

STRIVE

Science, Technology, Research & Innovation
for the Environment

STRIVE

Environmental Protection
Agency Programme

2007 – 2013

Environmental Protection Agency

The Environmental Protection Agency (EPA) is a statutory body responsible for protecting the environment in Ireland. We regulate and police activities that might otherwise cause pollution. We ensure there is solid information on environmental trends so that necessary actions are taken. Our priorities are protecting the Irish environment and ensuring that development is sustainable.

The EPA is an independent public body established in July 1993 under the Environmental Protection Agency Act, 1992. Its sponsor in Government is the Department of the Environment, Heritage and Local Government.

OUR RESPONSIBILITIES

LICENSING

We license the following to ensure that their emissions do not endanger human health or harm the environment:

- waste facilities (e.g., landfills, incinerators, waste transfer stations);
- large scale industrial activities (e.g., pharmaceutical manufacturing, cement manufacturing, power plants);
- intensive agriculture;
- the contained use and controlled release of Genetically Modified Organisms (GMOs);
- large petrol storage facilities.

NATIONAL ENVIRONMENTAL ENFORCEMENT

- Conducting over 2,000 audits and inspections of EPA licensed facilities every year.
- Overseeing local authorities' environmental protection responsibilities in the areas of - air, noise, waste, waste-water and water quality.
- Working with local authorities and the Gardaí to stamp out illegal waste activity by co-ordinating a national enforcement network, targeting offenders, conducting investigations and overseeing remediation.
- Prosecuting those who flout environmental law and damage the environment as a result of their actions.

MONITORING, ANALYSING AND REPORTING ON THE ENVIRONMENT

- Monitoring air quality and the quality of rivers, lakes, tidal waters and ground waters; measuring water levels and river flows.
- Independent reporting to inform decision making by national and local government.

REGULATING IRELAND'S GREENHOUSE GAS EMISSIONS

- Quantifying Ireland's emissions of greenhouse gases in the context of our Kyoto commitments.
- Implementing the Emissions Trading Directive, involving over 100 companies who are major generators of carbon dioxide in Ireland.

ENVIRONMENTAL RESEARCH AND DEVELOPMENT

- Co-ordinating research on environmental issues (including air and water quality, climate change, biodiversity, environmental technologies).

STRATEGIC ENVIRONMENTAL ASSESSMENT

- Assessing the impact of plans and programmes on the Irish environment (such as waste management and development plans).

ENVIRONMENTAL PLANNING, EDUCATION AND GUIDANCE

- Providing guidance to the public and to industry on various environmental topics (including licence applications, waste prevention and environmental regulations).
- Generating greater environmental awareness (through environmental television programmes and primary and secondary schools' resource packs).

PROACTIVE WASTE MANAGEMENT

- Promoting waste prevention and minimisation projects through the co-ordination of the National Waste Prevention Programme, including input into the implementation of Producer Responsibility Initiatives.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

MANAGEMENT AND STRUCTURE OF THE EPA

The organisation is managed by a full time Board, consisting of a Director General and four Directors.

The work of the EPA is carried out across four offices:

- Office of Climate, Licensing and Resource Use
- Office of Environmental Enforcement
- Office of Environmental Assessment
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet several times a year to discuss issues of concern and offer advice to the Board.

An Ghníomhaireacht um Chaomhnú Comhshaoil

Is í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaoil do mhuintir na tíre go léir. Rialaímid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntímid go bhfuil eolas cruinn ann ar threochtaí comhshaoil ionas go nglactar aon chéim is gá. Is iad na príomh-nithe a bhfuilimid gníomhach leo ná comhshaoil na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe.

Is comhlacht poiblí neamhspleách í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) a bunaíodh i mí Iúil 1993 faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil 1992. Ó thaobh an Rialtais, is í an Roinn Comhshaoil agus Rialtais Áitiúil a dhéanann urraíocht uirthi.

ÁR bhFREAGRACHTAÍ

CEADÚNÚ

Bíonn ceadúnais á n-eisiúint againn i gcomhair na nithe seo a leanas chun a chinntiú nach mbíonn astuithe uathu ag cur sláinte an phobail ná an comhshaoil i mbaol:

- áiseanna dramhaíola (m.sh., líonadh talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh., déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- díantalmhaíocht;
- úsáid faoi shrian agus scaoileadh smachtaithe Orgánach Géinathraithe (GMO);
- mór-áiseanna stórais peitreal.

FEIDHMIÚ COMHSHAOIL NÁISIÚNTA

- Stiúradh os cionn 2,000 iniúchadh agus cigireacht de áiseanna a fuair ceadúnas ón nGníomhaireacht gach bliain.
- Maoirsiú freagrachtaí cosanta comhshaoil údarás áitiúla thar sé earnáil - aer, fuaim, dramhaíl, dramhuisce agus caighdeán uisce.
- Obair le húdaráis áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí chomhordú a dhéanamh ar líonra forfheidhmithe náisiúnta, díriú isteach ar chiontóirí, stiúradh fiosrúcháin agus maoirsiú leigheas na bhfadhbanna.
- An dlí a chur orthu siúd a bhriseann dlí comhshaoil agus a dhéanann dochar don chomhshaoil mar thoradh ar a gníomhaíochtaí.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOIL

- Monatóireacht ar chaighdeán aeir agus caighdeán aibhneacha, locha, uiscí taoide agus uiscí talaimh; leibhéil agus sruth aibhneacha a thomhas.
- Tuairiscíú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntiú a dhéanamh.

RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA HÉIREANN

- Caínníochtú astuithe gáis ceaptha teasa na hÉireann i gcomhthéacs ár dtiomantas Kyoto.
- Cur i bhfeidhm na Treorach um Thrádáil Astuithe, a bhfuil baint aige le hos cionn 100 cuideachta atá ina mór-ghineadóirí dé-ocsaíd charbóin in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde ar shaincheisteanna comhshaoil a chomhordú (cosúil le caighdeán aeir agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Ag déanamh measúnú ar thionchar phleananna agus chláracha ar chomhshaoil na hÉireann (cosúil le pleananna bainistíochta dramhaíola agus forbartha).

PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheisteanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaoil a scaipeadh (trí cláracha teilifíse comhshaoil agus pacáistí acmhainne do bhunscoileanna agus do mheánscoileanna).

BAINISTÍOCHT DRAMHAÍOLA FHORGHNÍOMHACH

- Cur chun cinn seachaint agus laghdú dramhaíola trí chomhordú An Chláir Náisiúnta um Chosc Dramhaíola, lena n-áirítear cur i bhfeidhm na dTionscnamh Freagrachta Táirgeoirí.
- Cur i bhfeidhm Rialachán ar nós na treoracha maidir le Trealamh Leictreach agus Leictreonach Caite agus le Srianadh Substaintí Guaiseacha agus substaintí a dhéanann ídiú ar an gcrios ózóin.
- Plean Náisiúnta Bainistíochta um Dramhaíl Ghuaiseach a fhorbairt chun dramhaíl ghuaiseach a sheachaint agus a bhainistiú.

STRUCHTÚR NA GNÍOMHAIREACHTA

Bunaíodh an Ghníomhaireacht i 1993 chun comhshaoil na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord Iánaimeartha, ar a bhfuil Príomhstíúrthóir agus ceithre Stiúrthóir.

Tá obair na Ghníomhaireachta ar siúl trí ceithre Oifig:

- An Oifig Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig um Fhorfheidhmiúchán Comhshaoil
- An Oifig um Measúnacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáide

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag ball air agus tagann siad le chéile cúpla uair in aghaidh na bliana le plé a dhéanamh ar cheisteanna ar ábhar imní iad agus le comhairle a thabhairt don Bhord.

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Executive Summary

The new Environmental Protection Agency (EPA) programme for Science, Technology, Research and Innovation for the Environment (STRIVE) is based on the following:

- the Environmental Research Sub-programmes of the *National Development Plan 2007 – 2013*;
- the Government's *Strategy for Science, Technology and Innovation* launched in 2006;
- the EPA's most recent assessments of the state of Ireland's environment;
- The EPA's strategy *2020 Vision – Protecting and Improving Ireland's Environment*;
- a series of workshops organised by the Agency, mainly during 2006, involving environmental policymakers, managers and researchers;
- the experience gained in the previous EPA programme 2000 – 2006.

It also takes account of developments at EU level, in respect of environment and research, and of the wider international context.

The general objective of the EPA STRIVE Programme is:

To protect and improve the natural environment by addressing key environmental management issues through the provision of world-class scientific knowledge generated through a vibrant, competitive programme of

research supported and co-ordinated by the EPA.

The programme covers the period 2007 to 2013 and comprises the following:

- seven principal thematic areas;
- three key measures; and
- two measures in support of these.

The seven principal thematic areas for the programme are as follows:

Theme A: Climate Change;

Theme B: Waste, Resource Management & Chemicals;

Theme C: Water Quality and the Aquatic Environment;

Theme D: Air Quality, Atmospheric Deposition and Noise;

Theme E: Impacts on Biodiversity;

Theme F: Soils and Land-use; and

Theme G: Socio-economic Considerations.

In addition, other emerging issues will be taken on board as the need arises.

The following are the three key measures, each with two sub-measures:

Measure 1 (Key Measure): Sustainable Development

1.1 Informing Environmental Policies

1.2 Sectoral Integration of the Environment

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Measure 2 (Key Measure): Cleaner Production and Environmental Technologies

- 2.1 *Innovation in Cleaner Production
and Operations*
- 2.2 *Environmental Technologies*

Measure 3 (Key Measure): A Healthy Environment

- 3.1 *Risks to Human Health*
- 3.2 *Environment, Ecosystems
and Quality of Life*

Two further measures as follows are designed to support the key measures:

Measure 4 (Support Measure): EPA Environmental Research Centre

- 4.1 *Pooling, Sharing and Advancing
Knowledge*
- 4.2 *Advanced Environmental
Management and
Assessment Methods*

Measure 5 (Support Measure): Capacity and Capability Building

- 5.1 *Developing Researcher Capability*
- 5.2 *Support for Instrumentation &
Related Infrastructure*

Each of the five measures listed above will be applied across the various thematic areas as appropriate in accordance with priorities identified.

The funding for the programme will come from a number of sources:

- €93 million provided in the Environmental Research Sub-programme of the National Development Plan (NDP);
- €8 million provided for research in aspects of climate change, transboundary pollution and earth observation under the Inter-Departmental Committee for the Strategy for Science, Technology and Innovation (IDC-SSTI);
- co-funding by economic sectors in respect of Measures 1 & 2; and
- EPA core funding for staffing the management of the programme.

Other sources of funding for environmental research under the programme will continue to be developed as appropriate.

The EPA has a statutory role to co-ordinate environmental research in Ireland and in fulfilling this role the Agency will undertake other functions in addition to organising and administering the STRIVE programme. This includes, in particular, key national support in respect of the EU's 7th Framework Programme for research, specifically the theme *Environment, including Climate Change* as well as liaison and support in respect of other EU programmes and in the wider international context.

Chapter One National Context



Introduction

This document outlines a strategy whereby the Environmental Protection Agency (EPA) can develop and sustain a dynamic programme of Science, Technology, Research and Innovation for the Environment (STRIVE) for 2007–2013, taking account of national and international environmental needs and of existing programmes and policies. It summarises the current environmental situation, describes the previous research programme 2000 – 2006, and suggests steps that should be taken to build effectively on this solid foundation for the benefit of Ireland’s environment and people.

The STRIVE programme is based mainly on the following:

- the Environmental Research Sub-programmes of the *National Development Plan 2007 – 2013*;

- the Government’s *Strategy for Science, Technology and Innovation* launched in 2006;
- the EPA’s most recent assessments of Ireland’s environment;
- the EPA’s strategy *2020 Vision – Protecting and Improving Ireland’s Environment*;
- a series of workshops organised by the Agency, mainly during 2006, involving environmental policymakers, managers and researchers; and
- the experience gained in the previous EPA programme 2000 – 2006.

It also takes account of developments at EU level in respect of its environment and research programmes and of the wider international context. The present chapter presents the national context and some related EU developments are presented in the next chapter.

Ireland’s Environment

Ireland’s Environment 2004, published by the EPA during the Irish presidency of the EU in 2004, provided a comprehensive assessment of the state of the natural environment in Ireland. It recognised the considerable progress of recent years, but noted that increased economic activity has placed additional strains on the environment. It stated that emissions to air, waste management and water eutrophication (over-enrichment of lakes and rivers) are crucial areas requiring urgent action. The environmental

achievements of recent years are being outstripped by overall growth in waste production, due in part to Ireland's rapid economic development. The report also identified the need for greater integration of environmental considerations across all policy areas, better enforcement of environmental legislation – and prioritising protection of the environment and conservation of our natural resources in the plans, programmes and actions of all economic sectors.

Meeting UN and EU environmental obligations at the national level frequently requires the support of environmental research. For example, Ireland's biological diversity remains poorly understood, creating a potential for conflict with major infrastructural development if significant flora and fauna are undiscovered until late in the project planning. Research, monitoring and information management can help prevent such problems, and can support environmental management at the local level.

An update on the key environmental issues was provided in the EPA's report *Environment in Focus 2006*. The report emphasised a number of deadlines, which Ireland has to meet in coming years:

- *Kyoto Protocol, 2008 to 2012 period:* Ireland is committed to limit greenhouse gases to 13 per cent above 1990 levels. Greenhouse gas emissions stand at 25.4% above 1990 levels (2005 figures).
- *EU National Emissions Ceiling Directive, by 2010:* Ireland is required to cap emissions of four gases (sulphur dioxide, ammonia, volatile organic compounds and nitrogen oxides). Limiting nitrogen oxides will pose the greatest challenge.
- *Water Framework Directive, 2015:* All water bodies in the state should achieve good status. Almost 30% of rivers fall short of this.
- *Landfill Directive, 2010, 2013, 2016:* Landfilling must be reduced progressively to 35 per cent of the quantity of biodegradable waste – paper, cardboard, food wastes and garden wastes – generated in 1995.

The need for greater integration of environmental considerations across all policy areas was again emphasised in the report and it was stressed that the new National Development Plan provides what is undoubtedly the most important opportunity for such integration. As new directives and protocols are negotiated and agreed the importance of data and information specific to Ireland cannot be overstated.

National Development Plan (2007 – 2013)

The National Development Plan (NDP) (2007 – 2013) published in January 2007 highlighted the vital role of enterprise, science and innovation in order to build on Ireland's recent success and to ensure better standards of living and quality of life, improved and sustainable competitiveness.

In line with the Strategy for Science, Technology and Innovation 2006 – 2013 (see below) support for research will continue during the period of the NDP through a series of Sub-Programmes including the following:

- World Class Research, Science Technology and Innovation (STI);
- Enterprise STI;
- Agri-Food Research;
- Energy Research;
- Marine Research;
- Geoscience;
- Health Research; and
- Environment Research.

The allocation to the environmental research sub-programme is €93 million.

Particular emphasis is placed on research to combat the principal environmental challenges identified by the EPA – meeting our international commitments on air quality (CO₂ and acidifying gases), waste management and eutrophication of surface waters. Research to assist in identifying the best options for implementation of EU environmental legislation will also continue to be a feature of environmental research.

Consistent with the principle that the environment should be integrated into all sectors, environmental research will be undertaken as part of many NDP measures and programmes that have a significant

environmental impact. This will include the energy, transport, agriculture and marine sectors, and naturally, environmental infrastructure in its own right.

Strategy for Science, Technology and Innovation (2006 – 2013)

The *Strategy for Science, Technology and Innovation* launched in mid 2006 aims at delivery on the knowledge economy and sets a target for Ireland to be internationally renowned for the excellence of its research by 2013. It foresees investment in research and innovation in areas such as environmental technologies leading to tangible improvements to our quality of life.

The strategy aims at building on the National Development Plan investments to deliver a sustainable, world-class research system across the spectrum of humanities, physical and social sciences. The objectives are to deliver quality by increasing the number of research teams led by internationally competitive principal investigators; to upgrade existing infrastructure and to develop new facilities to support research; to enhance postgraduate skills through a graduate schools mechanism; to develop sustainable career paths for researchers; to enhance the mobility of researchers; and to double the number of PhD graduates by 2013.

The strategy sets out the strategic direction for environmental research. It should anticipate and respond to changing circumstances and engage in research

to generate new knowledge of the environment and environmental technologies. In addition, it sees that meeting international environmental obligations requires continued engagement in areas such as climate change, biodiversity loss, environment and health, urban environment, air pollution, waste management and water quality.

The Environmental Research Centre (ERC) developed as part of the NDP 2000 – 2006 by the EPA is viewed as having the potential to become a key environmental component of the knowledge economy and the cornerstone of future environmental research.

Strategy for Science, Technology and Innovation – Special Fund

In late 2006 the Government provided a special fund of €40 million for R&D for the 2007/2008 period. The Dept. of Finance indicated that the fund should be allocated by competitive process for the sectors identified in Chapter 6 of the Strategy on Science, Technology and Innovation (SSTI), namely Agriculture, Health, Environment, Marine and Energy.

Proposals for the environment aspect were developed by the EPA and these have been approved following Inter-Departmental discussions. The selected environmental themes for this funding stream are climate change, transboundary air pollution and observation systems (GMES). A total value of €8.0 million is provided in relation to the environmental aspect.

National Climate Change Strategy (2007 – 2012)

The recently published National Climate Change Strategy 2007 – 2012 seeks to build on the research base developed during the 2000 – 2006 period. It envisages the further development of analytical capacity in support of current and emerging regulatory and monitoring activities on climate change and wider atmospheric protection issues.

Particular emphasis in the strategy is placed on the following:

- provision of a scientific basis for achievement of a sustainable greenhouse gas emissions profile for Ireland;
- provision of analyses of climate change impacts, key vulnerabilities and identification of sustainable adaptation options;
- identification, development and promotion of socio-economic and technological solutions to mitigate climate change and to adapt to adverse impacts of unavoidable climate change;
- development of analyses of air, land, ocean, exchange processes and their drivers (including future climate conditions); and
- development of climate observations and analysis systems.

EPA 2020 Vision – Protecting and Improving Ireland’s Environment

The EPA’s third formal strategy *2020 Vision – Protecting and Improving Ireland’s Environment*, published in 2007, sets out a long-term vision to 2020 as well as the actions the EPA will undertake between 2007 and 2010.

The EPA aims at building scientific expertise by becoming a proactive, forceful environmental champion with a key focus on environmental management. This focus in *2020 Vision* is moving beyond identification of environmental issues towards the active resolution of the root causes.

The *2020 Vision* document outlines six environmental goals, reflecting the main challenges identified in the EPA’s State of the Environment Reports as well as key issues at the global and EU levels. These goals are:

- limiting and adapting to climate change;
- clean air;
- protected water resources;
- protected soil and biodiversity;
- sustainable use of resources; and
- integration and enforcement.

The EPA is already addressing many of the environmental challenges posed. The *2020 Vision* strategy document includes the EPA’s key action plans for the initial period to

2010 and these include specific actions in respect of research and capacity building, which are listed for ease of reference in Appendix 1 of this document.

EPA Research Workshops

The active co-operation of a number of key stakeholders will be required to meet the immediate targets and the overall objectives of the STRIVE programme.

A series of workshops including presentations from national and international experts were held in a variety of topics primarily in 2006. There were over 400 participants at these workshops. The format was generally the circulation of a draft research discussion document in advance of the meeting. This document highlighted the research priorities and perceived gaps identified by the EPA research team. Written submissions were invited and received following the workshops. These submissions were considered and incorporated where applicable in this strategy.

Chapter Two European Context

Introduction

Following a decade of relatively stagnant economies and lagging competitiveness, the EU Heads of State at Lisbon in 2000 agreed a strategy to reinvigorate growth. European investment in research and development is at the heart of the Lisbon Agenda to improve economic growth and competitiveness. At Barcelona in 2002 they agreed to a target for Europe for gross expenditure on R&D to reach 3% of GDP by 2010, from 1.9% at that time.

In 2003 the European Commission published its Communication on actions required in Europe to achieve the 3% target by 2010 - *Investing in Research: An Action Plan for Europe*. This sets out initiatives to give Europe a stronger research base and to make it more attractive to private investment in research; it also provides a basis for the development of national action plans by the Member States.

In 2004, the EU published guidelines addressing the future of European research, entitled *Science and Technology: the Key to Europe's Future*. These are aimed at securing Europe's leading role in research and technological development, while looking down the road to the Seventh EU Framework Programme for research and technological development (see below).

The Irish response to the Lisbon and Barcelona Agendas, outlined in a 2004 report of the Inter-Departmental Committee on Science, Technology and Innovation, anticipates increased R&D investment (2.5%



of GDP) and creation of a pro-innovation culture. The *Strategy for Science, Technology, and Innovation* aims to take Ireland from an "impressive latecomer" to research to an acknowledged leader.

Europe's Environment

The 2005 *Environment Outlook* report published by the European Environment Agency (EEA) assessed the environmental consequences of key socio-economic developments in Europe, particularly with regard to climate change, air quality, water stress and water quality. The report noted that targets in respect of greenhouse gas emissions, climate change and the use of alternative sources of energy for electricity generation, heat and transport are in danger of being missed in Europe. Increased tourism and urbanisation are further pressures, and

demographic trends dictate that an ageing, wealthier society with changing consumption habits will have a huge impact on the environment in the future.

According to the report, EU legislation has successfully addressed the 'big polluters'; new concerns are likely to arise from individual consumption and diffuse sources of pollution associated with agriculture. Successful responses will require a shift to more integrated approaches across key sectors.

These findings show that the main challenges for Ireland identified in the Environmental Protection Agency's reports are shared across Europe.

Sixth EU Environment Action Programme

The Sixth EU Environment Action Programme, adopted in 2002, sets out the EU's environmental roadmap to 2012. It focuses on areas where more action is needed and where new European initiatives can make a difference to protect the environment and foster sustainable development. The programme provides for strong action on four areas as follows:

- tackle climate change;
- protect nature and wildlife;
- address environment and health issues; and
- preserve natural resources and manage waste.

The relationship of research initiatives to the programme are outlined later in this chapter. The Sixth Environment Action Programme is underpinned by the preparation of seven thematic strategies as follows: soil protection; protection of the marine environment, sustainable use of pesticides; air pollution; urban environment; sustainable use and management of resources; and waste prevention and recycling.

LIFE+

The LIFE+ programme will address all four priority areas of the Sixth Environment Action Programme as well as the programme's seven thematic strategies. The budget for LIFE+ for the EU25 is €862 million for 2007 – 2010, of which 40% has been reserved for spending on the "nature and biodiversity" priority area. The funding available to Irish participants will be approximately €3-€3.5 million per annum.

LIFE+ will fund the following:

- best practice or demonstration measures to support nature and biodiversity;
- innovative or demonstration measures to support the implementation and development of community environmental policy (such as approaches to addressing greenhouse gas emissions, environment and health, water quality, chemicals policy);
- information and communication actions.

Informing Sustainable Development

Research at EU level informs the implementation of global commitments such as the Millennium Development Goals, the earth observation initiative, Kyoto protocol and contributions to the Intergovernmental Panel on Climate Change. In addition there are significant research needs arising from EU level policies, such as the Sixth Environmental Action Plan, the action plans on Environmental Technologies (ETAP) and Environment and Health, and new legislation such as the Water Framework Directive and the REACH Regulation and specific environmental aspects of agricultural and fisheries policies.

The renewed EU Sustainable Development Strategy, approved in June 2006, reaffirms the strong political willingness from the EU to move into the sustainable path where environmental protection goes hand in hand with economic prosperity and social cohesion. The Cardiff process (1998) aims at getting environmental consideration into all EU policies, with a particular emphasis on those sectors that interact strongly with the environment. Reliable environmental research informs policy makers and provides an authoritative scientific basis for policy in fields as diverse as tourism, industry, health and transport.

Seventh EU Framework Programme for Research & Technological Development

The Framework Programmes (FPs) are the EU's main instruments for funding research and development. FPs have been implemented since 1984, and cover a period of seven

years, with an overlap of one year between them. The Seventh Framework Programme (FP7) will run from 2007 to 2013 and is designed to build on the achievements of its predecessor towards the creation of a European Research Area and further development of the knowledge economy and society in Europe.

Thematic Area 6 of FP7 is entitled *Environment, including Climate Change*. Its objective is to promote sustainable management of the natural and human environment and its resources by advancing understanding of the interaction of the biosphere, ecosystems and human activities and developing new technologies, tools and services to address global environmental issues in an integrated way. Emphasis will be on prediction of climate, ecological, earth and ocean system changes, on tools and technologies for monitoring, prevention and mitigation of environmental pressures and risks, including to health, and on the sustainability of the natural and man-made environment. The budget proposed in this area is €1.9 billion.

Other thematic areas under FP7 relevant to environmental researchers include the following: food, agriculture and biotechnology; nanosciences, energy and transport.

The EPA will provide support to the national efforts via a National Delegate/National Contact Point to the Thematic Area 6 in FP7. Table 2.1 below outlines the linkages between FP7 and the Sixth Environment Action Programme with respect to environmental needs.

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Table 2.1: Matrix of themes and linkages between the 6th Environmental Action Programme (6EAP) and 7th Framework Research Programme (FP7) (Theme 6)

	FP7 Environment including climate change ^{Note 1}					
	Climate change, pollution and risk ¹		Sustainable management of resources		Environmental technologies	Earth observations and Assessment Tools
Sixth Environmental action plan	Pressures on the environment and climate	Environment and health	Natural and man made resources	Marine Environment		
Tackling climate change	✓				✓	✓
Nature and Biodiversity			✓	✓	✓	✓
Environment and Health		✓			✓	✓
– Water management and quality		✓	✓	✓	✓	✓
– Air pollution		✓			✓	✓
– Noise Pollution		✓			✓	✓
– Chemicals: Pesticides		✓			✓	✓
Sustainable resources and waste management			✓	✓	✓	✓

Note 1. In addition to the areas highlighted in the table, there are areas of overlap between environmental research and other FP7 thematic areas such as transport, energy, health, food, agriculture and biotechnology, information and communication technology, socio-economic sciences and humanities, and security and space.

¹ Natural Hazards is an additional sub-activity in this area.

Competitiveness and Innovation Framework Programme (CIP)

Competitiveness and innovation are the twin keys to unlocking Europe's potential for sustainable growth and more and better employment. In 2005, the Commission (DG Enterprise) proposed a Competitiveness and Innovation Framework Programme (CIP) with a budget of €3.6 billion for the period 2007–2013. The CIP will build on existing programmes and support actions that develop the capacity of enterprise and industry to innovate.

Although the EU is a leader in eco-technologies, it is not fully exploiting its potential in bringing to the market environmentally friendly technologies. One element of the CIP programme will address these market failures by:

- promoting energy efficiency and a more rational use of energy;
- fostering the use of new and renewable energy sources and helping energy diversification;
- supporting technological solutions to reduce greenhouse gas emissions caused by the transport sector;
- promoting eco-innovation and facilitating access to finance for SMEs investing in environmental technologies.

* * *

The EPA is closely involved in programmes such as FP7 and maintains contact and liaison with the EU level activities and other

relevant international activities.

This engagement helps to inform the development and ongoing implementation of the national programmes.

Chapter Three Building on the Previous Programme



2000 – 2006 Programme Overview

The previous EPA research programme *Environmental Research Technological Development and Innovation (ERTDI)* covered the period 2000 – 2006. Investment was provided in four sub-measures:

(i) environmentally sustainable resource management; (ii) sustainable development; (iii) cleaner greener production; (iv) national environmental research centre of excellence. These are outlined briefly in turn.

Environmentally Sustainable Resource Management. Projects covered were of three types: large-scale multidisciplinary groups and relevant sectoral interests; medium and small-scale desk and feasibility-type projects, and fellowships and scholarships. The subject areas covered include climate change, emissions to air, water and soils, terrestrial environment,

land use and spatial analysis, biodiversity, transport impacts, urban environment, environment and socio-economics, waste management and dangerous substances.

Sustainable Development. Projects fostered linkages with the main economic sectors (forestry, agriculture, energy). Co-funding has been obtained from other departments/agencies including Coford, Teagasc, Sustainable Energy Ireland and the Marine Institute. The level of funding has typically been of the order of 50%. Synergies with Higher Education Authority, Programme for Research in Third-Level Institutions investments and, to a lesser extent, Science Foundation Ireland programmes have contributed to achievement of project objectives. Other projects have involved Met Eireann and the National Roads Authority.

Cleaner Greener Production. Projects were targeted at SMEs in particular to produce goods and services in more environmentally friendly ways, targeting the minimisation of emissions through cleaner production methods. The objective was to achieve a balance between economic activity and protection of the environment. More than 50 companies/consultancies have received part funding for demonstration projects. This sub-measure was broadened in 2005 to start the development of research into environmental technologies in line with ETAP.

National Environmental Research Centre of Excellence: Projects targeted information systems development, integrated environmental assessment and environmental management systems. The Environmental

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Research Centre (ERC) is designed as cross-cutting environmental infrastructure development.

The experiences gained from the ERTDI programme are invaluable in informing the development and implementation of the new programme. Some key aspects of this are summarized below.

International and National Research Links

Projects under the first two sub-measures were carried out in a total of 15 third-level institutions, including all universities in Ireland. European and US institutions also received some project funding. The research programme funded over 900 researchers to varying extents. The value of the research funding committed to the end of 2006 was of the order of €55 million. The 2000–2006 programme aimed at developing required national capacity, i.e. an expertise platform and observational capability.

The EPA research programmes draw on international expertise for project evaluation and review processes. The programmes also promote participation in EC Framework Programmes. The EPA is linked to a number of ERA NETWORK groups and other EU groups working on European environmental policy/research topics. It also represents Ireland in the ESA/EC Global Monitoring for Environment and Security (GMES) and the Group on Earth Observations (GEO) initiatives.

The EPA has also developed cooperative links with other state agencies and groups including; SEI, Teagasc, Coford, Marine Institute, NRA, DAF, EI, Met Eireann and SFI. Co-operation and collaboration with these organisations will continue to ensure that Ireland is in a position to benefit from R&D.

Impact of EPA Funding to Date

Considerable progress has been made in the development of environmental research in Ireland in terms of its quality and impact. Some aspects of this are outlined briefly below, in particular the following:

- capability development;
- policy impact;
- commercial impact.

Capability Development

The awarding of approx 140 large² projects has greatly enhanced the development of environmental research capacity at Third-Level institutions in the country. In addition, the post-graduate programme of ERTDI alone has resulted in the direct funding of 92 PhDs, 32 MSc and 40 Fellowships. The EPA has also initiated a Fulbright-EPA award which offers national researchers the opportunity to join an internationally recognised programme of top quality researchers from across the world.

There is common recognition that the full effect of an increase in research spending, even on such academic criteria as

² EPA Commitment of greater than €100,000.

publications, takes some five years to occur, with the impact on citations (a measure of research quality) taking some two further years. Notwithstanding this fact, the quality of the environmental research carried out in Irish Third-Level Institutions is of a high standard internationally and the number of peer-reviewed publications involving Irish researchers in the environment/ecology area³ has increased by 70% during the period 1995 – 2005 (see Figure 3.1). The EPA programme has made a significant impact to the overall national research output.

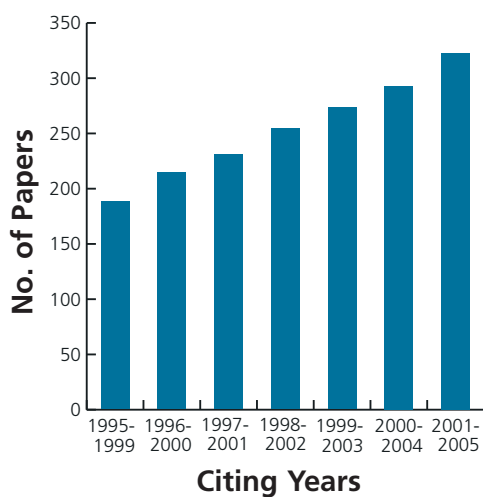


Figure 3.1 Number of Irish-Research Papers (in 5-year intervals) in environment/ecology

Policy Impact

Climate change research work funded under the ERTDI programme has helped to develop new national capacity to forecast future climate conditions in Ireland. This work has been recognised to be of

international standing (UNFCC report) and related work in this area has identified likely significant impacts nationwide in key sectoral areas such as agriculture, marine, natural and water resources.

Research on greenhouse gas emissions from agriculture has been central to the development of improved inventories for Ireland for the 1990 to 2004 period.

Research on the aquatic environment has supported environmental policy with the significant contribution by ERTDI-researchers into the development of novel methodologies for the characterization of water bodies and determination of reference baseline conditions as required under the Water Framework Directive (WFD). It has provided essential input, which has kept Ireland fully compliant with WFD deliverables. For example, it has supported WFD reporting, and a March 2007 communication from the European Commission placed Ireland first out of the 27 EU countries in reporting performance. A detailed analysis of the impact of the “water framework” research projects was undertaken and indicated that 62 per cent of projects demonstrated a high level of policy impact.

The value of a number of ERTDI research projects in the area of cleaner production, waste prevention, and market development have been highlighted in the recent National Biowaste Management Strategy document (2006).

³ Data obtained from Thomson Scientific Database.

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The large on-going biodiversity project *Ag-biota* has identified suitable bio-indicators for the environmental impacts of agriculture and will assist in the national aspiration to halt and reverse the decline in biodiversity within our wider countryside.

The ERTDI programme has also helped to assist in the development of Strategic Environmental Assessment (SEA) expertise nationally and the inventory datasets developed are widely disseminated and used in the SEA process nationally.

Commercial Impacts

The Cleaner Greener Production Programme (CGPP) was established to encourage organizations to implement cleaner greener practices and there have been over 60 industrial projects funded to date. Specific completed projects have made significant annual savings of greater than €50,000 each arising from more effective use of resources and reduced emissions following changes in on-site practices. On the basis of improved housekeeping and waste prevention/minimization alone, one construction company alone made savings of up to €200,000 over a 9-month pilot project which if implemented nationwide across the construction sector as recommended in the ERTDI guidance note would realize savings of €115.65 million. Of the initial 29 projects funded that have been completed two companies are in the process of filing

patents on new technologies developed in-house. On average there are five departments within each organisation working on each CGPP project.

The hazardous waste classification tool developed under the ERTDI programme is widely used by the EPA and industry alike and subsequently the researchers are leading a European project in this area.

The ERTDI programme has been regarded as an efficient and well-managed programme⁴. The time to process, assess and award grants has been reducing year-on-year⁵. The indicators and targets set in the NDP for the ERTDI programme have been met and surpassed in some cases. The success of the ERTDI programme has been recognised nationally and throughout Europe among our peers and the ERTDI team have been invited to participate in a number of European funded projects for research funders such as Scientific Knowledge for Environmental Protection (SKEP) and Sustainable Enterprise (SUSPRISE).

* * *

The new EPA programme for science, technology, research and innovation for the environment (STRIVE) will build on the strengths and benefit from the experiences of ERTDI across its very broad range of activities in support of environmental policy development and implementation.

⁴The European Commission recently (27/9/06) circulated a document entitled "Synthesis and Analysis of the National Roadmaps" for ETAP and made reference in the highlights section to the CGPP programme of the EPA.

⁵The time to grant award 70% of the new projects in 2005 under the seven research thematic areas was 76 days. The European Figures for awarding 70% of the EU Framework Programme (FP6) projects was 420 days.

Chapter Four STRIVE Objectives and Themes



Introduction

The following section sets out the broad objectives and anticipated outcomes of STRIVE - the programme for science, technology, research and innovation for the environment for the 2007 to 2013 period. The outcomes will be assessed by measurement of the progress in attaining the targets set out for the next four years in the defined *measures* and *thematic areas*.

Objectives

The STRIVE programme is an ambitious one that will contribute positively to the sustainable development of Ireland. The general objective of the programme is:

To protect and improve the natural environment by addressing key environmental management issues through the provision of world-class scientific knowledge, generated

through a vibrant, competitive programme of research supported and co-ordinated by EPA.

The STRIVE programme aims at building on the success of the current programme and specifically at achieving the following:

- (i) contribute to a better environment by delivering applicable and relevant STRIVE data, information and knowledge, based on high quality science and technology;
- (ii) develop new techniques, methods and systems for measuring, recording and predicting the quality of the environment;
- (iii) develop practical methods for the integration of environmental considerations into policies and programmes of the main economic sectors;
- (iv) provide knowledge to support the mainstreaming of environment in National Development Plan implementation;
- (v) collaborate with and assist other agencies/organisations in their environmental decision making by providing high-quality, relevant, responsive and timely scientific information and research results;
- (vi) develop and integrate the environmental component of the knowledge economy and ensure that environment is a key issue for research priorities at national level;

- (vii) ensure that emerging international, EU and national environmental and research plans, policies and legislation are supported and implemented within the research programme;
- (viii) disseminate the findings of the individual research projects and the overall programme to the widest possible audience in a coherent and timely manner.

Targets for the Initial Phases

Over its initial phases, the STRIVE programme aims at achieving the following targets.

- The programme will have delivered substantial progress in relation to contributing to a better understanding of the environment and will have assisted in tackling key environmental problems for Ireland.
- The programme will be recognised by policy makers, other stakeholders and funding agencies as being a leading activity supporting environmental research in Ireland on the basis of project & financial management, dissemination and evaluation.
- The programme will have attracted new researchers from science, engineering, socio-economics and related disciplines.
- Irish environmental researchers will increase their international standing measured by agreed output and performance indicators such as numbers of PhDs, peer-reviewed publications/ citations and participation in competitive international programmes (e.g. FP7) and academic societies.

The initial phases of the STRIVE programme will play a major role in delivering the research and capacity building goals for the EPA's strategy *2020 Vision* as set out for ease of reference in the Appendix to this document.

Key Criteria

The EPA recognises the importance of concentrating resources in specific areas in order to develop the critical mass of expertise needed to be competitive with the best in the world. The following criteria were applied to identify the thematic areas for inclusion in the STRIVE programme:

- should be of significant relevance to the DEHLG (including international commitments, protocols and initiatives, legislative & policy requirements, EU thematic strategies and action plans);
- should be of significant relevance to objectives of the EPA strategy and/or be a priority area as outlined in recent state of the environment and indicator reports;
- should contribute to the environment element of the knowledge economy;

- should be distinctive or complementary to research funded by other national research funders;
- should have the prospect of leverage of external (national, EU, business) research funding; and
- should be an existing core of national research competence in the field.

Thematic Areas

Based on the foregoing considerations and using these criteria, seven priority thematic areas are identified for inclusion in the STRIVE Programme:

Theme A: Climate Change

Theme B: Waste, Resource Management and Chemicals

Theme C: Water Quality and the Aquatic Environment

Theme D: Air Quality, Atmospheric Deposition and Noise

Theme E: Impacts on Biodiversity

Theme F: Soils and Land-Use

Theme G: Socio-economic Considerations

In addition, other emerging issues will be taken on board as the need arises. A brief overview of each of these thematic areas is outlined in the following paragraphs, and their relationship to the EPA strategy is shown in Table 4.1.

Theme A. Climate Change

Research projects will focus on climate modelling and climate observations, that will help to reduce uncertainties surrounding climate change and its potential impact. This research area will also focus on mitigation options and their cost implications for the economy, as well as new technologies that have potential to reduce this cost. Research necessary to support the implementation of the National Climate Change Strategy 2007 – 2012 will be undertaken (Chapter 2).

Theme B. Waste, Resource Management and Chemicals

This research area will contribute to more effective waste and resource management in Ireland and seek to address environmental impacts by the development and validation of new methods. These new methods will assess the environmental impacts of waste generation and management by taking into consideration the whole life cycle of resources. The focus will be on developing and validating new approaches, methods and models for the risk assessment of chemicals and alternative testing strategies.

Theme C. Water Quality and the Aquatic Environment

Supporting Ireland's commitments under the Water Framework Directive, this research area will contribute to ensuring excellent water quality in Ireland by focusing on investigating significant fundamental knowledge gaps, measures

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to support relevant water policy and the development of new technologies to protect our water environment.

Theme D. Air Quality, Atmospheric Deposition and Noise

The air quality research programme will help to deliver cleaner air in Ireland by focusing on the key sources of air

emissions, examining atmospheric transport and pollutant dispersion and finally studying the effects of air pollution on human health/ecosystems and technological solutions. Noise research will assist in the implementation of the Noise Directive and will also measure and assess the impact of noise on the Environment and Health.

Table 4.1: Matrix of linkages between STRIVE Thematic Areas (2007 – 2013) and EPA Strategic Goals (2007 – 2020)

EPA Strategic Goal (2007 – 2020) STRIVE Thematic Area	Clean Air	Clean and Plentiful Water Resources	Protected Soil and Biodiversity	Sustainable Use of Resources	Limiting Adapting to Climate Change	Integration and Enforcement
Air Quality, Atmospheric Deposition and Noise	✓✓			✓	✓	✓
Impacts on Biodiversity		✓	✓✓	✓	✓	✓
Climate Change	✓	✓	✓	✓	✓✓	✓
Socio-Economic	✓	✓	✓	✓	✓	✓
Soils and Land-Use		✓	✓✓	✓	✓	✓
Waste, Resource Management and Chemicals	✓	✓	✓	✓✓	✓	✓✓
Water Quality and Aquatic Environment		✓✓	✓	✓	✓	✓✓

Code:

- ✓✓ Strongly contributes to meeting this EPA Strategic Goal (2007 – 2020)
- ✓ Contributes to meeting this EPA Strategic Goal (2007 – 2020)

Theme E. Impacts on Biodiversity

The Biodiversity research programme will contribute to protecting and enhancing our natural resources by getting a better understanding of the impacts of the significant pressures on biodiversity, on how to prevent and reduce these pressures and examining ways to improve the policies for biodiversity conservation and protection. Research also focuses on collecting information on status, trends and distribution of key significant habitats and species of National/EU interest. It will also study the medium and long-term effects of GMOs on biodiversity. Research under this theme will complement the research undertaken by the National Parks and Wildlife Service and close liaison will be maintained.

Theme F. Soils and Land-Use

The soils research programme will help to protect and ensure a sustainable use of soil by getting a better understanding of soil and its functions and by preventing the threats to soil and mitigating their effects. Research activities in this thematic area will aim at supporting sustainable urban and land-use policies.

Theme G. Socio-Economic Considerations

This research programme area will focus on support for the development of analytical tools and empirical evidence upon which to build a sustainable future. Research projects will investigate potential economic tools for environmental protection and examine the costs/benefits of good environmental

management. The research will also seek to improve existing indicators and develop new ones to assess sustainable development policy priorities.

* * *

The overall approach to achievement of the objectives of the programme across these thematic areas is set out in the next chapter.

Chapter Five STRIVE Organisation and Measures

Introduction

The general approach of the EPA in ensuring that the objectives of the STRIVE programme are met will include the following actions.

- (i) Manage the programme to the highest standards with respect to project/ programme evaluation and ensuring optimal value for money for stakeholders.
- (ii) Increase and sustain the number of active, productive researchers in all environmental-related disciplines at Third Level Institutions and other research institutes and including researchers who have not previously worked with the EPA.
- (iii) Promote strategic alliances and partnerships (multi-institutional and interdisciplinary) among Irish (and international) researchers to undertake integrated research in areas of mutual interest.
- (iv) Make details of research programme and findings available in a coherent and timely manner to ensure synergies across the wider research agenda and to ensure the earliest possible dissemination of the findings into the formulation of policy.
- (v) Continue to monitor and critically evaluate the quality of the research completed and assess further research needs.
- (vi) Keep environment on the agenda when national research strategies are being discussed to ensure that environmental research is seen as integral in development of the knowledge economy.



Overall, the EPA will continue to fulfill its statutory role to co-ordinate environmental science, technology, research and innovation in Ireland, including:

- a. the nationally-funded programme as set out in this document;
- b. the national roles (National Delegate and Contact Point) for the 'Environment including Climate Change' thematic area of the EU 7th Framework Programme.

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Proposed Measures

The STRIVE programme 2007 – 2013 is organised under three key measures together with two supporting measures, making five measures. Each of the five measures in turn comprises two

sub-measures. The measures will be applied as appropriate across the various thematic areas listed in Chapter 4. Figure 5.1 below is a schematic representation of the structure and of the STRIVE Programme.

<p>KEY MEASURE 1</p> <p>Sustainable Development</p> <p>1.1 Informing Environmental Policies</p> <p>1.2 Sectoral Integration of the Environment</p>	<p>KEY MEASURE 2</p> <p>Cleaner Production and Environmental Technologies</p> <p>2.1 Innovation in Cleaner Production and Operations</p> <p>2.2 Environmental Technologies</p>	<p>KEY MEASURE 3</p> <p>A Healthy Environment</p> <p>3.1 Risks to Human Health</p> <p>3.2 Environment, Ecosystems and Quality of Life</p>
<p>SUPPORT MEASURE 4</p> <p>EPA Environmental Research Centre (ERC)</p> <p>4.1 Pooling, Sharing and Advancing Knowledge</p> <p>4.2 Advanced Environmental Management and Assessment Methods</p>		
<p>SUPPORT MEASURE 5</p> <p>Capacity and Capability Building</p> <p>5.1 Developing Researcher Capability</p> <p>5.2 Support for Instrumentation and Related Infrastructure</p>		

Figure 5.1 Structure of the STRIVE programme

In the following pages, for each sub-measure of the programme, an account is given of the rationale for the sub-measure and the general approach to be adopted.

Key Measure 1: Sustainable Development

Sub-measure 1.1: Informing Environmental Policies

Rationale

The complexity of current and emerging environmental issues and the multiplicity of causal factors mean that policy must be underpinned by the kind of knowledge that can only come from systematic programmes of research. Many of the environmental strategies and much of the legislation being developed at EU level cover aspects of the environment or ways of managing the environment that are new and require new approaches; much of the practical development of these new approaches has to be done at Member State level. A central issue is gaining a good understanding of the environmental risks involved – so that the measures taken are sufficient to protect the environment and yet not overly precautionary placing an unnecessary burden on enterprise. In consultations and negotiations on emerging policies and legislation at the EU and in the wider international context, similar considerations apply and Ireland needs to have a sufficient knowledge base to be well-informed in entering into commitments. Hence this is a broad Sub-measure, embracing a wide range of environmental topics.

Approach

Research under this measure is concerned with informing policy development and implementation. The research topics include commitments on air emissions, climate change, eutrophication prevention, waste management and prevention, protection of soils. Projects covered in this measure will range from desk studies to large-scale multidisciplinary capability development projects.

Sub-measure 1.2: Sectoral Integration of the Environment

Rationale

The importance of the interactions of a range of key economic sectors (including transport, industry, energy and agriculture) with the environment is now fully recognised. Many such sectors are developing at unprecedented rates and the ways in which they operate are changing in the light of technological developments, market conditions and economic factors generally. Understanding must be developed of how such growth and change in sectors impacts on the environment. Guidance is needed on how consideration of the environment can be taken fully on board in the policies, plans and actions of each of the key sectors.

Approach

Projects that inform and support the integration of environmental and natural resource considerations into the policies, plans and actions of economic sectors will be supported under this sub-measure. There will be co-funding from the sectors - as was the case in the most recent programme.

Key Measure 2: Cleaner Production and Environmental Technologies

Sub-measure 2.1:

Innovation in Cleaner Production and Operations

Rationale

Projects funded under a similar measure in the previous programme have demonstrated significant win-win outcomes for business and the environment in the development of cleaner production and of cleaner, more environmentally friendly operations. The aim is at encouraging and supporting the development of more environmentally beneficial products, processes and services.

Approach

The approach for this is essentially bottom-up, in which individual enterprises can respond to calls for proposals with projects addressing a range of issues, including waste minimisation and prevention, reduction of emissions – including greenhouse gas emissions, the substitution of hazardous chemicals, and efficiencies in the use of water and of resources generally. These serve as demonstration projects for the relevant sectors.

Sub-measure 2.2:

Environmental Technologies

Rationale

As was noted by the Minister for Enterprise, Trade and Employment in the Introduction to the *Strategy for Science, Technology and Innovation*, environmental technologies is one of the key areas in which research and innovation are essential, both for economic competitiveness and to yield outcomes that make tangible improvements to quality of life. Innovations in these areas can also assist in improving environmental management and can assist the relevant agencies and authorities in the enforcement of environmental legislation.

Approach

Research in this area will focus on developing new or improved environmental technologies (e.g., nanotechnology, green chemistry, white biotechnology) that are needed to reduce the environmental impact of human activities, protect the environment and manage resources more efficiently.

Key Measure 3: A Healthy Environment

Sub-measure 3.1: Risks to Human Health

Rationale

As stated in the National Development Plan, 'Human health protection is a fundamental aspect of environmental protection since our health is impacted on, *inter alia*, by the air we breathe, the water we drink and the food we eat. Although very substantial progress has been made in controlling risks to water and air quality from industrial emissions, more remains to be done in this regard, and emissions to air from the transport sector pose challenges in meeting tighter EU standards by 2010. Research and development capacity will be vital to the identification of these risks and the measures required to ameliorate them.'

Approach

Research will be undertaken as required to fill information gaps in respect of the links between the quality of air, water and soils on the one hand and human health on the other. Work in this area will be carried out in co-operation with other public bodies involved in the health sector to strengthen the development and implementation of both environmental and health policies.

Sub-measure 3.2: Environment, Ecosystems and Quality of Life

Rationale

Human health depends directly and indirectly on the health of ecosystems, which can provide early warnings of emerging environmental threats. The impacts of climate change are predicted to include changes in the distributions of species, including species that are hazardous to human health. Overall, as a country becomes more developed and prosperous a greater focus develops on quality of life issues, and the environment is fundamental to this. A healthy environment can help support quality of life in Ireland, and this in turn can be a key attraction for inward investment in a modern economy.

Approach

Research will focus on the forces causing environmental change and how such can be prevented or managed appropriately to protect the health of humans and ecosystems. The diffuse nature of many of the causes of environmental change can pose difficulties for their management and the aim will be to support the development of policy support and guidance in this respect. How modern lifestyles interact with the environment, in both positive and negative ways, is a key issue. The outcomes in this area will include aiming at influencing of behaviours for the betterment of the environment.

Supporting Measure 4: EPA Environmental Research Centre

Sub-measure 4.1: Pooling, Sharing and Advancing Knowledge

Rationale

The Government's *Strategy for Science, Technology and Innovation* states: 'An environmental research centre is being developed as a centre of excellence within the EPA in close co-operation with the Higher Education Institutes (HEIs) to build capacity in environmental data handling, modelling, assessment and guidance. In this regard partnerships will be developed with other organisations to achieve synergies. This centre has the potential to become a key environmental component of the knowledge economy and will be the cornerstone of future environmental research.'

Approach

The Environmental Research Centre (ERC) will continue to develop its work in the areas of data management and dissemination and the development of systems based on modern Information and Communication Technology (ICT) infrastructure. The ERC will play an increasingly important role on environmental knowledge, including communicating with stakeholders and policymakers and supporting the environmental aspects of national planning across a wide range of activities. This will be achieved primarily through continuation of support for post-doctoral researchers and through specific targeted strategic projects. The ERC will continue to develop its role as a source of knowledge on the environment in the context of the National Development Plan.

Sub-measure 4.2: Advanced Environmental Management and Assessment Methods

Rationale

Environmental protection can benefit greatly from advances in technologies and techniques provided the potential of these is fully recognised and harnessed. These can assist in monitoring the environment on a wide scale and in a synoptic manner not possible with traditional methods. They can also be used to predict the environmental impacts of future socio-economic scenarios. The complex, transboundary and interrelated nature of environmental issues in the present era necessitate the use of the most advanced approaches for proper assessment, so that effective guidance can be provided to policy development and implementation.

Approach

In this context, the methods include earth observation, various sensor technologies, spatial analysis, modelling, decision support systems and other techniques for assessment, management and prediction. Support will be provided to key functions such as the enforcement of environmental legislation and strategic environmental assessment (SEA). The EPA will continue to develop and deepen its co-operation with the HEIs and others in the development and operation of the ERC. International linkages will continue to be developed and strengthened.

Supporting Measure 5: Capacity and Capability Building

Sub-measure 5.1: Developing Researcher Capability

Rationale

The continued development of research in support of environmental protection is dependant on the availability of teams of high quality researchers. New forms of EU environmental legislation require the development of innovative monitoring approaches and technologies and of new techniques for environmental management. Research, technological development and innovation require people with the necessary qualifications and skills across a wide range of disciplines.

Approach

This will be achieved primarily through continuation of development programmes that have proved successful to date, notably the scholarship support for MSc and PhD students and the fellowship scheme for Post-Doctoral researchers. New funding mechanisms for more long-term research career development in the coming years will be initiated.

Sub-measure 5.2: Support for Instrumentation and Related Infrastructure

Rationale

The need for a sub-measure of this nature became apparent during the consultations on this new programme undertaken by the EPA. While other national funding sources cover major infrastructure, such as extensions or new buildings, there is a need to support research effort through the provisions of key equipment and related infrastructure. This can be shared among researchers in order to maximise benefits.

Approach

This programme is not intended to support new construction work for research facilities but will support the making good of deficits in equipment and related items. Support for research infrastructure funded in this sub-measure could be up to 75-80% of the cost, with the balance to be met by the host institute.

Funding

The funding for the STRIVE programme will come from a number of sources:

- €93 million provided in the Environmental Research Sub-programme of the National Development Plan (NDP);
- €8 million provided for research in aspects of climate change, transboundary pollution and earth observation under the Inter-Departmental Committee for the Strategy for Science, Technology and Innovation (IDC-SSTI);
- co-funding by economic sectors in respect of Measures 1 & 2;
- EPA core funding for staffing the management of the programme.

Other sources of funding for environmental research under the programme will continue to be developed as appropriate.

Chapter Six Implementation

Initial Phase

The STRIVE programme will be managed using the five sub-measures across the seven thematic areas as set out in the previous chapter. A series of research calls will be announced periodically over the course of the programme, commencing in 2007. An implementation plan will be developed in phases and it will set priorities, assign clear responsibility and deadlines, and commit resources to carry out the programme. The commitments set out in the EPA 2020 *Vision* strategy will be among the specific research issues to be covered in the period up to 2009.

Evaluation

To measure and assess progress toward achieving the goals, the EPA will regularly track measures of success. An evaluation framework has been developed (Chapter 3), which will assist in assessing the value for money of research projects. The framework will be used both as a management tool as projects are proceeding, and as a form of ex-post assessment of projects on their completion.

This information will be used to evaluate what is working and what needs improvement, and make adjustments accordingly. As necessary, the objectives will be revisited and action taken in light of progress and changing external circumstances. Moreover, progress with STRIVE will be communicated regularly



to stakeholders and there will be an openness to learning from them and from partner organizations how to achieve continual improvement in implementation of this programme.

Making a Difference for the Environment

The research work funded under the ERTDI and previous programmes is regarded as a positive contribution to Ireland's sustainable development and has been well received by the Department of the Environment Heritage and Local Government and other stakeholders⁶. The indicators and targets set in the National Development Plan were met and surpassed.

EPA funded research is now very well placed to grow in line with national and

⁶ Mid-Term Review of ERTDI Programme. (2003). Circa Europe.

European policies for more R&D spend and thereby support research priorities from emerging legislation and policy. It can also build on the skills and resources of the EPA research programme team, the Environmental Research Centre fellows and the broader national research community.

The STRIVE programme will enable the research community to work with key economic sectors to achieve high environmental standards in the context of competitiveness. It will provide information for policy development and environmental management and also for promoting Ireland's interests internationally. It will further develop international co-operational links with relevant bodies thereby providing added value to the core research work.

Pushing out the Boundaries

During the previous programme, the EPA research team has engaged widely with other research funders and a variety of other stakeholders. There has been significant investment in all areas of R&D in the country over the past number of years and this is likely to continue into the future. It is necessary that the concept of environmental science, technology, research and innovation be broadened to include new disciplines. The EPA will continue its recently established initiative of funding "new environmental researchers" whose top-class research and facilities have been strongly supported

under other Government programmes. In addition, Ireland has a number of world-class researchers in the related biochemistry and food science fields. It is vital for the STRIVE programme to build research capacity in a number of new areas (e.g., nanotechnology, green chemistry, biotechnology) and, consequently, the EPA will actively encourage key researchers in these related disciplines to participate in this programme.

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In summary, the new programme will be flexible and dynamic as well as highly relevant to the environmental priorities identified in international commitments, protocols, initiatives and emerging EU and national legislation and policies.

Appendix 1 Towards Achieving the EPA Environmental Goals of *2020 Vision*

Research and Capacity Building 2007 – 2010

The following are the actions on environmental research and capacity building for the period 2007 to 2010 identified in the EPA's strategy *2020 Vision: Protecting and Improving Ireland's Environment*. The STRIVE programme will play a major role in the delivery of the majority of these (although some specific areas will be funded from other sources).

Goal 1: Limiting and Adapting to Climate Change

"Ireland will achieve major reductions in greenhouse gas emissions and will be prepared for the unavoidable impact of climate change"

- Coordinate and publish research on climate change in Ireland and participate in international research activities on mitigation and adaptation and on emissions reduction potentials.
- Target new research on the use and deployment of low carbon technologies and on assessing barriers to behavioural change.

Goal 2: Clean Air

"Our air will be healthy and clean. Ireland's emissions to the atmosphere will meet all international and national targets"

- Continue to promote state-of-the-art research to inform policy-makers and effect change.
- Support and publish environmental research including:
 - national and regional air quality forecasting
 - continually improving emission inventories and reducing uncertainty
 - analysing the effects of transboundary air pollutants
 - natural contribution of particulate matter.

Goal 3: Protected Water Resources

"Our surface water and groundwater will not be depleted and will be of excellent quality meeting all national and international standards"

- Develop the in-house capacity to undertake the analysis of dangerous substances in water as required under the Water Framework Directive
- Coordinate environmental research to support the implementation of the EU Water Framework Directive.

Goal 4: Protected Soil and Biodiversity

"The soil of Ireland will be protected from contamination and loss and will support dependent plants and animals. Our biodiversity will be protected and managed for future generations to enjoy"

- Build capacity in Ireland for undertaking biodiversity assessments.
- Complete priority studies into the clean-up of worked-out mine sites and on landspreading of industrial waste.
- Coordinate and publish research projects on the impacts of development and sectoral activities on biodiversity.
- Coordinate and publish research to support integration and enforcement, including a project on the development of an environment/economic forecasting model.

Goal 5: Sustainable Use of Resources

“The overall goal is a more efficient use of resources (water, energy and materials). Waste will be prevented and minimised, with the balance safely collected, recycled or recovered. Final disposal will be completed in a way that does not harm the environment”

- Assist local authorities in their waste enforcement work by providing training, support and guidance.
- Provide funding for environmental technologies to encourage their uptake in Ireland.

Goal 6: Integration and Enforcement

“Environmental considerations will be at the heart of policy-making and decision-making. Responsible environmental behaviour will be the norm across all sectors of society and those who flout environmental laws will be held to account”



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