

Environmental RTDI Programme 2000-2006

**Investigation into why Existing Environmental
Technologies are underused
(2005-ET-DS-19-M3)**

Synthesis Report

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Prepared for the Environmental Protection Agency
by
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Since this document was authored, a review of the National Climate Change Strategy (2000) has taken place, and a revised NCCS was published in April 2007, entitled *Ireland - National Climate Change Strategy, 2007-2012*. The ERTDI programme referred to throughout the text has been replaced by the Science, Technology, Research and Innovation for the Environment (STRIVE) programme 2007-2013. The STRIVE programme is funded by the Irish Government under the National Development Plan 2007-2013.

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ENVIRONMENTAL TECHNOLOGIES

The Environmental Technologies Section of the Environmental RTDI Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in this area. The reports in this series are intended as contributions to the necessary debate on environmental technologies and the environment.

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Executive Summary

Environmental technologies provide great potential for Ireland and the European Union (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 with 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 the Main Report to this study. 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 in Ireland.

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, intensified, and adapted to future trends and needs.

This study 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 to 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 in order 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 Integrated Pollution Prevention and Control (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 Environmental Protection Agency's (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.

1. Introduction

1.1 Project Summary

This is the Synthesis Report of the ERTDI Desk Study: *Investigation into Why Existing Environmental Technologies are Underused* and it summarises the results of the research carried out in that study. A Full Report and Appendices are 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, the CTC:

- assessed the current situation in Ireland regarding environmental

technologies, their status and implementation;

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

1.2 Background and Context of the ETAP

The European Union, at the Göteborg European Council and subsequently, has made a commitment to sustainable development (CEC, 2001). As part of this commitment, it has developed policies and programmes, such as the EU's Sixth Environmental Action Plan, in recognition of the need for synergies between environmental protection and economic growth. 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

degradation (CEC, 2003). 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 (CEC, 2004a). Some activities to support the ETAP include:

- a High Level Working Group (HLWG) established in 2004;
- a form of the 'Open Method of Co-ordination' for Member States;
- a European Forum on Eco-Innovation, and
- EU Member States invited to formalise their national transposition of strategies and action plans.

1.3 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 which generate low or no waste, for the prevention of pollution' (UNCED, 1992). 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 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' (UNCED, 1992).

1.4 Quantifying Environmental Technologies in the EU

While data on eco-industries for most sectors in Europe remain incomplete, a 2006 Ernst and Young study (Ernst and Young, 2006) quantified this sector economically. The estimated total turnover of eco-industries in the EU-25 is €227 billion, of which €214 billion corresponds to the EU-15 area. In constant prices, the turnover of the eco-industries 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 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 following three countries also have significant spends: €21.2 billion (UK), €19.2 billion (Italy) and €14 billion (Netherlands) and together represent another 24% of the EU-25 total expenditures. 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 spending on environmental technologies. In absolute economic terms, this figure of €1.2 billion appears relatively low and comparatively it is also about 12% of that for Austria and 13% of that for Denmark.

Denmark and Austria are the European leaders regarding turnover of eco-industries per capita with over €1,600 per capita in Denmark and over €1,200 per capita in Austria. Ireland's turnover per capita is just less than €300.

The turnover of eco-industries as a percentage of Gross Domestic Product (GDP) has an EU

average of 2.3% and is highest in Denmark and Austria. One reason for the low percentage per GDP 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 to do a lot of catching up, progress is being made.

2. Initiatives in the EU and other Countries

2.1 Introduction

Many initiatives have been put in place by the EU and in individual countries (both inside and outside the EU) in support of environmental technologies. Several of these are analysed in the Main Report to this study and in its Appendices. These good example case studies, describing specific current technologies (including examples of future potential technologies), give details of hard technologies (with information also on processes, good practices and materials) and outline initiatives and programmes designed to ensure that technologies are applied and that their uptake can be maximised.

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 the analysis. This was done according to the use or environmental area at which these technologies are aimed. Thus, the research team divided the technologies and their related information into 10 subject areas as follows: Waste; Agriculture; Energy; Transport; Climate Change; Air; Water; Products; Industry, and Chemicals.

When examining the broad scope of environmental technologies, and with a view to

recommending policies, programmes and actions to prevent underuse, 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 and has grouped programmes and schemes accordingly.

2.2 EU Initiatives

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 IPPC licensing in Ireland has led to the use of Best Available Techniques (BAT) in several industrial sectors.

The EU provides a high level of economic support for improved environmental behaviour and an increased uptake in 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. Over €1.4 billion have been allocated between 1992 and 2004 and 2,478 projects have received 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. 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 itself and the large volume of information available on this subject is a good example. The EU is active in directly raising environmental awareness through a wide variety of means.

2.3 Other Countries

There are several initiatives in place in other countries in each of the subject areas reviewed. Successful initiatives have been given priority in the study and in particular, those which could be replicated in Ireland. These initiatives are investigated and described in detail in the Main Report and Appendices. One such initiative from each subject area is as follows:

Waste: The UK WRAP scheme is well funded and structured company to support waste prevention and recycling. A large number of new recycling standards and technologies have been supported and co-funded.

Agriculture: Austria has provided 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: In Finland, 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. Finland applies technology funding, availability of grants for new technologies, tax allowances for the production of renewable energies, energy wood harvesting, and wide information dissemination.

Transport: In Sweden, 10% of all new cars are run on biofuels. There are numerous incentives promoting the uptake of these vehicles: E85 (85% ethanol, 15% petrol) is 40 SEK cent cheaper than petrol; biofuel cars are exempt from congestion charges in the major cities; they also receive free parking.

Climate change: In Germany, greenhouse gas (GHG) emissions were brought down by as much as 18.5% by the year 2003 as against 1990 levels. Emissions were brought down by 15 million tonnes between 1999 and 2003 (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.

Air: In Germany, the mineral oil tax rate for sulphur-free fuels which contain a maximum 10 milligrams of sulphur per kilogram of fuel is 1.5 cent cheaper per kilogram.

Water: In Canada, water pricing initiatives in selected areas are such that 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.

Products: Swedish industry has initiated and established an official Type III environmental declaration programme called the Environmental Product Declaration (EPD)

system. It is 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.

Industry: In Austria, free advice and consultancy is given to companies from the City of Vienna Advisory Service.

Chemicals: The Danish List of Undesirable Substances contains the names of all substances which 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 in Denmark.

3. Initiatives in Ireland

3.1 Introduction

In Ireland, support and policy instruments as well as regulatory pressures have been put in place in all the subject areas considered. Substantial efforts in staff and resources have been invested in several areas, to support the uptake of environmental technologies by government departments, State agencies and private organisations. These include: Environmental Protection Agency (EPA); Enterprise Ireland (EI); Sustainable Energy Ireland (SEI); Forfás; Geological Survey of Ireland (GSI); Marine Institute (MI); Department of the Environment, Heritage & Local Government (DEHLG); Department of Enterprise, Trade and Employment (DETE); Department of Agriculture and Food (DAF); Department of Education and Science (DES); Department of Transport (DT); Department of Communications, Marine and Natural Resources (DCMNR); Higher Education Authority (HEA). Many of the instruments and incentives implemented by these agencies are listed in the *Irish National Roadmap for the implementation of ETAP* (DEHLG, 2006).

Despite all these many instruments and initiatives, however, there is still an underuse of environmental technologies in Ireland – this was outlined in Section 1.4 above. While the environment is in good condition overall in

Ireland, recent affluence is leading to greater levels of consumption which can cause further environmental pressures. Progress is especially required in the areas of transport, energy, climate change and agriculture.

3.2 Initiatives in Ireland

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. Many legislative instruments have been applied at a variety of levels and the setting up of the Office of Environmental Enforcement (OEE) in the EPA has aided enforcement of the regulations. Many economic instruments are in place regarding waste such as the plastic bags and landfill levies and have had some impact. Awareness raising programmes such as *The Race Against Waste*, ENFO (www.enfo.ie) local authority programmes, etc. have been implemented.

In agriculture the implementation of the Nitrates Directive may have some effect but its implementation has been delayed somewhat. Other initiatives such as the Water Pollution

Act, and the IPPC Licensing of Intensive Pig and Poultry Farms have led to an uptake of environmental technologies. 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 Irish Farmers' Association (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 the Common Agricultural Policy (CAP).

In the field of energy, there has been an increase in support systems and initiatives. For example, from SEI alone, systems have been set up to aid research, public sector support, specific technology supports, domestic renewable energy grants, and awareness raising programmes. 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.

Fiscal and information instruments are the main instruments in place to mitigate greenhouse gas emissions from transport, and promote environmental technologies. One major economic incentive for biofuels is the excise relief scheme. 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, a pilot scheme for mineral oil tax relief for biofuels was designed either to produce biofuel or test the technical viability of biofuel for use as motor fuel. A significant quantity of research has been done in Ireland into the use of biofuels. In addition to the experimental research conducted by Teagasc, the EPA is also funding research through ERTDI and the potential of the biofuels industry has also been extensively investigated by SEI.

The National Climate Change Strategy (NCCS) of 2000 set out the main strategies which were to be used in tackling Ireland's GHG emissions. It recognised that serious action was necessary in all sectors. Reductions of emissions were to have been achieved through an integrated approach, using the full range of instruments and policy options including taxation on GHG emissions, phasing out coal use at Moneypoint, taxation changes to favour fuel efficient cars, investment in public transport, improved energy efficiency in buildings, emissions trading, tax benefits for emissions compliance and supports through SEI promoting energy efficiency and renewables.

Some of the commitments in this original strategy have not yet 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.

Many initiatives have been put in place 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.

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.

Regarding products, the Environmentally Superior Products (ESP) programme, being implemented by Enterprise Ireland since 1999, was designed to support indigenous Irish Small and Medium-sized Enterprises (SMEs) in examining ways to reduce the environmental impact of an existing product or

that of a new product in development. The second phase of the Cleaner Greener Production Programme (CGPP), which started in May 2004, supported an innovative green computer ecodesign project.

Irish industry is a major consumer of products and resources and in its many sectors utilises a wide variety of technologies. Many incentives, from a policy, economic and information or awareness perspective have been and are being implemented at national and international levels. IPPC-licensing is a stringent and innovative system supporting Best Available Techniques (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. Several support structures are in place for Irish industry through the EPA (CGPP), Enterprise Ireland, 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 Dún Laoghaire-Rathdown) have been in place for some time to good effect. The Local Authority Prevention Demonstration Programme (LAPD) of the EPA is also providing economic aid to local authorities to prevent waste and emissions in their regions. 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.

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 regarding the Classification, Packaging and Labelling (CPL) of dangerous substances and this system is well controlled by the Health and Safety Authority (HSA).

Some chemicals, such as lead in paints, are being phased out. 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.

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 barriers and the drivers to overcome them need to be understood at both micro and macro levels to stimulate social change (Reason, 2005). 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, for example, the current dependency on carbon-based fuels 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 obstacles (Meadows, Randall and Meadows, 2004). Thus the nature of the most immediate problem is one of *diffusion* of the clean technologies which already exist and the development of appropriate policy supports and instruments in that regard (Carrillo-Hermosilla, 2006).

4.2 Barriers in Industry

With respect to industry, for example, a major barrier is the lack of senior management commitment (Gibson, 2000). If that commitment is present, the other barriers (organisational, economic, technological, etc.) all fall away. 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 them (Moors *et al.*, 2005). Stakeholders in society have divergent agendas and there is still a lack of knowledge about the environment, in particular relating to best practice (Dijkema, G.P.J. *et al.*, 2006).

4.3 Externalities not considered

Another important issue to consider when examining the economic systems which 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 production (Owen, 2006).

4.4 Psychological and Attitudinal Factors

Nowhere do such psychological and cultural factors have such an impact as in the choice of transport (particularly, it would seem in Ireland, given recent trends). The car has taken on a much broader meaning than simply a form of transportation (Hall and Kerr, 2003). Larger, more powerful cars (and so called Sports Utility Vehicles (SUVs)) appear to be a choice which 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 fuels (Tseng *et al.*, 2005). 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. A low level of environmental awareness and concern is a barrier to the uptake of environmentally friendly products and technologies (Faiers and Neame, 2006). This is discussed further in an Irish context below.

4.5 Legislative/Regulatory Barriers

There is still resistance to improved and more stringent legislation in Ireland from various stakeholders and interest groups. This barrier needs to be tackled. 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 disadvantage (Network of Heads of European Environment Protection Agencies, 2005). Michael Porter has noted (Porter and Van der Linde, 1995), 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 innovate (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) has led improvements regarding waste regulation since 2003. 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.

4.6 Economic/Market Barriers

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 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.

In 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 Main 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.

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 reductions in single use packaging and waste disposal as well as ensuring better resource efficiency.

4.7 Social/Information/Awareness

Barriers

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 Agency (Faughnan and McCabe, 1998) 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 study (Davies *et al.*, 2006) 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 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.'

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.

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.

A common barrier to Green Public Procurement (GPP) is the widespread

perception that it is in breach of procurement legislation to give preference to products or services 'just' because they are environmentally better. Some procurement professionals also mistakenly believe that it is necessary to select tender offers on economic grounds only. It is also difficult for those

involved in public procurement to draw up tender specifications with an environmental element since they do not have the knowledge to environmentally assess technologies or services.

5. Policies and Programmes in Support of Environmental Technologies

5.1 Introduction

Many environmental technologies are being utilised in Ireland and other regions, as previously stated. 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 progress to make on implementation, in comparison to some other countries.

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.

5.2 Regulation/Legislation-based Programmes

There have been significant developments in recent years in Ireland's environmental legislative framework. Fifteen separate legislative/regulation policy instruments were identified for the waste sector alone in Ireland

in the Main Report. 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 Techniques (BATs) 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

Ireland has implemented a number of successful restrictions and bans. Lead has been banned from fuels since 2000. Bituminous coal has been banned in several urban areas – 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.

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.

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 with municipalities.

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 resulting in Ireland going beyond agreed targets. A similar scheme is now in place for WEEE and it has achieved some early success. In Finland, almost 100% of used vehicle tyres are now recycled because of one such scheme.

Such agreements can work, especially when implemented properly and when backed up by legislation which can bring penalties and sanctions to bear in the event of non-implementation or not meeting agreed targets. Government should enter discussions with suitable industrial and commercial sectors in order to implement new 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 Techniques, clean technologies and less hazardous products.

At present in Ireland, air and water emission legislation for industry not covered by IPPC sets limit values but this can reduce innovation by removing the incentives for companies to

go beyond the targets. Nor are these regulations integrated, but rather deal with single media. Such regulation hinders take up in environmental technologies, especially cleaner technologies, as is explicitly stated in Annex II to the 2004 Communication on ETAP (CEC, 2004a).

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.

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, and is necessary to meet Landfill Directive targets.

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 the EU Communication on the ETAP (Action 5: Ensure that new and revised standards are performance-related) (CEC, 2004a). Secondly, standards can be voluntary, for example, to stimulate confidence and security for investors. They can also 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.

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. In August 2006, Ireland also announced that it will begin implementing the EU Energy Performance of Buildings Directive (EPBD) in 2007. 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. Standards are also an important feature of water usage and quality. 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.

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. 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 Germany the

'Bright NRW' energy efficiency programme involved free giveaway of CFLs to households. Transport is another area where such grant aid can be effective. In Sweden, E85 (85% ethanol, 15% petrol) is 40 SEK cent cheaper than petrol.

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.

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 relatively simple for the recipient, without too much red tape or bureaucracy. One Clean Technology Centre study showed that in the past, there have been some problems regarding uptake of environmental grant aid programmes (Cunningham *et al.*, 2003). It appears that such aid would have more appeal if it was 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.

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

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 often paid by society in general and not the producers who created them, or the consumers who use them.

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 services (Danish Environmental Protection Agency, 1999). 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 waste charges.

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.

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 Ireland (Virage *et al.*, 2006). 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, indeed, 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.

The benefits of GPP are significant. Public agencies have a very large purchasing power. This has been estimated to account for up to 16% of GDP (CEC, 2005) (€25.8 billion in the case of Ireland), which could obviously include many products utilising environmental technologies. Government agencies and public bodies have great potential for providing exemplary behaviour, which can have major knock on effects.

Some guidance has already been made available from the European Commission in the form of a guide book regarding public procurement (CEC, 2004). However, there are still real and perceived difficulties in implementing greener policies without breaching purchasing legislation and free market requirements.

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. Once 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, Ireland still has catching up to do on some of its EU neighbours.

5.4.1 Awareness Raising

When it comes to environmental issues, there is a need for awareness raising at several

levels in Ireland. 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*), and more recently water (taptips.ie) and energy-related campaigns (powerofone.ie) 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 alone (World Tourism Organization, 2002).

A worthwhile approach in Ireland might be the use of energy and other ratings which 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 EU 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 in the EU (UK, Denmark, France, Spain, The Netherlands, Austria and Belgium). These are coloured scales which rank cars according to their CO₂ emissions in an easily understood way, providing simple benchmarking potential.

However, as the ETAP showcase on environmental technologies states (CEC, 2006), such labels are of no value if consumers are not willing to choose the greener options. In one UK Study (RAC, 2006), 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. Such economic instruments, backed up with a good information campaign (including labelling) could boost environmental technologies in transport in Ireland.

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.

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 study (JRC, 2004) on the 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 estimates that it has saved British industry £1 billion since 1994 (Envirowise, 2007). The UK WRAP programme has been providing similar technical support regarding new outlets and markets for recyclables.

In Ireland the Cleaner Greener Production Programme (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 Local Authority Prevention Demonstration (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 programme (Clean Technology Centre, 2006).

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.

The ETAP website (CEC, 2007), 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).

A programme of technical support and training for the diffusion of environmental technologies should be set up in Ireland, with government backing.

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- industries (CEC, 2004a).

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.

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, has provided significant information regarding innovation and environmental technologies in

a variety of fields. Several other Irish programmes were highlighted in the Main Report and Appendices to this study. These covered 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' (DETE, 2006).

An expanded and focused research programme on environmental technologies should be set up within the ERTDI programme and also, by other appropriate agencies. 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.

6. Action Plan for Implementation

6.1 Introduction

In developing a plan to strategically implement such policies and programmes, it is useful to prioritise the most effective instruments which can tackle the main environmental challenges that Ireland is facing. It is also worthwhile to build upon past successes and proven programmes which have been or are being already implemented. One of the main challenges in the development of any such action plan is coordination. As mentioned previously, there are several agencies active in the implementation of ETAP-supporting instruments. While all of these (and other) organisations have important individual roles 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 is recommended here and in more details in the Main Report, including current policies and programme which can be intensified and new initiatives which have been successful elsewhere. Several priority actions relating to the practical implementation of the ETAP in Ireland are also suggested, outlining structural issues, the agencies which should be involved, the formalisation of the process, *etc.*

The implementation of the 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 6.1 (Actions 2.1 and 2.2).

A range of information and economic-based instruments are also necessary (again these are linked to Actions 2.1 to 2.14 in Table 6.1). These should be applied both on Sectoral levels ($S_1, S_2, S_3 \dots S_n$) and Process levels ($P_1, P_2, P_3 \dots P_n$). These initiatives are also graphically linked to the ETAP Actions Numbers recommended in the EU ETAP Communication (These are listed in Appendix I of the Main Report). There is also a level of Interaction required between the information and economic-based instruments and this will

ETAP ROADMAP FOR IRELAND

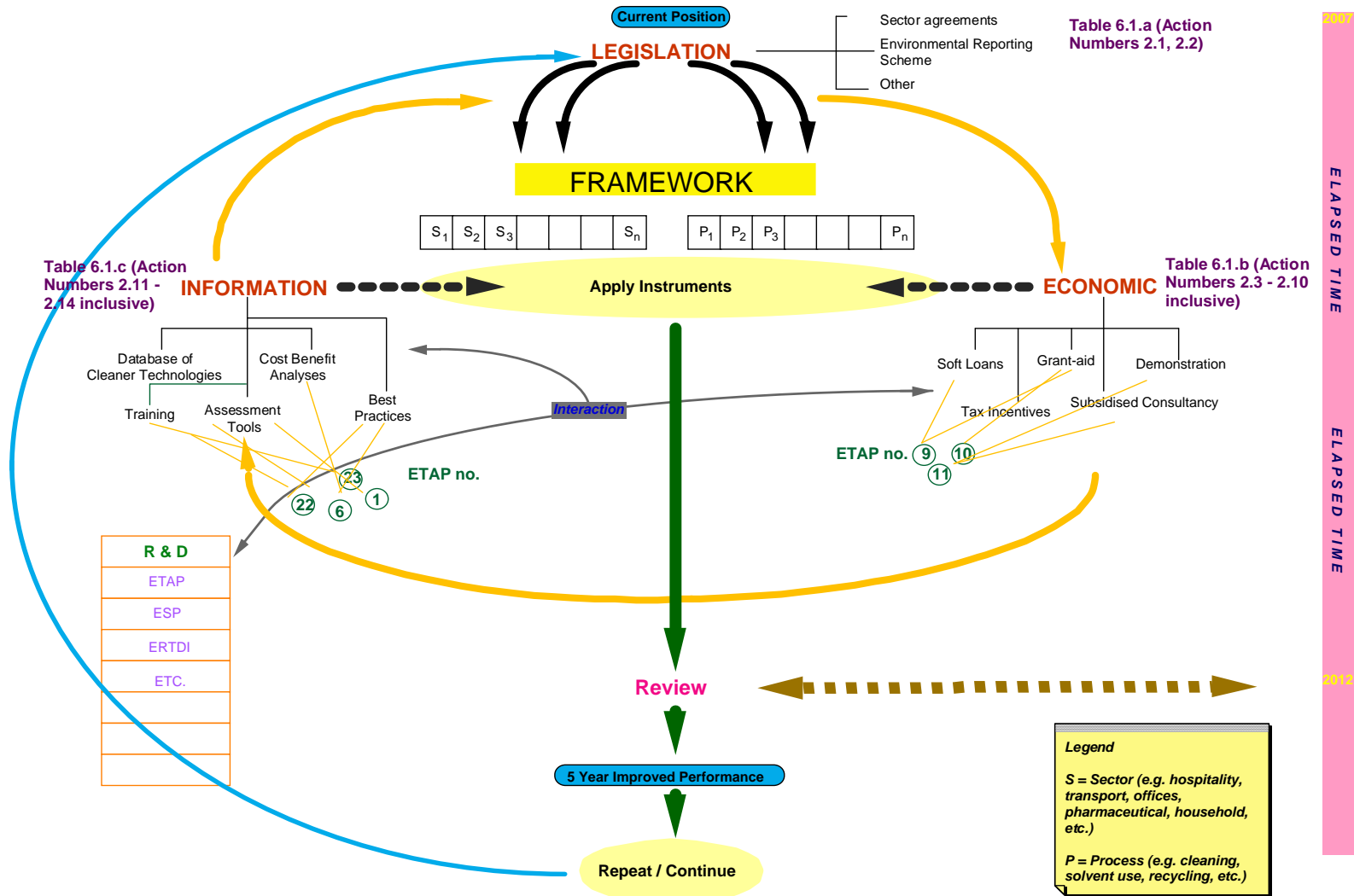


Figure 6.1 : The ETAP Roadmap for Ireland

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.

6.2 Priority Actions to Develop the Irish ETAP

Many Irish policies and programmes to support environmental technologies in several sectors were described above and in further detail in the Main Report and Appendices. Many are also listed in the Irish National Roadmap for Implementation of the ETAP, and these actions should be continued and intensified. However, it is also necessary to prioritise new actions and implement organisational structures in order to build upon past successes and achieve the levels of environmental technology implementation apparent in other regions.

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)* (DEHLG, 2006). Some priority actions are also outlined in that report and are further developed as follows.

6.2.1 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 which 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 which 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 the ETAP including public and private agencies, as well as relevant experts.

6.2.2 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 the 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 could 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 role (BEC Consultants, 2006).

6.2.3 Linking Organisations with Specific Action Points

The ETAP has identified 28 action points under 3 main headings and includes 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 the 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, ETAP Action Point 1, *Increase and Focus Research, Dissemination, Demonstration* could be 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.

6.2.4 Formal Co-ordination and Partnerships

As well as the informal links between relevant bodies and agencies according to actions points as mentioned in Section 6.2.3 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.

6.2.5 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 the 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.

6.2.6 Specific Action Points under the ETAP

It would be worthwhile to target specific action points under the ETAP as being of special interest or relevance to Ireland. Those ETAP

action points which offer the best potential to bring new innovations to the implementation stage or to address the major environmental challenges in Ireland should be encouraged. The details of these are given in Appendix I to the Main Report. By reviewing *Irish National State of the Environment Reports* and other data, particular challenges can be identified at different times. Specific action points which relate to the implementation of new legislation can also be identified. For example, in the current implementation of the Solvents Directive in Ireland, ETAP Action Points 1, 6, 8, 9, 11, 14, 19, 22, 23 were tackled.

6.2.7 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. 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 implemented in SMEs;
- The REPS scheme could be extended and intensified;
- VRT differentials between vehicles could be increased;
- Plastic bags type levy system 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.), and
- Markets Development Group could increase and intensify its actions.

6.2.8 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.

6.2.9 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.

6.2.10 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 and 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 which will take post consumer waste from north and south, comprising 60% of the amount collected

on the island. There are several potential joint initiatives which can be taken and should be considered regarding the uptake of environmental technologies on an all island basis.

6.2.11 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, and 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 (for example, the wind energy industry in Denmark supports 20,000 jobs and Denmark exports 90% of this environmental technology, providing a considerable economic boost to the State, with wind energy also providing 20% of electricity consumption in 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.*).

6.2.12 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, 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, the considerable dependency on fossil fuels and future trends, availabilities and costs relating to such energy sources.

An example of one such project on the EU level is the 6th Framework funded ETTAR project (Ecologic, 2006) which was specifically funded to meet the needs of the ETAP and focuses mainly on the transport sector.

6.2.13 Review of the Irish ETAP

All elements of the ETAP 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.*

6.3 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 in the Main Report and Appendices.

Those required to tackle environmental priorities and those with most potential for replication in Ireland are outlined in Table 6.1 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.

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

Table 6.1a: Priority Legislation/Regulation Policy Actions required to support environmental technologies in Ireland

Legislation/Regulation/Policy						
Action Number (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	Éco-peinture, Canada; tyre programme in Finland	DEHLG, DETE, IBEC <i>et al.</i>	Producer responsibility for recovery of tyres, plastic bottles, paint tins, hazardous waste packaging, newspapers, <i>etc.</i> – funding to be ring fenced to the environment fund to pay for collection, recycling programmes, <i>etc.</i>	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 <i>et al.</i>	Better integrated licensing for non-IPPC companies including air, water, waste, noise, energy, <i>etc.</i> An Environmental Reporting Scheme could support preventive-based technologies. Best practice guides, cleaner production, <i>etc.</i> 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

Table 6.1b: Priority Economic Policy Actions required to support environmental technologies in Ireland

Economic						
Action Number (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 <i>et al.</i>	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 <i>et al.</i>	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 incentives to use biofuels	Transport; general public	Swedish incentives	Dept. Transport, DCMNR <i>et al.</i>	Price differentials for biofuels; parking exemptions; higher cost of petrol; congestion exemptions; bus lane exemptions;	1, 2, 5, 6, 7, 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 <i>et al.</i>	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 <i>et al.</i>	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 <i>et al.</i>	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 <i>et al.</i>	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 <i>et al.</i>	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

Table 6.1c: Priority Information Policy Actions required to support environmental technologies in Ireland

Information						
Action Number (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 <i>et al.</i>	Advisory agency, publishing reports, giving grants, hot line, audit tools, pilot projects, database of environmental technologies, subsidised consultancy, assessment tools, cost benefit analyses, <i>etc.</i>	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 <i>et al.</i>	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 <i>et al.</i>	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, <i>etc.</i>	Dept Transport <i>et al.</i>	Obligatory labels with CO ₂ and efficiency ratings for vehicles, similar to those for domestic appliances, easily benchmarking vehicles against other vehicles.	1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 14, 19, 20, 21, 22, 23

6.4 Priority Environmental Actions

The *Environment in Focus 2006 Report* (EPA, 2006) published in September 2006 highlighted some priority action points for Ireland relating to the environment. These can be summarised as follows:

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.), and
- 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 biofuels¹;
- 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, and
- 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.

¹ Care should be taken to evaluate all life cycle effects for particular biofuels.

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 programmes;
- Develop new programmes of economic support (as outlined for example in Table 6.1, actions 2.3 and 2.11), and
- Providing grants for training, consultancy, feasibility studies, environmental technology developments, sectoral fora consultations, etc. in appropriate industrial sectors.

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, and
- 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, and
- Consideration of differential water charges for domestic users.

Air

Global climate change remains the primary environmental challenge of this century. GHG 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 NO_x 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, and
- Develop best practice energy guides, training, auditing, environmental management reviews, cleaner production plans in designated sectors specifically related to reduced energy usage and carbon emissions.

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., and
- Research and demonstration of alternative crops.

6.5 Implementation of Specific ETAP Action Points in Ireland

As mentioned in Section 6.2, 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 the 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 6.2. This table lists the actions points in numerical order and gives some of 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 to the Main Report).

Table 6.2: Implementation of specific ETAP Actions in Ireland

Getting From Research To Markets Priority Actions (PAs) indicated in bold				
No.	Action	Who?	When?	How?
1	Increase and focus research, demonstration and dissemination. Improve coordination of relevant programmes. (PA1)	EPA, HEA, SEI, EI <i>et al.</i> ETAP Steering Group and Secretariat as outlined above	2007 -	ERTDI, HEA, EI, SEI <i>et al.</i> To increase % of R&D devoted to the ETAP; involvement of SMEs, larger industry and other stakeholders
2	Establishing technology platforms (PA2)	DEHLG, EPA, EI, DETE, Forfás, IBEC <i>et al.</i>	2007 -	Establish networks to facilitate Irish participation in FP6/FP7 in fields relating to the 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 <i>et al.</i>	2007 -	Dialogue with CEN, CENELEC, others

Improving Market Conditions Priority Actions (PAs) indicated in bold				
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 <i>et al.</i>	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, <i>etc.</i>
7	Mobilising financial instruments to share the risks of investing in environmental technologies (PA5)	DF, banks, lending agencies, IBEC, business groups <i>et al.</i>	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 <i>et al.</i>	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

Improving Market Conditions Priority Actions (PAs) indicated in bold				
10	Financial instruments for renewables and energy efficiency technologies	DCMNR, DF, SEI, EPA <i>et al.</i>	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 <i>et al.</i>	2007-	Dialogue with financial institutions
13	Dissemination of good practices among financial institutions	DF, DETE, DEHLG, IBEC <i>et al.</i>	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 (A & L Goodbody <i>et al.</i> , 2005)
17	Encourage systematic internalisation of costs through market-based instruments	DF, DEHLG, DETE, DT <i>et al.</i>	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 <i>et al.</i> (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 <i>et al.</i>	2007 -	Go beyond legislative requirements as in smoking bans in the workplace, e.g. initiate green public procurement, implement levies (e.g. plastics bag levy), implement new producer responsibility initiatives, <i>etc.</i>
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, <i>etc.</i>
22	Raise business and consumer awareness (PA9)	EPA, DETE, DEHLG, SEI, Local Authorities <i>et al.</i>	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 <i>et al.</i>	2007-2012	Subsidised training and consultancy provision to SMEs. Prevention element of Second National Hazardous Waste Management Plan. Green Business Initiative.

<p style="text-align: center;">Acting Globally Priority Action (PA) indicated in bold</p>				
No.	Action	Who?	When?	How?
24	Promotion of environmental technologies in Developing Countries	DFA, DEHLG, DE TE <i>et al.</i>	2007 -	Investment and capacity building in developing countries. Match fund any initiatives in which Irish companies are developing capacities in non-First World countries (through EU, World Bank, <i>etc.</i>)
25	Promoting responsible investments in and use of environmental technologies in developing countries and countries in economic transition (PA11)	DFA, DEHLG, DE TE <i>et al.</i>	2007 -	Investment and capacity building in developing countries. Match fund any initiatives in which Irish companies are developing capacities in non-first world countries (through EU, World Bank, <i>etc.</i>)

<p style="text-align: center;">Moving Forward</p>				
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	DE TE, 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, <i>etc.</i>

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Acronyms and Notation

[Referring to Ireland, unless otherwise stated]

AIC	Accredited Inspection Contractor
BAT	Best Available Techniques
CAP	Common Agricultural Policy (European Union)
CEC	Commission of the European Communities (European Union)
CGPP	Cleaner Greener Production Programme
CPL	Classification, Packaging and Labelling
CTC	Clean Technology Centre
DAF	Department of Agriculture and Food
DCMNR	Department of Communications, Marine and Natural Resources
DEHLG	Department of the Environment, Heritage & Local Government
DES	Department of Education and Science
DETE	Department of Enterprise, Trade and Employment
DT	Department of Transport
EI	Enterprise Ireland
ENFO	Environmental Information
EPA	Environmental Protection Agency
EPBD	Energy Performance of Buildings Directive (European Union)
EPD	Environmental Product Declaration
ERA	European Research Area (European Union)
ESP	Environmentally Superior Products
ETAP	Environmental Technology Action Plan (European Union)
ETTAR	Environmental Technologies, Training and Awareness Raising
EU	European Union
Forfás	Irish National Policy and Advisory Board for Enterprise, Trade, Science, Technology, and Innovation
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GPP	Green Public Procurement
GSI	Geological Survey of Ireland
HEA	Higher Education Authority
HSA	Health and Safety Authority
HLWG	High Level Working Group
IBEC	Irish Business and Employers' Confederation
IFA	Irish Farmers' Association

IPPC	Integrated Pollution Prevention and Control
ISME	Irish Small and Medium Enterprises Association
ISO	International Organisation for Standardization
LAPD	Local Authority Prevention Demonstration Programme
MDG	Markets Development Group
MI	Marine Institute
NCCS	National Climate Change Strategy
NPBR	National Platform for Biodiversity Research.
NPWS	National Parks and Wildlife Service
NRW	North Rhine-Westphalia (Germany)
OEE	Office of Environmental Enforcement
ÖPUL	Österreichische Programm zur Förderung einer umweltgerechten, extensiven und den natürlichen Lebensraum schützenden Landwirtschaft (Austria)
PA(s)	Priority Action(s)
R&D	Research and Development
REACH	Registration, Evaluation and Authorization of Chemicals (European Union)
REPS	Rural Environment Protection Scheme
SEI	Sustainable Energy Ireland
SMEs	Small to Medium Enterprises
SUVs	Sports Utility Vehicles
Teagasc	Irish Agricultural and Food Development Authority
TR	Technical Report
UNCED	United Nations Conference on Environment and Development
VRT	Vehicle Registration Tax
WEEE	Waste of Electrical and Electronic Equipment (European Union)
WRAP	Waste and Resources Action Programme (United Kingdom)