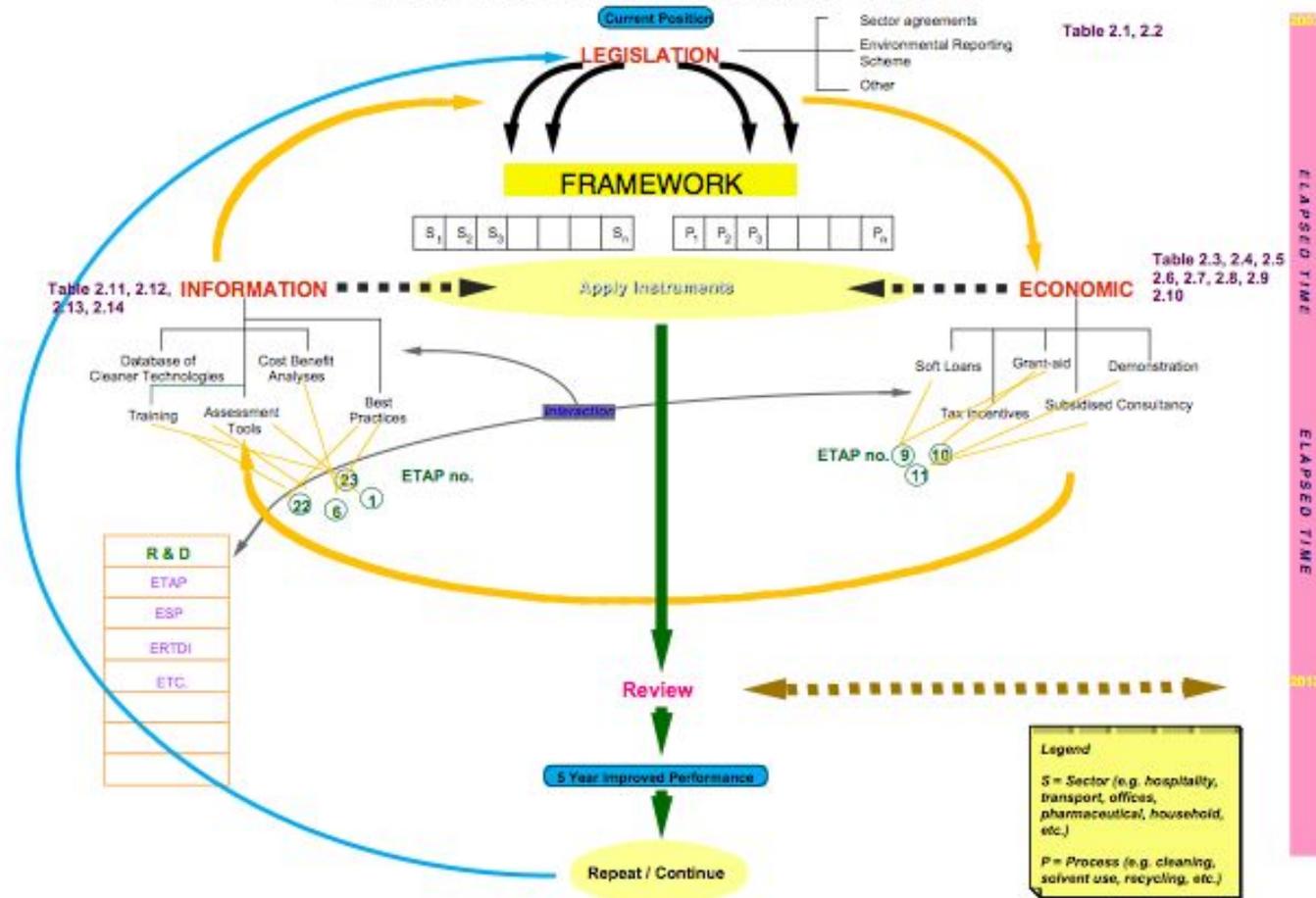


Figure 6.1: ETAP Roadmap for Ireland

6.2 Main policies and programmes in place

Many Irish policies and programmes to support environmental technologies in several sectors were described in Sections 2 and 3 above and in further detail in Appendix II. Many are also listed in the Irish National Roadmap for Implementation of ETAP.

Of these the main policy instruments being applied are shown in Table 6.1 below. In this table they are divided into 3 three main categories: legislation/regulation; economic; and information based. The table also outlines each instrument, the sector it affects, who is implementing it as well as providing some details. It also indicates the relevant numbers of the 28 specific actions recommended as part of the ETAP⁷⁷.

This table shows that useful and long lasting policies and programmes have been implemented and that they have been successful. One of the aims of this study is to learn from these successes and to build upon them.

⁷⁷ These were outlined by the Commission in the *2004 Communication on ETAP* and are given in Appendix I

Table 6.1: Main Irish actions supporting environmental technologies in Ireland

Legislation/Regulation/Policy				
Type of Instrument	Sector	Who?	Details	ETAP Action Numbers
IPPC	Several industrial sectors	DEHLG/EPA	Licensing system that covers industries with highest potential for pollution (approx. 700 companies); based upon BAT and cleaner production.	1, 6, 11, 14, 19, 22, 23
National Waste Prevention Programme	Waste & emissions; all sectors	DEHLG/EPA	Programme to reduce amounts and hazardousness of waste being produced in Ireland – a high environmental priority at present.	1, 5, 6, 11, 14, 19, 20, 22,
Office of Environmental Enforcement	Waste management	DEHLG/EPA	Section set up within the EPA in 2003 to increase enforcement levels of waste legislation, working with local authorities, waste companies, business and central government.	1, 11, 19, 22, 23
AIC Solvents Directive Scheme	Certain non IPPC sectors that use solvents	DEHLG/EPA/local authorities/AIC approved companies	Council Directive 1999/13/EC is being implemented in Ireland via Statutory Instrument No. 543 of 2002 "Emissions of Volatile Organic Compounds from Organic Solvents Regulations 2002", which came into force on 30th November 2002. The Regulations provide the means for regulating the emissions of solvent vapours from 20 specified activities when they exceed the relevant solvent consumption thresholds.	1, 6, 8, 9, 14, 19, 22, 23
Producer responsibility initiatives	Waste streams; sectors that produce them	DEHLG/Local authorities, industry	Producer responsibility initiatives for packaging (with REPAK); WEEE (with WEEE Ireland); Farm films (with Farm Films Producer Group), C&D waste (with National Construction and Demolition Waste Council) and chewing gum (with chewing gum industry).	1, 2, 6, 8, 9, 11, 12, 19, 21, 22, 23
Nitrates Directive	Agriculture	DAF	Will lead to reducing water pollution caused or induced by nitrates from agricultural sources and prevention of further such pollution, with the primary emphasis being on the management of livestock manures and other fertilisers.	6, 7, 14, 19, 22
CAP Reform	Agriculture	DAF	The decoupling of payments from production and the replacement with a single payment could have a positive effect with the reduction of the environmental effects of intensive farming such as water pollution through over usage of fertilizer, over-grazing and reduction in methane emissions through lower animal numbers.	6, 7, 14, 19, 22
Signatory to international conventions	Air, soil, water, biodiversity, climate change etc.	DEHLG	Ireland is a signatory to many international conventions, committing to various actions in the protection of the environment. These include: Persistent Organic Pollutants (POP) Aarhus protocol; UNEP Stockholm Convention; United Nations Framework Convention on Climate Change (UNFCCC); Convention on Biological Diversity Protocol, Cartagena Protocol on Biosafety, etc.	1, 7, 19, 22
Bans on bituminous coal	Air	DEHLG	A ban on the marketing, sale and distribution of bituminous coal in sixteen towns and cities around the country (Dublin from 1990, Cork 1995, Arklow, Drogheda, Dundalk, Limerick and Wexford 1998, Celbridge, Galway, Leixlip, Naas and Waterford 2000, Bray, Kilkenny, Sligo and Tralee 2003).	9, 11, 19, 22

Legislation to protect water	Water	DEHLG	Several pieces of legislation are in place to protect ground water, surface waters, drinking water, estuarine water etc. from a variety of pollutants and pressures.	9, 11, 12, 19, 21, 22
Energy Standards for Buildings	Energy, construction	DCMNR	Implementation of the EU Energy Performance of Buildings Directive (EPBD) in 2007. The implementation will be threefold involving Building Energy Rating (BER) of buildings; Improving the energy efficiency of larger boiler systems; and mandatory inspections of air conditioning systems.	1, 2, 5, 6, 9, 11, 12, 14, 19, 20, 21, 22
Economic				
Type of Instrument	Sector	Who?	Details	ETAP Action Numbers
Plastic bags levy	Waste; retail sector	DEHLG/Local authorities	15 cent levy, increased to 22 cent in August 2006; has led to 90% reduction in plastic bag consumption in retail sector since implementation	1, 9, 17, 19, 22
REPS	Agriculture	DAF	An economic grant scheme which rewards farmers for carrying out their activities in an environmentally friendly manner	1, 2, 6, 7, 9, 10, 11, 12, 17, 19, 21, 22
Farm Waste Management Scheme	Agriculture	DAF	An economic grant scheme to assist farmers meet new requirements under the European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2005 (S.I. No. 788 of 2005). Grant-aid for facilities for the collection and storage of animal excreta, soiled water, other farmyard manures and new equipment for the application of these materials to farmland.	1, 2, 6, 7, 9, 10, 11, 12, 14, 17, 19, 21, 22
Energy related grant aids	Energy in households and industry	SEI	Grant schemes to support CHP, Domestic renewable energy; Bioheat boilers; bioethanol refinery; supports to improve the quality of low income housing;	1, 2, 6, 7, 9, 10, 11, 12, 14, 17, 19, 21, 22
Biofuels excise relief package	Transport, industry, agriculture	DCMNR	Economic instrument providing excise relief on biofuels	1, 9, 10, 11, 12, 14, 17, 19, 21, 22
Emissions Trading Programme	Climate change, industry	EPA	EPA has been assigned responsibility for implementation of Greenhouse Gas Emissions Trading Regulations 2004 (S.I. 437 of 2004). The second National Allocation Plan covers the period 2008-2012 and was delivered to the EU Commission in June 2006.	1, 9, 10, 11, 12, 13, 24
Motor tax initiatives	Transport, air quality, climate change	DT	1998 motor tax reductions for public transport vehicles; 2001 VRT refunds for hybrid engines; 2003 threshold reduction from 2,000cc to 1,900cc.	9, 10, 11, 12, 14, 17, 19, 22
Information				
Type of Instrument	Sector	Who?	Details	ETAP Action Numbers
Waste databases	Waste; all	DEHLG/EPA	Details of waste production and destinations for all Irish solid wastes; detailed	1, 11, 12, 19,

1996 – 2004	sectors		information on types of waste, sources, destinations etc. with recommendations and priorities	22
ERTDI Programmes	All sectors	DEHLG/EPA	Several programmes of research on many different areas of environmental protection with relevance to many new and existing environmental technologies	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 17, 19, 20, 21, 22, 23
LIFE Environment Programme	All sectors	DEHLG	Implementation of LIFE Environment Programme in Ireland by DEHLG	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 17, 19, 20, 21, 22, 23
Race against waste	Waste; domestic sector mainly also business	DEHLG	National awareness and communications campaign launched in 2003 to raise awareness of waste issues and change behaviour among people at home and at work in order to reduce the amount of waste being produced and increase recycling and composting.	1, 2, 9, 11, 12, 19, 22, 23
Teagasc advisory systems and research	Agriculture	DAF/Teagasc	Aid with implementation of environmental grant aid programmes and environmental research to reduce the impact of agriculture on the environment	1, 2, 6, 7, 8, 9, 11, 12, 14, 17, 19, 21, 22, 23
Energy related research	Energy in households and industry	SEI, DES, HEA	Research into energy issues related to buildings and housing, funding of scholarships for 3 rd level research activities	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 17, 19, 20, 21, 22, 23
Energy related awareness raising	Energy in households and industry	SEI	Project dissemination – publication of case studies; General information on energy–national advertisement campaigns; schools information awareness campaigns; presentations to third level students; detailed and informative website	1, 2, 6, 9, 10, 11, 12, 19, 22, 23
Research into biofuels	Agriculture, transport, industry	SEI, EPA, Teagasc	Variety of research programmes on several aspects of biofuel production and use including crop issues, manufacturing and use in transport.	1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 14, 17, 19, 20, 21, 22, 23
CGPP programmes 2000 - 2006	Industry, products	EPA	€3.7 million in grant aid, to encourage companies in Ireland, particularly SMEs, to adopt a high standard of environmental performance by adapting or improving production processes and services in order to minimise negative impact on the environment. Demonstration programmes to develop technical knowledge, experience and promote cleaner production	1, 2, 7, 8, 9, 10, 11, 12, 14, 17, 19, 20, 21, 22, 23
LAPD	Industry, public sector	EPA	Grant aid scheme to develop demonstration projects promoting waste prevention programmes in local authorities including subsidised consultancy and technical support	1, 2, 7, 9, 10, 11, 12, 14,

			to the grantees	19, 20, 21, 22, 23
Environmentally superior products	Industry, products	EI	Grant aid scheme since 1999 designed to support indigenous Irish SMEs in examining ways to reduce the environmental impact of an existing product or that of a new product in development through LCA and eco-design	1, 2, 7, 9, 10, 11, 12, 14, 19, 20, 21, 22, 23,
Information and awareness outlets	All sectors	Various	ENFO (www.enfo.ie), Enterprise Ireland Information Centre (www.envirocentre.ie), ANSWER and EDS databases (www.answer-online.org); local authority environmental websites and environmental awareness officers; NGOs, government agencies etc.	1, 2, 9, 11, 12, 19, 22, 23
Programme for ETAP implementation in Ireland	All sectors	DEHLG, EPA and others	DEHLG commitment for the implementation of the ETAP Programme in Ireland, development of a roadmap etc.	All

6.3 Priority Actions to develop ETAP

Details of the main agencies implementing policies and actions are given in *Ireland's national roadmap for the implementation of the environmental technologies action plan (ETAP)*⁷⁸. Some priority actions are also outlined in that report and are further developed herein.

6.3.1 National Steering Group for ETAP implementation

As mentioned above there are many agencies and organisations working in the development of environmental technologies in their own field. However, this leads to some duplication of resources and some actions that do not have synergies. The level of shared knowledge and expertise in environmental technologies is also not as wide as it could be.

A National Steering Group would co-ordinate the actions of the various individual organisations related to environmental technologies. It would also remove duplication of work and streamline priority actions. Many of the policy instruments that need to be applied can be done on a co-operative basis and a national steering group would aid such co-operation. The Steering Group would also be the Irish liaison with the European Commission ETAP programme. The Steering Group would comprise members of some of the primary stakeholder groups related to ETAP including public and private agencies, as well as relevant experts.

6.3.2 ETAP Secretariat

Consideration should be given to the potential of establishing an Irish ETAP Secretariat which would assist in collaborative efforts among research funders and stakeholders. Such a secretariat would be a national focal point for ETAP in Ireland and any citizens or companies interested in environmental technologies would have one contact point with which they could initially engage. This secretariat should have a well developed and informative website, which would lead interested parties to the relevant funding/development agency they require. It would also gather good practice examples and disseminate already existing or newly developed environmental technologies, providing added value. It should create a searchable database of environmental technologies. It should be a permanent and stand alone unit, with free phone number, office, resources, adequate and full-time staffing, and focused on ETAP issues alone.

It could be based within some suitable current agency such as the EPA or Enterprise Ireland. One example of a successful secretariat is the Core Prevention Team in the EPA, implementing the National Waste Prevention Programme.

Another model would be the one being implemented by The National Platform for Biodiversity Research (NPBR). The NPBR is a forum set up under the auspices of the National Parks and Wildlife Service (NPWS) and the EPA who form the steering committee of the NPBR. In 2003 it was agreed that an Irish National Platform for Biodiversity Research should be established. It was also agreed that EPA and NPWS would contract an individual or organisation to act as Secretariat to the NPBR and assist its start-up activities. The secretariat would act as main contact point for the NPBR and a private company, BEC Consultants Limited were selected and contracted in this role⁷⁹.

6.3.3 Linking organisations with specific action points

ETAP has identified 28 action points under 3 main headings and including 11 priority actions. As part of its work, the national steering group should identify and engage with the organisations and agencies most suitable for carrying out specific relevant ETAP action points. Most of these actions should involve more than one organisation and partnerships and joint developments will naturally occur. By having responsibilities allocated, all organisations should be aware of their obligations regarding ETAP and can work towards meeting them. This would also ensure that all relevant action points would be worked upon in an Irish context and progress could then be measured, benchmarked and reported to the European Commission ETAP programme. For example, Action Point 1, *Increase and Focus Research, Dissemination, Demonstration* could be

⁷⁸ Department of Environment, Heritage and Local Government. *Ireland's national roadmap for the implementation of the environmental technologies action plan (ETAP)* DEHLG, 2006.

⁷⁹ Full details of the tasks of the Secretariat to the NPBR are available at <http://www.biodiversityresearch.ie/>

linked with the EPA in relation to many environmental issues; Teagasc regarding agriculture related research and SEI regarding energy related research. All ETAP related research could be coordinated so that it is focused and meets Irish needs.

6.3.4 Formal co-ordination and partnerships

As well as the informal links between relevant bodies and agencies according to actions points as mentioned in Section 6.3.3 above, more formal partnerships should also be considered between the main stakeholders in the first instance and subsequently with the wider community of interested parties. The aim of such partnerships would be to create more efficient and focused frameworks of action. Rather than each organisation or agency 'doing its own thing' individually, joint programmes and actions could be developed using suitable resources from the stakeholders. For example, the experience with business in the DETE could be combined with the environmental knowledge of the EPA etc. The educational expertise of the Higher Education Authority (HEA) could be combined with the knowledge on energy in SEI. And so on.

6.3.5 A National Roadmap

An Irish ETAP Roadmap should be developed by the Steering Group which would be viewed as a "living document" subject to ongoing review, updating and improvement as appropriate. An initial roadmap could have a five year plan built in, for example. It would encompass the whole programme of action of the national steering group and all the relevant agencies. It would provide a picture of the current situation regarding environmental technologies in Ireland (especially relating to ETAP) and show how Ireland can progress to a higher level of uptake. It should report on the action points and whose responsibility it is to implement them in Ireland. It should lay out suitable targets and how they can be achieved.

6.3.6 Specific Action Points under ETAP

It would be worthwhile to target specific action points under ETAP as being of special interest or relevance to Ireland. Those ETAP Action Points that offer the best potential to bring new innovations to the implementation stage or to address the major environmental challenges in Ireland should be encouraged. By reviewing *Irish National State of the Environment Reports* and other data, for example, specific challenges can be identified at specific times. Specific action points that relate to the implementation of new legislation can also be identified. For example, in the current implementation of the Solvents Directive in Ireland⁸⁰, several ETAP Action Points were tackled, in support of environmental technologies, including the following:

Action 1: Increase and focus research, demonstration and dissemination.

Action 6: Performance Targets

Action 8: Public Private Partnerships

Action 9: Promote new business niches

Action 11: Measures in support of ecoindustries

Action 14: Identification of opportunities to integrate environmental technologies

Action 19: Encourage procurement of environmental technologies

Action 22: Raise business and consumer awareness

Action 23: Provision of targeted training

Tables 6.1 and 6.2 link recommended actions and instruments to the relevant action points under ETAP.

6.3.7 Intensify Activities

The various Irish bodies already involved in ETAP related activities should seek opportunities to intensify their own activities while also seeking co-operation and partnerships with other groups.

⁸⁰ For further information see <http://www.epa.ie/TechnicalGuidanceandAdvice/SolventRegulations/>

Many activities are already underway and are successful. However, these can be expanded and intensified. Some examples would include:

- The ban on bituminous coal could be made nationwide, not just for some areas
- IPPC type licensing could be extended to other sectors and activities
- An Environmental Reporting Scheme could be set up for SMEs
- The REPS scheme could be extended and intensified
- VRT differentials between vehicles could be increased
- Plastic bags type levy could be extended to other selected products such as newspapers, bottles, tyres, hazardous waste packaging etc.
- ERTDI and other research programmes could be increased and expanded
- Producer responsibility schemes extended to tyres, plastic containers, hazardous waste packaging (e.g. paints, cleaning agents etc.)
- Markets Development Group could increase and expand its activities

6.3.8 Monitor current ETAP related research

Successful projects under the Environmental Protection Agency's 2005 call for proposals under ETAP should be closely monitored. It is considered that the success or otherwise of these projects could assist in informing future actions. Environmental technologies being developed under a recent ERTDI call should be monitored for further development. The outputs from this specific study and another study related to research to markets should be considered. So also research projects by Enterprise Ireland, Sustainable Energy Ireland, The Marine Institute, Teagasc and others should be considered as a stimulus for actions and initiatives. Environmental technologies developed due to the CGPP, LIFE Environment and other programmes should also be considered for further dissemination and diffusion.

6.3.9 Identify and remove barriers

Steps could be taken to identify and remove the existing barriers to progress. Some of the barriers identified in this study and other research studies should be examined and suitable potential instruments for their removal can then be identified and considered for implementation. Examples of particular companies and individuals who have developed environmental technologies but are being prevented from entering the market due to specific barriers should receive special attention.

6.3.10 An all island approach

An all island approach to environmental issues has been taken regarding a number of initiatives in recent years. The Race Against Waste campaign, for example, delivered waste awareness information north and south using actors from both regions. A joint approach was taken in an investigation into the feasibility of a paper mill, involving the North South Market Development Group and Waste & Resources Action Programme (WRAP). Joint North/South strategies to promote science, research and other initiatives should receive special consideration. Relevant industrial all Ireland enterprise ventures should also be supported. In November 2006 the company Irish Polymers announced the development of a reprocessing facility for plastic bottles that will take post consumer waste from north and south, comprising 60% of the amount collected on the island. There are several potential joint initiatives that can be taken and should be considered regarding the uptake of environmental technologies on an all island basis.

6.3.11 Specific areas of opportunity for Ireland

It is generally acknowledged that certain regions and countries have developed niche industries and expertise in environmental technologies. For example, France is the leading country for biofuels; Denmark is the EU leader in wind energy; Finland has developed a leading edge in environmental technologies relating to biomass; Austria is the leading country for organic farming.

There is an opportunity for Ireland to develop such a niche or leading edge, and become a market leader. This can have economic and environmental advantages (e.g. Denmark). A detailed feasibility study should be carried out with a view to becoming market leaders in specific sectors

or processes. This could build upon strengths already developed in certain areas (such as IPPC for example). It could relate to specific processes or technologies (e.g. biotechnologies), or take advantage of Ireland's potential or natural resources (e.g. organic farming, eco-tourism etc.).

6.3.12 Sectoral fora for industries, SMEs in particular

There should be considerable funds made available for the organisation of sectoral fora for SMEs. The purpose would be to explain and discuss the ETAP programme, evaluate potential environmental technologies and their potential uptake, and to seek areas of expertise. Potential feedback from SME sectors could be invaluable and sectoral groups such as IBEC, ISME, et al could be used for this kind of stakeholder interaction.

This process could be allied to a gap analysis of existing environmental technologies in key sectoral areas. It could focus on sectors or processes with high business potential or target areas of environmental pressure or upcoming legislation (e.g. agriculture). It should certainly take into consideration Ireland's difficulties regarding meeting Kyoto targets, its considerable dependency on fossil fuels, future trends, and availabilities and costs relating to such energy sources.

An example of one such project on the EU level is the 6th Framework funded ETTAR project⁸¹ which was specifically funded to meet the needs of the ETAP programme and focuses mainly on the transport sector.

6.3.13 Review of ETAP

All elements of the ETAP programme for Ireland would be evaluated annually by the secretariat itself and published in an annual report. A full in depth review should be independently carried out every 5 years by suitable experts and appropriate changes would be made regarding its implementation. The programme would be reviewed on its achievements over that time, and whether or not the targets of the roadmap were met. It would assess the Irish performance, the level of success across the EU generally, and activities in other progressive countries. Ireland could then be benchmarked against the best performing regions. The review would then make recommendations regarding new developments, changes in direction, structural issues, funding, new policy instruments to be considered etc.

6.4 Potential initiatives for the promotion of environmental technologies

As well as intensifying and building upon current initiatives, Ireland needs to consider new policy directions in order to ensure best practice and to increase uptake of environmental technologies. Many examples of policy initiatives in other regions were outlined above. Those most important to tackle environmental priorities and those with most potential for replication in Ireland are outlined in Table 6.2 below.

The table shows the type of instrument, which sector is affected, an example of such an instrument from other regions, which Irish organisation could be responsible for implementation, a brief description and the related recommended ETAP actions. More details of these and other programmes in other regions are available in Deliverable 1.

The 14 recommended new instruments are numbered 2.1 to 2.14 for future reference and these references can also be seen in Figure 6.1 above in a graphical format.

⁸¹ Ecologic , *Identification and assessment of training needs, methods and activities for the wider use of environmental technologies in key sectors (ETTAR)*, Ecologic (D), Schenker AG (D) , Clean Technology Centre, CIT (IRL), University of Cambridge Programme for Industry (UK), Chalmers University (Se), ENVIROS Prague (Cz), 2006

Table 6.2: Priority actions required to support environmental technologies in Ireland

Legislation/Regulation/Policy						
Action Number (see Figure 6.1)	Type of Instrument	Sector	Example	Who?	Details	ETAP Action Numbers
2.1	New sector agreements, producer responsibility initiatives	Various products to be examined	Eco Peinture, Canada; tyre programme in Finland	DEHLG, DETE, IBEC et alia.	Producer responsibility for recovery of tyres, plastic bottles, paint tins, hazardous waste packaging, newspapers etc. – funding to be ring fenced to the environment fund to pay for collection, recycling programmes etc..	1, 5, 6, 7, 8, 9, 11, 12, 14, 17, 19, 20, 21, 22, 23
2.2	New prevention based regulation	Various	Austrian waste permit system for companies with over 100 staff	DEHLG, EPA, local authorities, DETE, et alia.	Better integrated licensing for non IPPC companies including air, water, waste, noise, energy etc. An Environmental Reporting Scheme could support preventive based technologies. Best practice guides, cleaner production etc. could be implemented using AIC type licensing system to reduce pressure on local authorities and EPA.	1, 2, 5, 6, 7, 9, 10, 11, 14, 19, 21
Economic						
Action Number (see Figure 6.1)	Type of Instrument	Sector	Example	Who?	Details	ETAP Action Numbers
2.3	Grant aid and reports, standards etc. related to recycling markets	All	UK WRAP programme	EI, DETE, DEHLG et alia.	Funding for new markets for recyclates and products made from them; setting up of agency/group such as WRAP to implement such a programme. Could be done under aegis of (Recycling) Market Development Group.	1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25
2.4	Economic grants for biofuels; new crops; biomass; anaerobic digestion	Agriculture	French support schemes	DAF, Teagasc, EPA, DCMNR, IFA, et alia.	Grants to aid support biofuels being developed from agriculture, transport and industrial perspectives; also non food crops; also biomass developments and energy from waste (e.g. anaerobic digestion etc.)	1, 2, 5, 6, 7, 9, 10, 11, 12, 14, 17, 19, 20, 21, 22, 23
2.5	Economic	Transport;	Swedish	Dept. Transport,	Price differentials for biofuels; parking exemptions;	1, 2, 5, 6, 7,

	incentives to use biofuels	general public	incentives	DCMNR, et alia.	higher cost of petrol; congestion exemptions; bus lane exemptions;	8, 9, 10, 11, 12, 14, 17, 19, 20, 21, 22, 23
2.6	Domestic water charges	Domestic	Canadian water pricing initiatives	DEHLG, local authorities et alia.	Price differential for water usage; no charge for the lower limit; a small charge for over that limit; a high charge for large scale domestic users	1, 5, 7, 9, 11, 12, 14, 17, 19, 21, 22, 23
2.7	Traffic congestion charges	Transport	UK, Sweden	Dept Transport et alia.	Congestion charges in major urban areas to promote environmental technologies, public transport, park and ride programmes etc.	1, 7, 9, 10, 11, 12, 14, 17, 19, 20, 21, 22, 23
2.8	CO ₂ related bands for VRT	Transport; Domestic	UK	Dept Transport et alia.	VRT related to CO ₂ emissions; bands put in place linked to labels; also for car fleets	1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 14, 17, 19, 22, 23
2.9	Green Public Procurement	Public sector; industry	Austria	DEHLG, local authorities, et alia.	Environmental issues included in all public procurement tenders and taken into account in all purchases	1, 2, 5, 6, 8, 9, 10, 11, 12, 14, 17, 19, 20, 21, 22, 23
2.10	Soft loans	All sectors	Austria, Germany, Spain, Denmark	DF, DEHLG, DETE, et alia.	Soft loans are common in many countries for upgrading or purchasing technology relating to renewable energies, cleaner technologies etc.	1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 17, 19, 20, 21, 22, 23
Information						
Action Number (see Figure 6.1)	Type of Instrument	Sector	Example	Who?	Details	ETAP Action Numbers
2.11	Technical support, advice, training	All industry	Envirowise	EPA/CTC/EI/DEHLG et alia.	Advisory agency, publishing reports, giving grants, hot line, audit tools, pilot projects, database of environmental technologies, subsidised consultancy, assessment tools, cost benefit analyses etc.	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 19, 20, 21, 22, 23, 24, 25
2.12	Research into new crops for biofuels, biomass and other purposes	Agriculture	France	Teagasc, EPA, et alia	Detailed research into how biofuels can be developed from agriculture, transport and industrial perspectives; also crops such as hemp which have many uses; also crops with biomass potential	1, 2, 5, 6, 7, 9, 10, 11, 12, 14, 18, 19, 20, 21, 22, 23

2.13	Water efficiency ratings for domestic appliances	Industry; domestic	Australia	DETE, et alia	Domestic products must have a water rating similar to energy rating for domestic appliances at present	1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 14, 19, 20, 21, 22, 23
2.14	CO ₂ and efficiency ratings for cars	Motor; domestic	UK; Netherlands etc.	Dept Transport, et alia.	Obligatory labels with CO ₂ and efficiency ratings for vehicles, similar to those for domestic appliances, benchmarking vehicles against others	1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 14, 19, 20, 21, 22, 23

6.5 Priority Environmental Actions

The *Environment in Focus 2006 Report*⁸² published in September 2006 highlighted some priority action points for Ireland relating to the environment. These can be summarised as follows⁸³:

Waste Management

While the waste infrastructure for collection and transport has increased, the recycling infrastructure still remains weak with a high demand for exporting. Irish recycling infrastructure for reprocessing/recycling must be developed along with associated markets. Waste per capita is growing and waste volume trends must be reversed. Associated actions:

- Intensify activities of (Recycling) Markets Development Group (MDG)
- Investment in Irish recycling processing infrastructure
- Grant aid to support new markets for recyclables in Ireland
- Development of standards for recyclates and recycled products
- Intensify activities of National Waste Prevention Programme with extra resources and staffing
- Green public procurement regarding materials
- Product responsibility scheme for safe collection and recovery of hazardous waste packaging (paint tins, treatment fluids, cleaning agents etc.)
- Awareness raising programme to the public relating to waste prevention

Transport

The report shows that in the transport sector there has been rapid growth both in vehicle numbers, energy consumption and emissions generation. The number of private cars and goods vehicles has more than doubled in the last 15 years. There are now many more vehicles on Irish roads and the trend has been to buy cars with larger engine sizes. Associated actions:

- Economic supports for biofuels
- Economic levies according to vehicle emissions
- Investment in public and more environmentally friendly transport
- Green public procurement in transport
- Intensification of research into biofuels and transport related issues
- Congestion charges in major urban areas
- Carbon based levies on fuels

Industry

Industrial growth (in the manufacturing sector) has been achieved in the absence of increased waste generation, indeed figures have reduced since 1998 according to national waste statistics, and with minimal increases in energy consumption. Industrial policy is working successfully in tandem with environmental policy and some of those successes could be transferred to other policy areas. Associated actions:

- Expand IPPC, and solvents (AIC) type legislation to other sectors
- Implement an Environmental Reporting Scheme for SMEs
- Intensify CGPP, LAPD, ESP and other industry supporting grant aid and demonstration programmes
- Develop new programmes of economic support (as outlined for example in Table 6.2, actions 2.3 and 2.11)

⁸² Environmental Protection Agency *Environment in Focus 2006 Environmental Indicators for Ireland*. EPA, 2006.

⁸³ From <http://www.epa.ie/NewsCentre/PressReleases/MainBody,10552,en.html>

- Grants for training, consultancy, feasibility studies, environmental technology developments, sectoral fora consultations, etc. in appropriate industrial sectors (see also 3.13 above)

Energy

The report shows that dependency on fossil fuels continues to grow; imported oil and gas now accounts for approximately 73% of Ireland's energy supply. The supply of renewable energy has increased by 122% since 1990 and new targets will require electricity generation from renewables to be doubled over the next five years. Renewable energy sources provide just 4 to 5% of Ireland's electricity generation needs. A continued focus on the efficiency of electricity use is required with greater use of energy generating technologies such as CHP being encouraged within the industrial and commercial sectors. Associated actions:

- Information, training and awareness raising related to energy conservation at work and home
- Greater supports (economic and legislative) for renewable energy sources
- Green public procurement related to energy

Water

River water quality has improved marginally. However, this report shows that the rate of improvement will need to be significantly increased if Ireland is to meet the requirements of the Water Framework Directive and achieve 'good' status for all water bodies by 2015. Implementing the Water Framework Directive is a policy measure that will deliver better water quality. Further improvements in municipal sewage treatment are needed, especially on inland waters across the country, and these need to be provided for now in the preparation of the National Development Plan. Associated actions:

- Intensified implementation of Water Framework Directive
- Implementation of Nitrates Directive
- Investments in municipal sewage treatment on inland waters
- Water conservation programmes and awareness raising
- Consideration of differential water charges for domestic users

Air

Global climate change remains the primary environmental challenge of this century. Greenhouse gas emissions were 23.1% above 1990 levels in 2004 and this figure must be reduced to just 13% above 1990 levels over the 2008 to 2012 period if Ireland is to meet its Kyoto obligations. The post-Kyoto scenario is likely to involve deeper cuts so Ireland needs to prepare now to meet more of these targets domestically and break the current dependence on fossil fuels. The shortfall can be met by buying emission credits from abroad, a measure which Ireland will have to rely on in the short term.

It is now also becoming clear that Ireland will have great difficulty in meeting the 2010 limit for NOx emissions set out in the EU National Emission Ceilings Directive, primarily due to the increase in energy consumption, particularly related to transport. Associated actions:

- As above, greater level of renewable energy sources
- As above, reduction in CO₂ and NO_x emissions from transport
- Develop best practice energy guides, training, auditing, environmental management reviews, cleaner production plans in designated sectors specifically related to reduced energy usage and carbon emissions⁸⁴.

⁸⁴ See CGPP Irish Hotels Institute *Greening Irish Hotels Initiative* final report for recommendations regarding the hospitality sector, available at <http://www.greeningirishhotels.ie/>

Agriculture

There has been much change in the agriculture sector with the advent of decoupling and the introduction of the single farm payment scheme. There is great potential for added value products from agriculture such as organic products, non-food crops, biomass products etc. The requirements of the Nitrates Directive will also change the sector over the coming years. Associated actions:

- Greater investment in organic farming
- Economic grant aid to less energy and pesticide intensive farming (intensification of REPS and other schemes)
- Implementation of the Nitrates Directive
- Economic grants for alternative crops related to biofuels, construction etc.
- Research and demonstration of alternative crops

6.6 Implementation of Specific ETAP Action Points in Ireland

As mentioned in Section 6.3 above, it is considered worthwhile to link specific organisations or groups of organisations to specific ETAP Action points. This would have several advantages for the National Steering Group in implementation of ETAP in Ireland and it would also provide clear responsibilities for the organisations involved.

Some preliminary allocations and recommended initiatives regarding implementation of specific ETAP action points are given in Table 6.3 below. This table lists the actions points in numerical order and gives the main Irish organisations that could be involved, when it should happen and how (what initial instruments could be used). This allocation should, of course be regularly reviewed, and as new actions are recommended, or priorities change, it can be edited. This table does not include EU related initiatives and actions (these are given in Appendix I).

Table 6.3: Implementation of specific ETAP Actions in Ireland

GETTING FROM RESEARCH TO MARKETS				
No.	Action	Who?	When?	How?
1	Increase and focus research, demonstration and dissemination. Improve coordination of relevant programmes. (PA1)	EPA, HEA, SEI, EI et al. ETAP Steering Group and Secretariat as outlined above	2007 -	ERTDI, HEA, EI, SEI et al. To increase % of R&D devoted to ETAP; involvement of SMEs, larger industry and other stakeholders
2	Establishing technology platforms (PA2)	DEHLG, EPA, EI, DETE, Forfás, IBEC et al.	2007 -	Establish networks to facilitate Irish participation in FP6/FP7 in fields relating to ETAP; setting up manufacturing and other sectoral groups to create such platforms
3	Establishing European Networks of technology testing, performance verification and standardisation (PA3)	N/A (This is mainly an EU wide initiative but Irish agencies could also become involved as in Action 2 above)		
4	Develop an EU catalogue of existing directories and databases on environmental technologies	EPA, EI, DEHLG	2007 -	Ireland to develop own database and input to Commission
5	Ensure that new and revised standards are performance-related	DEHLG, NSAI, EPA, DETE et al.	2007 -	Dialogue with CEN, CENELEC, others

IMPROVING MARKET CONDITIONS				
No.	Action	Who?	When?	How?
6	Develop and agree on performance targets for key products, processes and services (PA4)	EPA (ERTDI and Core Prevention Team), EI, IBEC et al.	2007-	Set up performance targets. Studies on: IPPC, non-IPPC, AIC scheme, ESP. Refer also to targets in <i>Delivering Change</i> , NBWMP, NHWMP 2, etc.
7	Mobilising financial instruments to share the risks of investing in environmental technologies (PA5)	DF, banks, lending agencies, IBEC, business groups et al.	2007 -	Increased levels of activity in grant aid, soft loans, economic instruments
8	Public/private partnerships	DF, DEHLG, DETE; banks, lending agencies, IBEC, business groups et al.	2007-	Dialogue with relevant stakeholders, including financial institutions
9	Promote new business niches	Forfás, EPA, EI, DETE, IBEC	2007 -	Examine grant-aid and soft loans. Increase current grant programmes
10	Financial instruments for renewables and energy efficiency technologies	DCMNR, DF, SEI, EPA et al.	2007-	New and more focused grants and subsidies
11	Measures in support of ecoindustries	EI, DETE, Forfás, EPA	2007-	Soft loans, grant-aid, technical support schemes
12	Promote socially and environmentally responsible investment	DF, DETE, DEHLG, IBEC et al.	2007-	Dialogue with financial institutions
13	Dissemination of good practices among financial institutions	DF, DETE, DEHLG, IBEC, et al.	2007-	Dialogue with financial institutions
14	Identification of opportunities to integrate environmental technologies when capital stock is replaced	DEHLG, DF	2007-	Evaluate Green Procurement
15	Review operational criteria of the Structural Funds	N/A (EU level)	2007-	
16	Review state aid guidelines (PA6)	DETE, DF, DEHLG, Forfás	2007 -	Ongoing study, discussions following from Forfás study, 2005 ⁸⁵
17	Encourage systematic internalisation of costs through market-based instruments	DF, DEHLG, DETE, DT et al.	2007 -	Continue to review environmental taxes (e.g. plastic bags levy) with view to extension. Ring fence funds for financing ETAP measures.
18	Review environmentally harmful subsidies (PA7)	DF, DETE, Forfás et alia (see also 2005 study for Forfás)	2007 -	Examine how subsidies can best aid environmental technologies and the environment
19	Encourage procurement of environmental technologies (PA8)	DF, DEHLG, DETE, DT, local authorities, public bodies, IBEC et al.	2007 -	Go beyond legislative requirements as in smoking bans in the workplace. E.g. initiate green public procurement, implement levies (e.g. plastics bag

⁸⁵ A&L Goodbody Consulting and the Clean Technology Centre *Assessment of the Potential to Develop Environmental State Supports for Enterprise A Report to Forfás* May, 2005.

				levy), implement new producer responsibility initiatives etc.
20	Life cycle costing promotion	EPA (ERTDI and Core Prevention team), DEHLG	2007 -	Green procurement. Life cycle costing studies. Cost/benefit analyses of Cleaner Technologies.
21	Investigation of technology procurement	EPA, DETE	2007 -	Research into full life cycle costing, green public procurement, economic instruments etc.
22	Raise business and consumer awareness (PA9)	EPA, DETE, DEHLG, SEI, local authorities et alia	2007 -	Intensify current waste, water, energy national programmes. Local authority programmes. LAPD programme. Eco labels for cars and other products. Green Business awards, such as Green Fáilte, Ecobusiness Ireland Award.
23	Provision of targeted training (PA10)	Core Prevention Team (EPA), EI, SEI et alia.	2007-2012	Subsidised training and consultancy provision to SMEs. Prevention element of 2 nd National Hazardous Waste Management Plan. Green Business Initiative.
ACTING GLOBALLY				
24	Promotion of environmental technologies in Developing Countries	DFA, DEHLG, DETE et al.	2007 -	Investment and capacity building in developing countries. Match fund any initiatives in which Irish companies are developing capacities in non 1 st world countries (through EU, World bank etc.)
25	Promoting responsible investments in and use of environmental technologies in developing countries and countries in economic transition (PA11)	DFA, DEHLG, DETE et al.	2007 -	Investment and capacity building in developing countries. Match fund any initiatives in which Irish companies are developing capacities in non 1 st world countries (through EU, World bank etc.)
MOVING FORWARD				
No.	Action	Who?	When?	How?
26	Regular Review of the Action Plan	ETAP Steering Group	2007 -	Annual report and 5 yearly major review. Ongoing improvements and shifting targets.
27	European Panel on Environmental Technologies	DETE, SEI, MI, DEHLG, EPA	Commencing 2007	Overview and surveillance report annually.
28	Open Method of Co-ordination	DEHLG, ETAP Secretariat	2007 -	Ongoing communication with Commission ETAP programme etc.