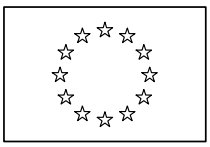

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# COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

## Stimulating Technologies for Sustainable Development: An Environmental Technologies Action Plan for the European Union

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(Text with EEA relevance)

## 1. INTRODUCTION

Sustainable development – development that meets the needs of the present without compromising those of future generations – is at the core of the European Union's (EU) objectives. In 2001, the Göteborg European Council launched the EU strategy for sustainable development. This set ambitious objectives and called for a more integrated approach to policy making in which economic, social and environmental objectives can be achieved at the same time. It therefore complemented the Lisbon strategy to make the EU "*the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion*". It also underlined that "sustainable development requires global solutions", thereby supporting the EU's efforts to take a leading role internationally to promote global economic and social development while protecting the environment. 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.

The potential of technology to create synergies between environmental protection and economic growth was recognised by the October 2003 European Council. Environmental technologies – taken in this Action Plan to include all technologies whose use is less environmentally harmful than relevant alternatives[1] - are key to this. They encompass technologies and processes to manage pollution (e.g. air pollution control, waste management), less polluting and less resource-intensive products and services and ways to manage resources more efficiently (e.g. water supply, energy-saving technologies). Thus defined, they pervade all economic activities and sectors, where they often cut costs and improve competitiveness by reducing energy and resource consumption, and so creating fewer emissions and less waste. These potential benefits can also be of great importance for developing

[1] This definition is based on the definition given in Chapter 34 of Agenda 21 for environmentally sound technologies. This states that, "Environmentally sound technologies protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes. Environmentally sound technologies in the context of pollution are process and product technologies that generate low or no waste, for the prevention of pollution. They also cover end of the pipe technologies for treatment of pollution after it has been generated. Environmentally sound technologies are not just individual technologies, but total systems which include know-how, procedures, goods and services, and equipment as well as organisational and managerial procedures".

countries. With sufficient technology transfer they can provide these countries with affordable solutions for reconciling their desire for strong economic growth with the need to do so without increasing the pressure on the local, or the global, environment.

This Environmental Technologies Action Plan (ETAP) therefore **aims to harness their full potential to reduce pressures on our natural resources, improve the quality of life of European citizens and stimulate economic growth**. As such it is an important means to implement the EU Sustainable Development Strategy and to pursue the Lisbon Strategy, while also helping developing countries. It is based on the recognition that there is significant untapped technological potential for improving the environment while contributing to competitiveness and growth. Encouraging the choice of advanced environmental technologies in all investment and purchasing decisions will go some way towards realising this potential, thus widening their market and reducing their cost. This Action Plan sets out a series of measures to do this; measures that will require a concerted effort by the Commission, Member States and partners in the research community, industry and civil society.

The Action Plan's objectives are:

- to remove the obstacles so as to tap the full potential of environmental technologies for protecting the environment while contributing to competitiveness and economic growth;

- to ensure that over the coming years the EU takes a leading role in developing and applying environmental technologies;

- to mobilise all stakeholders in support of these objectives.

This Action Plan is based on the results of extensive stakeholder consultations. These began with the Commission's analysis of the contribution that environmental technologies make to economic growth and employment and a first assessment of barriers hindering their greater use.[2] Concrete questions were then posed to stakeholders in March 2003[3] and the Commission established four issue groups involving stakeholders. These, along with the responses to the consultation exercise, provided valuable input to this Action Plan (see Annex I).

## 2. THE POLICY CONTEXT

### The time is right…

The Göteborg European Council and the EU's Sixth Environment Action Programme (6EAP)[4] have set the overall objective of decoupling economic growth from environmental degradation. Some progress has already been made in important

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2 COM (2002) 122 final, 13.3.2002, Report from the Commission: Environmental technology for sustainable development

3 COM (2003) 131 final, 25.3.2003, Communication from the Commission: Developing an action plan for environmental technology

4 Decision 1600/2002/EC of the European Parliament and the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme

areas, such as air and water pollution. However, environmental impacts remain unsustainable. Indeed, in many areas, environmental pressures and impacts on public health and quality of life are actually increasing. Reversing these trends will require major investment in the development and use of environmental technologies. This investment needs to begin now if the EU is to meet the long-term challenge of sustainable development. Achieving the Lisbon objectives requires investments to be substantially increased. This provides an ideal opportunity to integrate environmental technologies into these investment decisions.

**The EU has a global responsibility…**

The EU also shares responsibility for the global environment because, just as the resources it uses are not limited to those from Europe, nor are its negative environmental impacts. It has shown leadership in international policies for sustainable development, such as the Kyoto Protocol and the ten-year framework of programmes for sustainable production and consumption established at the World Summit on Sustainable Development (WSSD). Well targeted, Europe's potential for innovation can help develop technologies that other countries may need to develop their economies, while reducing environmental degradation. In several areas, European environmental technologies are already globally significant. Other countries are also developing these technologies and maintaining EU leadership will require increased effort but will, in turn, consolidate its strong position to argue for serious efforts by other countries to provide a continued drive for sustainable development.

**It will be supported by significant research efforts…**

Developing and making better use of environmental technologies will also help to meet the Lisbon objective and modernise our economy by contributing to technological innovation, increasing European competitiveness, unlocking potential markets and thus creating new, skilled jobs. The Community target to increase research and technological development spending to 3 % of GDP by 2010 is important here as it should result in more environmental technologies becoming available for market application. 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.[5] The Seventh Framework Programme (FP) for Research, Technological Development and Demonstration (2006-2010) will also present opportunities to further environmental technologies. These can take advantage of the results of earlier Framework Programmes and other EU policies and initiatives where significant resources have been invested, such as the European Investment Bank's "Innovation 2010" initiative and the Biotechnology[6], eEurope and Innovation action plans.

**EU enlargement will provide a further incentive…**

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5 COM (2003) 112 final – Innovation Policy: updating the Union's approach in the context of the Lisbon Strategy

6 COM (2002) 27 final Communication from the Commission to the Council, European Parliament, the Economic and Social Committee and the Committee of the Regions: Life Sciences and Biotechnology – a Strategy for Europe

The accession of ten new Member States in May 2004 will also lead to more investment. These countries are going through a process of modernising their economies and are adapting to EU environmental, health and safety standards, of which complying with just the environmental standards will cost between €50 and 80 billion. This creates a big market for environmental technologies. The enlarged Single Market will also offer one of the largest markets in the world for applying new solutions and providing economies of scale for innovative technologies and products. The new financial perspectives for after 2006 and the reform of cohesion policy provide further opportunities for investing in advanced environmental solutions.

**The EU is well placed to launch an ambitious strategy for environmental technologies…**

European consumers have become more aware of environment and health issues. The ensuing consumer demand for "greener" products has contributed to high environmental standards and given the EU a competitive edge in developing and applying environmental technologies in consumer products.

European business has also made encouraging progress towards decoupling industrial output from certain polluting emissions. It has taken the lead in corporate social responsibility and triple bottom line reporting, while the financial sector has become increasingly aware of the benefits of social, environmental and ethical investments. Business has also seen the potential of many environmental technologies to increase competitiveness and in a number of areas, such as advanced power generation[7], photovoltaics, wind energy and water supply and treatment, it has become a leading producer and exporter.

**There are many policies and initiatives on which to build**…

Existing EU policies are a firm base to build on. The 6EAP identifies four priority areas on which particular attention needs to be focused over the next ten years: climate change, nature and bio-diversity, health and quality of life and management of natural resources and wastes. This provides a clear and ambitious policy framework for the development and dissemination of new environmental technologies; such a framework is a prerequisite for promoting their development. Existing policies ensure that some production meets high environmental standards, for example through the Directive on Integrated Pollution Prevention and Control (IPPC).[8] Regulation has been complemented with market-based and voluntary instruments, such as environmental management systems,[9] eco-labelling[10] and, most

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7 This is a clean technology for producing electricity or combined electricity and heat from fossil fuels in which the thermal efficiency is much higher than for conventional power generation. Examples include clean coal technology and highly-efficient combined cycle gas turbines

8 Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control, OJ L 257, 10.10.1996, p. 26-40

9 Regulation 761/2001 of the European Parliament and of the Council of 19 March 2001 allowing voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), OJ L 114, 24.4.2000, p. 1-29

10 Regulation 1980/2000 of the European Parliament and of the Council of 17 July 2000 on a revised Community eco-label award scheme, OJ L 237, 21.9.2000, p. 1-12

recently the Community's greenhouse gas emissions trading scheme.[11] Integrated Product Policy (IPP) strengthens the environmental performance of products while the Commission's proposal to reform chemicals legislation (REACH) will improve the protection of the environment and public health and encourage innovation and safeguard competitiveness at the same time.

Finally, other stakeholders have also taken significant measures, for example at national or regional level (see examples in Annex III). These provide a wealth of experience to capitalise upon, to exchange and to disseminate. In addition there are several voluntary initiatives that can be built on.

The overall aim is therefore clear: to exploit the potential of environmental technologies for meeting the environmental challenges faced by mankind while contributing to competitiveness and growth. The more widespread application of existing processes, techniques and products, and future technological breakthroughs will allow economic growth to be decoupled from environmental impacts, thereby reconciling economic and environmental objectives. Many companies in Europe and elsewhere have already realised that moving to more eco-efficient production and products will both improve environmental performance and cut costs for energy, resource input and waste management. New markets for environmental goods and services are emerging in the EU and world-wide. Investments in new environmental technologies may therefore offer an attractive growth dividend.

## 3. BUILDING THE ACTION PLAN

From the consultations undertaken in preparation of this Action Plan, the Commission identified a number of general factors that are of importance when promoting environmental technologies and which underpin this Action Plan.

– **There is potential to promote environmental technologies in all economic sectors –** Environmental technologies are very diverse**.** They vary in maturity (some are already in use, while others are still on the drawing board) and in scope (some, like information and communication technologies, cut across different application areas whilst others are more focussed on a specific issue e.g., carbon sequestration techniques). The Action Plan will provide a framework that will allow this diversity to flourish, rather than seeking to establish a "one size fits all" solution. Fully realising this potential will require substantial investments in human capital.

*Environmental technologies are very diverse: the example of ICT*

*Information and communication technologies are increasingly embedded into all kinds of systems and processes. These embedded ICT systems already today control power plants and car engines. They provide the intelligence needed to reduce environmental pollution and avoid the wastage of natural resources. They also allow the introduction of entirely novel technologies that have a favourable impact on the environment such as:*

[11] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Directive 96/61/EC, OJ L 275, 25.10.2003, p. 32-46

*- networked embedded controllers maximise the energy efficiency of industrial production processes. They also minimise the emission of dangerous pollutants; and*

*- intelligent sensing networks deployed in buildings can reduce heating needs to a bare minimum.*

*They will also give rise to new applications some of which are difficult to predict today.*

– **Many potentially significant environmental technologies exist, but are underused.** Many factors contribute to this. These include the lock-in to existing technologies, price signals that favour less eco-efficient solutions, difficult access to finance and low consumer and purchaser awareness. This situation needs to be significantly improved for environmental technologies to prosper.

– **Targeted and effective incentives to the introduction of environmental technologies can pave the way for lasting success** – This has been clearly demonstrated, for example, with wind turbines, where the EU is now the market leader. Strong policy incentives have led to a situation where 75 % of the world wind energy installed capacity is in the EU. In addition, promising technologies have been identified,[12] of which a limited number will be identified as examples throughout this Action Plan alongside the priority actions that are particularly important for stimulating their immediate take-up and longer-term development. In particular, cross-cutting technologies, such as information and communications technologies (ICT), nanotechnologies and biotechnologies, have an important role to play.

– **Reducing uncertainty about future market developments will help to boost investment in environmental technologies.** Investment decisions will certainly benefit from a clearer picture of how markets develop in the long-term. This includes factors such as: likely legislation, standards and targets; trends in consumer behaviour; how law enforcers will react to new technologies; reliable information (economic and environmental) on environmental technologies and their likely evolution compared to other relevant alternatives; and on the extent to which the public sector will demand environmental technologies through purchasing.

– **It is important to build on the experience and the commitment of different stakeholders -** The commitment of many different stakeholders was shown during the work of the four issue groups that were established to identify promising environmental technologies and identify barriers to their uptake. In particular, it emerged that various pockets of particularly good practice in enhancing investment for environmental technologies exist, mainly at national, regional and local levels. The Plan will capitalise on the considerable potential benefits from sharing experience by co-ordinating and facilitating exchanges of

[12] Based on previous technology foresight exercises carried out in some EU Member States - See for example "Weterings, R., Kuijper, J, Smeets, E, 1997: 81 options – Technology for sustainable development – Final report of the Environment-oriented Technology Foresight Study, commissioned by the Dutch Ministry of Housing, Physical Planning and the Environment, the Netherlands, TNO, http://www.tno.nl

good practice. It also recognises that developing countries[13] have their own contribution to make, for example through the potential of traditional knowledge to provide solutions.

– **There is a need to optimise the use of different policy instruments** – Many different types of policy instruments – from legislation, through market-based and economic instruments to voluntary measures – can be used to accelerate the uptake of environmental technologies. It is important to choose the most effective measure – or combination of measures – to create an environment that encourages those who develop, purchase and use environmental technologies.

– **Some of the measures which are needed may take time to affect investment decisions** - The time for research and development to come to fruition is often long, as is the investment cycle within companies and public bodies. In addition, it takes time for policies to change, for example on getting prices right. Given these time lags it is necessary to act now if there is to be a significant impact in the medium to long term.

The consultations carried out by the Commission also identified many different barriers to the development and diffusion of environmental technologies. These are summarised in Annex II.

## 4. THE ACTIONS

The actions proposed fall into three main areas: getting from research to markets; improving market conditions; and acting globally. All these actions are listed in tables at the end of each sub-section. These tables also show the priority actions (PAs) in bold. The cost-effectiveness of measures that have a direct impact on business should be analysed in line with the Commission's rules on impact assessment.[14]

### 4.1. Getting from research to markets

Given the increasing world-wide demand for and pressure on natural resources, existing technologies are not, in the longer term, adequate to safeguard sustainable development. This Action Plan puts forward actions to attract more private and public investment for the development and demonstration of environmental technologies in line with the EU objective of 3 % of GDP for research. The actions aim to improve the innovation process and to take inventions out of laboratories and onto the market.

Besides increasing and focusing research, demonstration and dissemination, there are two innovative actions, the establishment of technology platforms and of testing networks, which show how public/private partnerships can be established and how research can come closer to the market.

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[13] In this Plan the general term, developing countries, is used. However, it is recognised that many of the actions contained in this document could also usefully be applied in other countries which may not normally be considered as such.

[14] COM(2002) 276 final, Communication from the Commission on Impact Assessment

### *4.1.1. Increase and focus research, demonstration and dissemination*

Many environmental impacts can be reduced using existing technologies, but new technologies and more cost-effective solutions are always needed. The energy sector, for example, will benefit from new energy-efficient technologies and greater uptake of renewable energy sources. However, current consumption trends – to a large extent determined by cost and availability - mean that conventional energy sources, such as fossil fuels, will continue to be significant sources of supply. Hence, if climate change is to be minimised more research is needed into carbon sequestration or clean coal consumption techniques, as well as into renewables and energy-efficient technologies.

National and Community research and development (R&D) and innovation financing programmes, such as the Sixth Research Framework Programme (FP) (2002-2005), already devote significant resources to the development of environmental technologies as well as to research on socio-economic drivers, external costs and societal attitudes. However, there is also potential to further improve the effectiveness and efficiency of the existing funding mechanisms, including the European Investment Bank, in key technology areas. Financing programmes, in particular, need to facilitate effective small and medium-sized enterprise (SME) participation. It is also necessary to strengthen mechanisms to support the dissemination and exploitation of research results, as well as accelerating technological transfer. Very importantly too, the potential of fundamental research has to be better exploited to contribute more effectively to technology development.

*The need to reinforce research: the example of photovoltaics*

*Solar energy is a very attractive energy source that could, with further technological progress and cost reductions, meet a substantial part of the EU's electricity demand and have a beneficial impact on the environment and on society. The current photovoltaics share of the EU's electricity production is currently only 0.024%, mainly due to the high installation costs (five to ten times the cost of conventional electricity) but it is growing rapidly and costs are expected to diminish. In the EU, it is acknowledged that photovoltaics are being held back by low research budgets and fragmented research and market development programmes, unlike the situation in Japan.*

The Commission will encourage stakeholders to engage more intensively in the demonstration and dissemination components of the FP, especially in the Integrated Projects, and will also encourage Member States to review their own R&D programmes and set similar objectives.

Improved co-ordination of national and regional environmental technology-related programmes, including foresight research, can stimulate synergies, promote economies of scale and help disseminate good practice. This can leverage private and public investment beyond what could be achieved through the FP alone. The Commission will initiate this through the various initiatives taken within the European Research Area, including, for example, the ERA-NET[15] instrument of the FP, as well as examining the possibility of using the rules in Article 169 of the Treaty for participation in research programmes undertaken by several Member States.

[15] See http://www.cordis.lu/coordination/home.html and Annex III for an example of good practice

In addition, research should lead to commercial applications more often. New environmental technologies also require greater efforts to bring them to the market than other innovations. Users need to be made aware of their potential through demonstration actions and information on their performance and costs.

More funding should be made available for pilot, demonstration and dissemination actions for promising environmental technologies. Apart from the Framework Programme which is the main fund-raiser for EU-level demonstration, the Commission will promote the demonstration and dissemination of mature research results by other financing programmes that can provide additional resources to pilot projects, such as the Structural Funds or the LIFE programme. The EU-wide network of Innovation Relay Centres (see example in Annex III) will continue and, where possible, step up its activities on the transfer of environmental technologies. Member States need to take the necessary steps to ensure additional funds for the pilot implementation of mature research results developed at national level. In addition, the Global Monitoring of Environment and Security (GMES) initiative will support environmental technologies based on space applications and remote sensing.

*The importance of stepping up demonstration and dissemination: the example of white biotechnology*

*Industrial (or "white") biotechnology offers new ways to improve the environmental performance of industrial processes in various sectors, including traditional industries such as chemicals, textile, leather and paper, and high-value sectors such as pharmaceuticals. Such applications (e.g. bio-mass for energy/fuels and industrial feedstock, bio-polymers, bio-catalysis and bio-remediation) have the potential for reductions in raw materials and energy consumption, as well as less pollution and increased rates of recyclable and biodegradable waste. This potential has been shown in a growing number of industrial cases[16] but further demonstration and dissemination is needed.*

At the same time, using the possibilities under the 6FP, the Commission will promote further research on the environmental and health costs and benefits of policies and technologies, and, together with the Member States, ensure that it is better co-ordinated across Europe.[17]

### *4.1.2. Shaping a common vision through technology platforms*

Building on some of the promising environmental technologies identified in the work of the ETAP issue groups, the Commission intends to establish a number of technology platforms[18] on promising environmental technologies. A technology platform is a mechanism to bring together all interested stakeholders to build a long-term vision to develop and promote a specific technology or solve particular issues. Two environmental technology platforms on hydrogen and fuel cells, and on photovoltaics are already planned to start in early 2004,[19] and another on water

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16 See, for example the OECD report, 2001, "The Application of Biotechnology to Industrial Sustainability", which describes successful case studies in several sectors and the European Commission (2002), "The Assessment of Future Environmental and Economic Impacts of Process-Integrated Biocatalysts", EUR 20407 EN, Seville

17 An example of a current project is ExternE, which looked at the external costs of producing electricity from coal and other fuels (http://externe.jrc.es).

18 Such platforms can optimise the design and implementation of R&D by taking account of all major socio-economic and technological challenges. They provide a means to increase synergies and innovation efforts in a given technology sector.

19 In addition, a Steel Technology Platform could be launched in 2004. This will deal, amongst other things, with promising environmental technologies identified by the Issue Group on Sustainable

supply and sanitation technologies will be launched in early 2005. In general, technology platforms will be launched in those cases where the targeted technologies are considered to have significant environmental, economic and social potential.

The precise ways of working of each technology platform will be defined at the outset but they will have an open structure and could be built upon the foundations of existing European initiatives, networks and structures.[20] They may be guided by an advisory council containing a balance of expert knowledge and stakeholder interests and may have a secretariat that is funded jointly by the Commission and stakeholders. They will

– develop a strategic research agenda to improve the effectiveness of research in this area;

– bring together industry and financial institutions such as the European Investment Bank (EIB);

– examine possibilities for public-private partnerships to promote commercialisation;

– consider the possibilities for improving technology transfer to developing countries, in particular to least developed countries;

– develop a strategy for Europe-wide education and training programmes in this area;

– make proposals for demonstration and dissemination projects, including examining how EU Information sources (such as Info Points, Euro Info centres and Euroguichets) could be used to provide information to relevant operators.

In parallel to the establishment of technology platforms, the Commission will initiate a dialogue with stakeholders on specific issues relating to the development and deployment of technologies.

*4.1.3. Improving testing, performance verification and standardisation related to environmental technologies*

Convincing the market of the merits of their environmental technology is often very difficult for producers, and especially for SMEs. Establishing a mechanism to validate objectively the performance of these products would increase purchasers' confidence in new environmental technologies. This has been done in the USA (see box below).

The "Environmental Technology Verification" programme of the US Environmental Protection Agency develops testing protocols and verifies the performance of innovative technologies that have the potential to improve protection of human health and the environment. This successful programme was created in 1995 to accelerate the entrance of new environmental technologies into the domestic and international marketplace. It operates

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Production and Consumption, such as those with a potential to significantly reduce carbon dioxide emissions from steelmaking.

[20] See http://europa.eu.int/comm/research/energy/nn/nn_rt_htp1_en.html

through public/private testing partnerships. All tests and quality assurance plans and protocols are developed with the active participation of a broad range of stakeholders. [21]

Many European centres exist that are capable of undertaking such tests and assessments. In particular, the Joint Research Centre (JRC) of the European Commission has developed expertise in the verification of certain key technologies such as renewable energy technologies. In 2004, the Commission will encourage, within the framework of the 6FP, the creation of networks of such centres, based around families of technology sectors (e.g. water, energy, food processing). This will make the information on their performance more consistent and comparable. These networks will develop commonly agreed assessment protocols and evaluate the reliability of specifications provided by the technology producers. Assessments should verify the technological performance and the claimed performance from an economic and environmental viewpoint, taking into account the whole life-cycle of the technology. Each thematic network will include one expert organisation capable of monitoring and reporting on long-term technology and market prospects.

*The importance of testing and performance verification: the example of on-site soil remediation*

*Good examples of technologies that would benefit from the establishment of such a network are the emerging on-site soil remediation technologies, which are particularly suitable for heavily contaminated soils and groundwater. This is a very cost-effective way of treatment to prevent pollution in high-risk areas, such as drinking water catchments or protected habitats. Many different techniques have been developed to do this and the testing network could carry out the objective assessment of their relative strengths and weaknesses and so increase market confidence in them.*

Where appropriate, these networks could also develop common certificates, to allow environmental technology producers, including SMEs, easier access to the market and to national and EU financing schemes. Finally, they could also play a role in disseminating information and increasing awareness of promising technologies.

In their pilot phase, the networks could, for example, focus on the development of testing protocols for recycled plastics, biotechnology products and processes (e.g. biofuels), the measurement of energy use or soil remediation technologies. The medium-term objective is to make the networks financially independent.

In addition, the Commission will examine, together, where appropriate, with the European Environment Agency (EEA), how best to develop an EU Catalogue, in 2005, of existing directories and databases[22] on environmental technologies to provide interested stakeholders with simple access to existing information.

Furthermore, standardisation, ideally at the international level, can stimulate innovation. The Commission and the Member States will therefore work together

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21 http://www.epa.gov/etv/. The market input is given by the active involvement of stakeholder groups consisting of technology buyers, sellers, permit bodies, consultants, financial investors, exporters and others within each sector concerned.

22 For example the European Commission's Eco-industries database http://europa.eu.int/comm/environment/ecoindus/home.htm as well as the BBS database of the Innovation Relay Centres (see http://irc.cordis.lu)

with CEN and other standardisation bodies to ensure that new and revised standards are performance-related and better accommodate environmental technologies.[23]

*The importance of standardisation: the example of membrane bio-reactors for waste water treatment*

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

| GETTING FROM RESEARCH TO MARKETS | | | | |
|---|---|---|---|---|
| **Action** | | **Who?** | **When?** | **How?** |
| 1 | **Increase and focus research, demonstration and dissemination. Improve co-ordination of relevant programmes. (PA1)** | Commission, Member States, EIB | 2004-2005 | FP, ERA-NET, Article 169, Relay Centres, LIFE Programme, Structural Funds, GMES, national and regional programmes |
| 2 | **Establishing technology platforms (PA2)** | Commission, stakeholders, EIB | 2004-2007 | FP6 (pilot phase), FP7 (implementation of the Strategic Research Agenda), EU Info Points and centres |
| 3 | **Establishing European Networks of technology testing, performance verification and standardisation (PA3)** | Commission, testing centres, CEN | From 2004 | FP6 and FP7 |
| 4 | Develop an EU catalogue of existing directories and databases on environmental technologies | Commission, EEA | 2005 | FP6, EEA initiatives |
| 5 | Ensure that new and revised standards are performance-related | Commission, Member States, standardisation bodies, CEN, CENELEC | From 2004 | Dialogue with CEN, CENELEC, others |

## 4.2. Improving market conditions

The previous section argued that more research is needed and greater efforts to bring environmental technologies to the market. However, the stakeholder consultation exercise showed that many potentially significant environmental technologies exist, but are underused. Many factors contribute to this. These include the lock-in to existing technologies, price signals that favour less eco-efficient solutions, difficult access to finance and low consumer and purchaser awareness.

[23] Standardisation gaps exist in very different fields such as recycled plastics, biotechnology products or measurement of energy use.

This situation needs to be significantly improved for environmental technologies to prosper. Bold policy measures are required to further environmental technologies. Positive incentives and an appropriate regulatory framework are important, as are public procurement[24] and voluntary instruments. This section therefore proposes a series of such measures that will encourage the market uptake of environmental technologies.

### *4.2.1. Performance targets*

Setting targets that are both long-term and visionary as well as perceived as being viable and realistic by many different stakeholders (e.g. consumers, producers and policymakers) is one way to encourage industry to develop and take up environmental technologies. This has already been done, to some extent, for example, through the Renewables and Biofuels Directives.[25]

These targets need to be based on best environmental performance, while being realistic from an economic and social efficiency viewpoint[26], as well as different regional conditions. This means focussing on concrete quantifiable values, such as shown in the box below for cars and fridges.

Examples of possible types of performance targets

Cars are already available that achieve very low $CO_2$ emissions. The technology applied can be generalised to other types and more advanced technology is likely to come on stream over the coming years. In this context, best environmental performance could mean taking the $CO_2$ emissions of today's best performing passenger cars as the average standard in 10-15 years' time.

Fridges are another example. A model is currently available on the EU market that uses around 35 % of the energy used by an average cold appliance of comparable size and type. In this case best environmental performance could mean taking this level as the minimum standard in 10 years' time.

In both cases this approach would provide industry with the certainty with which to make investments, but also the flexibility to choose how they reach the targets. For society it would mean reduced emissions and a better climate for innovation.

It could mean using existing information on the best in the currently available class[27] or it could seek to go beyond what is currently available. When setting the

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[24] The European Parliament and Council have recently adopted new directives on public procurement that offer ample possibilities for setting performance specifications. Once implemented by Member States, these directives are expected to have significant beneficial effects on the uptake of environmental technology procurement over the coming years.

[25] Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity from renewable energy sources in the internal electricity market, OJ L 283 of 27.10.2001, p. 33-40 and Directive 2003/30/EC of the European Parliament and of the Council on the promotion of biofuels or other renewable fuels for transport, OJ L 123 of 17.5.2003, p. 42-46

[26] This will follow an impact assessment in line with that mentioned in the first paragraph of section 4 of this Communication.

[27] For example, making use of existing EU Eco-label or Energy-Label criteria (derived pursuant to Council Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances, OJ L 297, 13.10.1992, p. 16)

performance target, a policy message may be given that the target may, in the longer-term, be made legally binding if voluntary action in the sector concerned is ineffective. The choice of technology to meet the requirements and the timing of the necessary investment decisions would be left to the relevant operators thereby encouraging competition and innovation. As such this would act as a spur to investment in capital goods and research.

The Commission will work with Member States and other relevant stakeholders to consider how best to develop a process to identify such performance targets.

Where such environmental technologies are products this should be done within the framework of IPP where the products with the greatest overall potential for environmental improvement are in the process of being identified, or through the Commission's proposal for a framework directive on the eco-design of energy-using products (EuP).[28]

*4.2.2. Leveraging investment*

Commercialising and using environmental technologies requires a broad mix of financial instruments. These range from classical loans through guarantee mechanisms to venture capital. The Commission also aims to develop further Europe's risk capital market[29] through the action plan, "The European Agenda for Entrepreneurship" and the Innovation Action Plan.

The Commission has already begun to explore with the EIB Group how to maximise the use of existing instruments and whether there is a need to create new ones to share the risk of investing in environmental technology projects and companies, notably through risk capital funds. Initial areas of discussions have focused on:

– a €500 million dedicated financial facility to provide structured loans to companies undertaking investments within the EU emissions trading scheme (ETS) as part of the bank's actions to support the fight against climate change and to promote a low carbon economy; and

– a €10 million technical assistance facility to help structure the investments under point 1 and prepare projects under the Joint Implementation (JI) and Clean Development Mechanism (CDM) of the Kyoto Protocol. The EIB would finance up to €5 million from its own resources, and would aim to have this matched by funds from the Commission's budget or another source. The Bank is also considering the possibility of establishing an equity-type fund that it might manage to invest in carbon credits.

Other areas being discussed with the EIB, in the framework of this ETAP, are:

– a venture capital mechanism to promote renewable energy projects and companies in the frame of the Johannesburg Coalition for Renewable Energy (JREC). This mechanism could, for example, be a public-private partnership

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28 COM(2003) 453 final of 1.8.2003

29 In the context of the Johannesburg Renewable Energy Coalition, the Commission is undertaking similar initiatives and feasibility studies to facilitate access to risk capital by investors in renewable energy services.

establishing a revolving fund of funds that takes a minority stake in venture capital funds. This would increase, over time, to around €300 million and be dedicated to renewable energy projects/companies in partner countries. Revenue returning to the fund could be ploughed into further renewable energy projects. A similar type of instrument could also be envisaged to spur the provision of venture capital for renewable energy companies and projects within Europe, particularly in acceding and candidate countries;

– greater use of the EIB's Global Loan instrument to support environmental technology projects undertaken by SMEs;

– sustaining focus on research projects in environmentally cleaner technologies and products within the EIB Group's efforts to increase Research, Development and Innovation support within the EU Growth Initiative and the Group's Innovation 2010 Initiative.[30]

In addition, efforts to support the use of the European technology start-up facility and of the SME guarantee facility managed by the European Investment Fund[31] on behalf of the Commission will be intensified.

Existing public and private venture capital funds can act as financial intermediaries for reaching SMEs and are particularly important in the acceding states because of the small amount of risk capital available there. Additional risk capital should allow investments in promising innovations with higher risk premiums and lower return expectations than in purely commercial investments.

For the acceding states, the Commission will examine with the European Bank for Reconstruction and Development (EBRD) how best to utilise the dedicated financial instruments which are currently either under development or being implemented in the areas of climate change, water pollution and energy efficiency.[32]

The Commission will also explore, with Member States and relevant stakeholders, the following measures to leverage investment in environmental technologies:

(1) public/private partnerships with public participation providing the necessary risk-alleviating co-investment in seed capital or warranties;

(2) the better identification and promotion of promising new business niches, such as providers of energy services (i.e. those that provide a combination of energy, energy using technology, and possibly operations and maintenance of this technology, delivered as an integrated service product to energy end users) giving technical expertise and, at the same time, financing innovative projects;

(3) the increased use of financial instruments that guarantee the results of investments in renewables and energy efficiency technologies, such as energy performance contracting, third-party financing and other shared savings contracts;

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30 http://www.eib.org/i2i/en

31 Shareholders are the EIB, the European Commission and members of the banking community

32 for more information see Annex 4

(4) the study of the competitiveness of eco-industries in Europe and looking into the role that business incubators, such as European Business and Innovation Centres (BICs), can play in assisting "green" start ups;

(5) promotion of socially and environmentally responsible investment through a dialogue at European and national level with private financial institutions and fund managers;

(6) support, using the relevant trade associations, to exchanges of experience and dissemination of good practice among financial institutions, on innovative financing solutions for sustainable development projects.

There are also long-term benefits from exploiting opportunities for integrating environmental technologies when capital stock is replaced at the end of its normal life. An example is given in the box below. These opportunities will be identified in close consultation with stakeholders, using, for example, prospective studies financed by the 6FP.

In the EU-15 plus Poland and the Czech Republic close to 30 % of the thermal power generation capacity is older than 30 years and important decisions are hence coming up on the new capacity to be built. These will have a major impact on the EU's long-term ability to reduce its greenhouse gas and other emissions. In some Member States, including for example the UK, as well as the Czech Republic and Poland, the share of power stations above this age is even higher.[33]

Cohesion policy (the Structural Funds and Cohesion Fund) will also play a vital role in the promotion of environmental technologies, in particular in the acceding states when they are supporting the implementation of the body of Community law. The new programming period after 2006 should enhance this contribution to sustainable development by promoting support for investments in environmental technologies, albeit respecting the relevant competition and World Trade Organisation rules.

*4.2.3. Creating incentives and removing economic barriers*

Well targeted economic incentives can be useful in helping to promote the take-up of environmental technologies. These have been successfully used for promoting energy efficiency investments in households and for investing in renewable energy. They can take many different forms, for example, tradable vouchers and tax incentives. In order to ensure that such subsidies do not unduly distort competition in the internal market, the Commission has adopted guidelines for environmental State aid. However, recent experience suggests that the framework is not properly adapted to the increasing sophistication of investments in environmental technologies, nor to new forms of public/private partnership. Therefore the Commission will review the framework and decide on any necessary adjustments to the existing Guidelines.[34]

Getting prices right requires the systematic internalisation of costs through market-based instruments (e.g. taxes, tax breaks, subsidies, tradable permits and deposit-

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33 Chalmers University Power Plant Database, Department of Energy Conversion, Chalmers University of Technology, Sweden

34 This commitment was made in paragraph 73 of Commission Decision C21/03 of 11.11.2003 on the UK's Waste and Resources Action Programme.

refund schemes). If properly applied they are the best way to reduce pollution because they make producers and consumers bear the real costs of their actions or change their behaviour in a cost-effective way. Moreover, price distortions have been identified as a significant barrier to environmental technologies during the development of this Action Plan. Failure to remove them would significantly reduce the effectiveness of the actions proposed and thus the Action Plan's overall impact. In addition, market-based instruments can also boost the markets for environmental services and increase the demand for public goods.

In some cases, such as taxing externalities related to energy use, the need to ensure that the Single Market works smoothly may mean that action is best taken at Community level. However, this Action Plan will concentrate on promoting the Open Method of Co-ordination in this area (see section 5.3).

Environmentally-harmful subsidies can be a major barrier to the take-up of environmental technologies, distorting prices in favour of a more polluting, subsidised technology. Where these distortions occur, their removal should be considered, albeit taking into account their social and economic aspects. As recognised in the 6th Environment Action Programme, identifying environmentally harmful subsidies is a first step towards correcting prices and reducing subsidies' negative effects on the environment. The Organisation for Economic Co-operation and Development (OECD) will develop a framework to help identify and measure them by the end of 2004. In 2005, the Commission will work together with Member States and regional governments, using, as far as possible, this methodology, to identify the most significant subsidies that have a negative impact on the environment. Each level of government should then take the appropriate action, as quickly as possible, to remove or reduce their negative effects, for example by introducing new taxes or tax incentives combined with harmonised performance targets (see section 4.2.1). An example of one way of doing this is given in the box below.

The recently adopted Energy Taxation Directive[35] will allow Member States, amongst other things to introduce lower rates of fuel taxation for biofuels. This tax incentive, coupled with the EU target of a 5.75% share of biofuels in each Member State by 2010,[36] will help to secure innovation and investment in this field.

This action will complement the broader Communication on the use of market-based instruments in environmental protection that the Commission plans to produce in 2004. This Communication will update the 1997 Communication on environmental taxes and charges[37] and widen its scope to include issues such as tradable permits. It will analyse the existing Community rules in these areas, their consistency and the scope for Member States to use economic instruments.

### *4.2.4. Public Procurement*

Public procurement accounts for around 16 % of the EU's GDP, or roughly €1 450 billion,[38] and as such it represents a potentially powerful economic driver to further

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35 2003/96/EC, OJ L 283 of 31.10.2003

36 Council Directive 2003/30/EC of 8 May 2003 as above

37 COM(1997) 9 final of 26.3.1997 Green taxation: environmental taxes and charges in the single market

38 Based on the GDP in 2002

the uptake of environmental technologies. There is therefore considerable potential for governments at all levels to lead by example. Member States have a key role in promoting this important market driver. The Commission has contributed by proposing a directive requiring energy savings in each Member State[39] as part of its climate change programme and by developing, in the context of IPP, several initiatives[40] designed to encourage procurers to make use of the many possibilities in existing public procurement directives.[41]

During 2004 the Commission will also investigate the possibilities for promoting environmental technologies through the setting of performance-based requirements in public procurement procedures. This could be a way of pulling environmental technologies into the market place. Buyers, or groups of buyers, could formulate technical specifications that challenge companies to go beyond the current best available technologies. Industry then knows that if it produces such products it has better chances of winning relevant contracts. This results in competition to meet these criteria, thereby pulling the market upwards. This type of procurement, which has sometimes been called technology procurement, has been used for energy-efficiency products by a number of Member States (e.g. Sweden for refrigerators and heat pumps).

Furthermore, life-cycle costing needs to be promoted for long-term investments such as buildings and energy supply systems. For example, in the construction sector this would be expected to favour environmental technologies as the often higher construction costs of a more energy-efficient building would, in the long term, usually be outweighed by the lower running costs compared to more conventional buildings. Life-cycle costing is equally valid for private purchasing considerations.

*4.2.5. Building support for environmental technologies in civil society – business and consumer awareness, training and education*

Societal acceptance of environmental technologies is crucial to creating a framework conducive to investments in environmental technologies. The challenge is to create a situation where environmental technologies are viewed positively by society so that societal attitudes do not present an unjustified barrier to investments and purchasing decisions. Consumer awareness-raising measures can stimulate demand for such technologies by promoting products and services whose environmental impacts are lower.

Consumers should be aware of the existence and benefits of products (e.g. energy-saving lamps) and services (e.g. energy supply or transport modes) whose environmental impacts are lower than those of relevant alternatives, in order both to buy them and to make maximum use of their potential benefits. However, it is only when such information becomes widely available, such as on the real costs of a product over the life-cycle, that the power of consumers can be sufficiently mobilised

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39 Commission proposal for a directive on the promotion of energy end-use efficiency and energy services COM(2003) 739 of 8.12.2003

40 A handbook for public procurers, a product-group database and voluntary action plans for public procurement.

41 These possibilities are explained in detail in the Commission's Interpretative Communication on the Community law applicable to public procurement and the possibilities for integrating environmental considerations – COM (2001) 274 final, 4.7.2001

to drive the demand. Product labelling[42] is best carried out at the European level in order to avoid national requirements acting as barriers to the Single Market. Other types of consumer information and the promotion of product labels, however, are most effective at national, regional or local level where the information can be presented in a way that is culturally and linguistically sensitive.

For this reason this priority action has to be carried out by national, regional and local authorities. They should create a level of awareness that ensures that consumers can play a useful role in stimulating environmental technologies, notably by purchasing more environmentally-friendly products and services. This awareness-raising would be helped by networking the numerous innovative local initiatives and projects for introducing environmental technologies in real-life settings.[43]

For business-to-business information flows, more detailed information is often required than that given to consumers. In the context of IPP the Commission will, in 2005, examine the role for Environmental Product Declarations in providing this. In addition, environmental management systems, such as the Community EMAS scheme, are also a useful way to manage information and to increase demand for environmental technologies. Another important source of information in the context of sustainable production and consumption is the IPPC directive, which covers large industrial and agricultural plants and requires the application of "best available techniques". The information exchange required by the directive is a key driver for improved environmental performance as it involves sector-by-sector benchmarking and comprehensive screening and assessment of techniques applied.

In addition, progressive operators within the business community are making sustainable development operational through the concept of Corporate Social Responsibility (CSR). Initiatives such as triple bottom line reporting (Global Reporting Initiative) and the UN's Global Compact could also support investment in new technologies.

In addition, training and education (such as in university curricula) is required. This is particularly relevant for those who have the potential, through their jobs, to improve the case for investment in environmental technologies (e.g. public purchasers, entrepreneurs, maintenance operators and financiers). They can include those with influence on production, commercialisation, operation and maintenance.

*The importance of awareness-raising and training: the example of the construction sector*

*Many environmental technologies in the construction sector (e.g. window glazing) offer scope for reducing the consumption of raw materials, promoting the reuse and recycling of construction and demolition waste and enhancing energy efficiency. This is important because around 25 % of $CO_2$ emissions come from housing. These could have a considerable impact on the sector's efficiency, especially in urban areas. However, many commercialised state-of-the-art technologies are still poorly used because of the lack of awareness of key decision-makers (e.g. architects). Better access to key information on environmental technologies through, for instance, continuous training could therefore improve the sector's environmental performance.*

The Commission will promote information exchange on training and education for procurers and users of environmental technologies, including maintenance. To this

42 Such as eco-labelling and energy labelling

43 for instance, introducing novel sustainable local transport solutions.

end it will also promote the possibilities for training under the European Social Fund (ESF) and the Marie Curie Fellowships. In line with the principle of subsidiarity, Member States, regional authorities, industrial organisations and training bodies should provide the necessary training and education. Training programmes could, for example, be specifically targeted at SMEs on subjects like public procurement, IPP or EMAS. This could come, for example, through e-learning, re-skilling and benchmarking using information and communication systems.

| **Improving Market Conditions** | | | | |
|---|---|---|---|---|
| **Action** | | **Who?** | **When?** | **How?** |
| 6 | **Develop and agree on performance targets for key products, processes and services (PA4)** | Commission, Member States, EU Institutions, stakeholders | 2004-2007 | IPP, eco-design of EuP, voluntary agreements, policy initiatives, regulation |
| 7 | **Mobilising financial instruments to share the risks of investing in environmental technologies (PA5)** | Commission, EIB, EBRD, financial sector | 2004-2007 | European technology start up facility, SME guarantee facility, ETS Financial Facility, JI/CDM technical assistance facility, JREC venture capital, EIB Global Loan instrument, EIB contribution to EU Growth initiative, EIB Innovation 2010 initiative |
| 8 | Public/private partnerships | Commission, Member States, stakeholders | 2004-2005 | Dialogue with relevant stakeholders, including financial institutions |
| 9 | Promote new business niches | Commission, Member States, stakeholders | 2004-2005 | Financing innovative projects |
| 10 | Financial instruments for renewables and energy efficiency technologies | Commission, Member States, stakeholders | 2004-2005 | Dialogue with relevant stakeholders, including financial institutions |
| 11 | Measures in support of eco-industries | Commission, European Business and Innovation Centres, Member States, stakeholders | 2004-2005 | Dialogue with the sector and financial institutions |
| 12 | Promote socially and environmentally responsible investment | Commission, Member States, stakeholders | 2004-2005 | Dialogue with financial institutions |
| 13 | Dissemination of good practices among financial institutions | Commission, Member States, European trade | 2004-2005 | Dialogue with financial institutions |

| | | | | |
|---|---|---|---|---|
| | | associations | | |
| 14 | Identification of opportunities to integrate environmental technologies when capital stock is replaced | Commission, Member States, stakeholders | 2004-2005 | FP6 prospective studies |
| 15 | Review operational criteria of the Structural Funds | Commission, Council, European Parliament | 2005 | Structural Fund programming after 2006 |
| 16 | **Review state aid guidelines (PA6)** | Commission and Member States | 2004-2007 | Guidelines for environmental State aid |
| 17 | Encourage systematic internalisation of costs through market-based instruments | Commission, Member States, regional governments | From 2004 | Open Method of co-ordination, Communication on environmental taxes and charges |
| 18 | **Review environmentally-harmful subsidies (PA7)** | Commission and Member States, regional governments | 2004-2005 | Communication on the use of market-based instruments and subsidies, in particular based on OECD report |
| 19 | **Encourage procurement of environmental technologies (PA8)** | Commission, Member States, National and local authorities, business | From 2004 | Directive on energy savings, IPP initiatives |
| 20 | Life cycle costing promotion | Commission, Member States, National and local authorities | From 2004 | Guidelines for procurement using Life-cycle costing approach, making use of the forthcoming handbook on greener public procurement, where appropriate |
| 21 | Investigation of technology procurement | Commission, Member States | 2004 | Report |
| 22 | **Raise business and consumer awareness (PA9)** | Commission, National, regional and local authorities, trade associations, NGOs | 2004-2005 | Networking of innovative local initiatives, IPP product declarations, support to CSR related initiatives |
| 23 | **Provision of targeted training (PA10)** | Commission, Member States, regional and local authorities, industry organisations, training bodies | 2004-2007 | Information exchange, national and regional training strategies, ESF, Marie Curie Fellowships |

## 4.3. Acting globally

Investment in environmental technologies has the potential not only to increase employment and economic growth within the EU, but also to promote sustainable development at the global level, particularly in developing countries. With economic growth, addressing detrimental social and environmental impacts from production activities is becoming increasingly urgent in many developing countries. At the same time, environmental technologies can promote innovation and competitiveness, as well as decoupling economic growth from environmental degradation, by leap-frogging traditional, polluting and resource-intensive production patterns and switching to increased eco-efficiency in the use of natural resources.

Environmental technologies can thus play an important role in achieving internationally agreed development goals. The implementation at national level of multilateral environmental agreements and the World Summit on Sustainable Development commitments is also generating an increasing demand for environmental technologies in developing countries. However, developing countries face major challenges in attracting, using or developing environmental technologies, including a lack of human and financial resources. In order to address these challenges, both national action and international cooperation are needed.

### *4.3.1. Promotion of environmental technologies in Developing Countries*

Developing countries themselves have a key role to play by ensuring good governance, transparent and predictable regulatory frameworks, including environmental regulations and protecting intellectual property rights. They also need to improve education and training policies, in order to develop the capability of local workers to adapt technologies to upgrade them and eventually to reach a higher grade of technological autonomy.

Several mechanisms are being used at EU level to support the transfer and uptake of environmental technologies. These include, in particular, science and technology (S&T) agreements. For example, the 6FP opens many areas of activity to developing countries and should make it easier for them to collaborate on developing suitable technologies to meet their needs.

*The potential of science and technology agreements: the example of wind energy*

*Helped by public support, wind energy enjoys a remarkably fast deployment rate in the EU and this could be replicated in other countries. The FP-funded CDMED (CDM for the Mediterranean area) and MED2010 projects(large scale integration of solar and wind power in Mediterranean countries) showed that the CDM mechanism could play a positive and important role in developing the wind energy market in the Mediterranean region. The installation potentials in four Mediterranean countries are as follows: Morocco (6,000 MW), Tunisia (1,000 MW), Egypt (10,000 MW) and Turkey (10,000 MW).*

Development co-operation can also play an important role in encouraging the use of environmental technology, such as through the Cotonou agreement. Although direct support for industry is not currently included among the priority sectors of the Community Development Policy adopted by the Commission and the Council in 2000, technology innovation and upgrading can be one of the components of actions in areas like support for structural adjustment, institution building and promotion of trade.

The uptake of environmental technologies needs to be addressed in 2004 as part of the mid-term reviews of the country and regional strategy papers. Similarly, existing programmes like Asia Pro-Eco, Asia Urban and similar schemes in Latin America must be reviewed with the aim of improving their effectiveness.

Three initiatives launched by the EU in Johannesburg will also be important in promoting the diffusion of environmental technologies. They will be delivered through multi-stakeholder partnerships involving Member States, third countries, the EIB, international institutions, civil society and the private sector.

Johannesburg Initiatives involving environmental technologies

The **Water Initiative** aims to provide clean drinking water and sanitation with a view to reducing poverty. This requires better governance and integrated water resources management, including of trans-boundary waters, and improved coordination and development of additional funding mechanisms. The Commission has proposed creating an ACP-EU Water Facility, amounting to €1 billion. A number of technologies and processes developed in the EU could be harnessed to deliver on these objectives.

The **Energy Initiative** aims to create the conditions necessary for developing countries to achieve their national economic, social and environmental objectives, in particular by maximising energy efficiency, including the more efficient use of fossil fuels and traditional biomass, and increasing the use of renewable energy. It has a multi-stakeholder approach and focuses on achieving poverty eradication and sustainable development by improving access to adequate, affordable and sustainable energy services.

The EU-led **Johannesburg Renewable Energy Coalition** is composed of 82 countries who have agreed to set targets and timeframes for increasing the share of renewable energies in their overall energy mix, thus going beyond the commitments in the Johannesburg Plan of Implementation. There will be a considerable need for environmental technologies in order to boost the share of renewable energies in participating developing countries.

At multilateral level, all major international environmental agreements include provisions concerning technology transfer and capacity building. The implementation of such provisions needs to be supported under existing instruments, including the Global Environment Facility.

The CDM and JI under the Kyoto Protocol offer great potential for fostering technology development in developing countries, particularly through privately funded investment projects and public/private partnerships. The EIB's new Dedicated Facility and Technical Assistance Facility will play a supportive role by providing funding for investments in cleaner technologies in the EU or JI/CDM projects outside the EU.

Work is also ongoing under the Convention on Biological Diversity (CBD). A programme on technology transfer is currently being developed, which proposes upgrading the Biodiversity Clearing House into a facilitator of technology transfer, for example of remote sensing equipment or database software.

### *4.3.2. Diffusion of environmental technologies through responsible investment and trade*

Increasing diffusion and use of environmental technologies is of course not possible by government action alone. The private sector has a key role to play. In particular, foreign direct investment (FDI) is a privileged channel for technology transfer to

developing countries and countries in economic transition. FDI generally provides recipient countries not only with a whole package of technologies (from equipment to training of workers) but also with knowledge and expertise.

The OECD guidelines on Multinational Enterprises (MNEs) represent a useful step towards enhanced investors' responsibilities when operating abroad. Among other aspects, these Guidelines encourage MNEs "to perform science and technology development work in host Countries", to grant licences "on reasonable terms and conditions and in a manner that contributes to the long-term development prospects of the host country", to adopt "practices that permit the transfer and rapid diffusion of technology and know-how" and to "adopt technologies and operating procedures in all parts of the enterprise that reflect standards concerning environmental performance in the best performing part of the enterprise".

It is also important to promote environmental technologies by influencing, within the limits of their mandate, the lending policies of International Financial Institutions, e.g. EBRD, EIB and World Bank, to which Member States contribute. Similarly, Export Credit Agencies could be stimulated to make further efforts to consider environmental aspects. The recent adoption of the OECD Recommendation on Common Approaches on Environment and Officially Supported Export Credits, which aims to integrate environmental considerations into export credits policies, represents a significant step forward. Export Credit Agencies can play a role in promoting sustainable development and be a driver for change. This could be particularly important in areas such as renewable energies. The Commission will examine the issue with the Member States with a view to promoting action in the OECD in 2004.

International trade is another important vehicle for promoting the diffusion and use of environmental technologies. Further liberalisation of – and removal of obstacles to – trade in environmental goods and services, whether at the multilateral level through the Doha Development Agenda negotiations or through regional/bilateral trade agreements, can greatly contribute to fostering the use and dissemination of environmental technologies.

The environment technology dimension should be given more attention in trade-related technical assistance/capacity-building activities. This is particularly necessary in areas such as agriculture where research institutions supported by public and non-commercial organisations are a key source for technology development and technology diffusion in developing countries, and countries in economic transition.

The role of export promotion networks and co-operation between national export promotion bodies need to be expanded in order to promote trade in environmental goods and services, in particular where the extra-EU market is large, and where EU companies have a competitive edge. Work by the European Trade Promotion Organisation (ETPO) could be useful in achieving this objective. Similarly, the Commission will support work by partners in the Sustainable Trade and Innovation Centre (STIC) to foster co-operation in environmental technologies, stakeholder networks, partnerships and twinning arrangements between European and developing country companies.

**Acting Globally**

| Action | | Who? | When? | How? |
|---|---|---|---|---|
| 24 | Promotion of environmental technologies in Developing Countries | Commission, Member States, developing countries, EIB, international institutions, civil society, private sector | 2004-2007 | S&T Agreements, Development co-operation and international agreements, country strategies, Regional technology centres, Kyoto mechanisms, WSSD Initiatives, Global Environment Facility (GEF), Biodiversity Clearing House, EIB facilities |
| 25 | **Promoting responsible investments in and use of environmental technologies in developing countries and countries in economic transition (PA11)** | Commission, Member States, ETPO, STIC, EBRD, EIB, private sector, World Bank, export credit agencies, OECD | 2004-2007 | OECD guidelines on multinational enterprises, OECD Recommendation on export credits, Doha Development Agenda, regional/bilateral trade agreements |

## 5. MOVING FORWARD

### 5.1. Regular Review

This Action Plan and its implementation will have to be regularly reviewed, not just because of the continual developments in environmental technologies, but also to refine its measures. The Commission will closely monitor the implementation of the Plan and will report every two years to the European Council and the European Parliament, including on any need for revision.

### 5.2. European Panel on Environmental Technologies

Fostering the uptake of environmental technologies requires active support from many stakeholders at the European level. Many ongoing initiatives exist in which researchers, business and other actors exchange information and develop concrete initiatives. The Commission will explore how best to bring together these initiatives and actors in a European Panel on Environmental Technologies to improve the information flow between different actors to enable cross-fertilisation and joined-up action. The Panel will also help the Commission in implementing and further developing this Action Plan.

### 5.3. Open Method of Co-ordination

As well as taking action at European level, many of the actions in this plan need to be developed and undertaken by Member States or by other authorities which are even closer to the citizen. Considerable experience of these actions already exists in many Member States and hence there is scope for co-operation and sharing of information on best practice. Examples of where this could be particularly valuable include:

– use of economic instruments at national and sub-national level;

– consumer awareness-raising measures;

– training of key operators, such as entrepreneurs, maintenance workers and public purchasers; and

– export promotion activities.

Given the importance of this Action Plan in the context of the Lisbon Process, the Commission considers the "Open Method of Co-ordination" to be the most appropriate way of moving forward. This method for implementing the Lisbon Strategy has been used in several different areas, including in social, employment and research policy, and bearing in mind the need to avoid unnecessary bureaucracy, it is suitable for spreading best practice and helping Member States to develop their own policies and actions promoting environmental technologies. The box below sets out some of the areas where the Open Method of Co-ordination could be used to help promote environmental technologies.

Areas where the Open Method of Co-ordination could assist in promoting environmental technologies

(1) exchanging information on best practice - Identifying and exchanging information on best practice will raise stakeholder awareness at national, regional and local level. It will also highlight particularly effective combinations of measures;

(2) where appropriate, establishing indicators to compare best practice - Indicators will help to monitor progress towards the overall goal and to enable benchmarking and peer review; and

(3) where appropriate, establishing guidelines and timetables for the action programme for all the EU - This will allow a common view to be formed of how to work together towards the overall objective.

| **Moving Forward** | | | | |
|---|---|---|---|---|
| **Action** | | **Who?** | **When?** | **How?** |
| 26 | Regular Review of the Action Plan | Commission | 2006, then every 2 years | Report to European Council and European Parliament |
| 27 | European Panel on Environmental Technologies | Commission and stakeholders | 2004-5 | Analysis of existing initiatives, exchange of information |
| 28 | Open Method of Co-ordination | Member States, Commission | 2004-7 | Exchange of best practice, developing indicators, establishing guidelines and timetables. |

## 6. CONCLUSION:

The Commission is committed to the implementation of this Action Plan and asks Member States, the European Parliament and the European Council to:

– endorse this Plan and contribute to its rapid implementation;

– request the EIB Group and the EBRD to broaden the range of financing instruments, including venture capital, which can be effectively used to promote environmental technologies; and

– initiate the Open Method of Co-ordination to assist in implementing the specific actions in the Plan.

## ANNEX I: The Development of ETAP

The European Council, meeting in Stockholm in March 2001, announced that it would review the contribution that environmental technology can make to promoting growth and employment in Spring 2002. The Commission agreed to prepare a report on how this could be done. The report, "Environmental Technology for Sustainable Development", was adopted by the Commission in March 2002. In it the Commission suggested that an action plan be developed with stakeholders to tackle the obstacles to the development, take-up and use of environmental technologies. The European Council agreed to this proposal.

Following this, the Commission held a conference on environmental technology as part of Green Week 2002. This, and further stakeholder consultations, led to the publication of a Commission Communication, "Developing an action plan for environmental technology", in March 2003. This sought to deepen discussion on the content of an Action Plan by setting out a number of measures and questions as a basis for discussions. Around 70 contributions were received from a very wide range of stakeholders. These were examined in detail by the Commission's services.

In general, there was a broad agreement on the importance of the issues described in the Commission's Communication. Stakeholders felt it was important to consider both commercial and advanced technologies, as well as having a special focus on cross-cutting technologies such as ICTs. Some contributors would have preferred a more specific definition of environmental technologies, while others were content with the definition in the Communication. Of the barriers to the development of environmental technologies, the most significant were considered to be in the area of market penetration and development. There was general support for the establishment of a common EU framework for environmental technologies made up of both supply-side and demand-driven measures.

The different comments from stakeholders showed that while they may have particular preferences about the relative emphasis given to different measures and approaches, there is general agreement on several points:

- it needs to be based on a long-term vision;
- the internalisation of external environmental costs is essential;
- existing legislation is an important driver and it needs to be enforced;
- a mixture of market-based incentives, including sector-specific voluntary agreements, and strengthened legislation is required;
- concrete "performance" targets are needed;
- changes to Structural Funds and public procurement rules need to be made to assist environmental technologies;
- simplified approval and licensing procedures would be advantageous;
- continual R&D is required, in particular for the acceding states and for SMEs, along with large-scale demonstration;

– technology transfer is needed;

– education and training need to be improved.

In addition, four issue groups were established to allow for a problem-solving approach and also to facilitate stakeholder involvement. These were on climate change, soil protection, water and sustainable production and consumption. Each of these groups produced a report which reviewed the barriers to the adoption of environmental technologies in these areas and suggested possible measures that could be contained with the Action Plan.[44] This included looking at particular pieces of legislation and policy initiatives. For example, for climate change, the clean vehicle initiative, the combined heat and power action plan, the renewable energy strategy, the EuP proposal, and the Common Transport Policy were considered and for soil protection, the Thematic Strategy on soil protection[45] and the reform of the Common Agricultural Policy[46] were covered.

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44 Information on these groups is available at http://europa.eu.int/comm/environment/etap . See also, European Commission (IPTS) Promoting environmental technologies: sectoral analysis, barriers and measures – a report from the Sustainable Production and Consumption Issue Group to the EU Environmental Technologies Action Plan (ETAP), see http://www.jrc.es/home/publications/publication.cfm?pub=1168

45 COM(2002) 179 final of 16.4.2002 Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions: Towards a Thematic Strategy for Soil Protection

46 http://europa.eu.int/comm/environment/agriculture/index.htm and http://europa.eu.int/comm/agriculture/mtr/index_en.htm

## ANNEX II: The Barriers to Environmental Technologies

Barriers to the uptake of environmental technologies are numerous. The most relevant are described in the following subsections.

### Economic barriers

Market prices should provide consumers with information on the economic, social and environmental costs of products and services. However, too often, markets simply reflect the direct economic costs and not the costs of environmental pollution (such as health care costs from urban air pollution). This market failure leads to systematic underinvestment in environmental technologies, especially from firms that cannot afford to be charitable in a competitive market. At times, this problem is compounded by government interventions that further bias markets, such as subsidies to fossil fuel production and consumption, which reduce the relative attraction of renewable energy.

Investors are also put off innovative technologies by up-front costs, even if the technologies would ultimately prove economically beneficial. Firstly, switching to an environmental technology can be costly in the short run if new infrastructure is needed, such as hydrogen distribution networks for hydrogen-powered vehicles. Secondly, costs decreases can be the result of factors such as economies of scale, learning by doing and improved design. However, the benefits from 'learning by doing' do not necessarily accrue to the first mover.

Environmental technologies are often perceived as risky investments. This can be both because they are often subject to changing political priorities and because they are often not seen as being part of the investor's core business. The latter has been the case in the energy sector, where investments in renewable energies are often outside the core business and hence require a larger rate of return to become attractive. More generally, the lack of adequate venture capital, in particular for SMEs and start-ups, represents an additional barrier to the rapid market development of environmental technologies.

### Regulatory barriers and standardisation

Smart legislation can act as a stimulus to environmental technologies by requiring their development and adoption. This is the case, for example, with the IPPC directive. However, where legislation is unclear, it can lead to market uncertainty and reduce the incentives to invest. An example of this is the definition of waste recovery and disposal within the Waste Framework Directive.[47] Legislation setting limit values can also limit innovation by removing incentives to go beyond them. Legislation containing overly detailed technical specifications also reduces the latitude for innovation, thereby discouraging it. The lack of stable legislation also deters investors.

Divergent Member State legislation can also act as a barrier to environmental technologies by fragmenting the Single Market and making market penetration subject to different requirements in different Member States. This reduces the size of

[47] Council Directive 75/442/EC on waste, as amended, OJ L 194, 25.7.1975, p. 39

the potential market for these technologies and acts as a barrier to their diffusion and uptake.

Poorly set standards may also act as a barrier, by favouring one technology over an environmental technology. On the other hand, the absence of standards may mean that environmental technologies are not taken up, because there is no certainty that they meet particular performance requirements.

Developing countries have a key role to play by ensuring good governance, transparent and predictable regulatory frameworks, including protection and effective enforcement of Intellectual Property Rights (IPRs). IPRs are fundamental to making technological knowledge accessible and securing business partners and foreign investors.

**Technological barriers**

Environmental technologies, like other technologies, require R&D to become competitive. However, this R&D support is often not forthcoming. For example, it is well known that R&D funding for renewable energies is significantly lower than their political importance would imply.[48] In part this relates to market prices being biased against environmentally-friendly technologies, to the detriment of private R&D funding. In addition, public R&D may not be well enough targeted and fails to promote adequate co-operation between universities, research centres and industries.

Furthermore, the linkages are often poor between financing programmes for research and innovation and programmes for demonstration and diffusion. This hinders their progress from inception to market.

**Diffusion barriers**

The biggest barrier to diffusion is lack of information about potential environmental technologies. Without knowledge of the costs and benefits throughout the life-cycle potential customers can not be expected to buy or use the technologies.

In addition, there is often too little knowledge about the socio-economic issues influencing the uptake of environmental technologies. For example, lack of public acceptance has acted as a barrier to the use of green biotechnology products in Europe.

Even where a technology could be competitive, it may be difficult to disseminate it because distribution channels for new technologies are not as good as those for established technologies.

The lack of adequately trained staff is also an issue: insufficiently trained key maintenance staff. Where a technology is new, it requires training for it to be installed and maintained properly. For example, in the construction sector the diffusion of the most advanced energy saving technologies is dependent on small local fitters and repair companies.

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[48] International Energy Agency data suggest that less than 10% of the IEA Energy R&D budgets are spent on the different renewable energy technologies.

The preponderance of SMEs as a target audience for environmental technologies compounds the difficulties of addressing the aforementioned factors. SMEs tend to have more difficulties than larger firms in accessing finance and information that is not linked to their core business.

Finally, these barriers are likely to be particular challenges in the acceding states and further afield.

## ANNEX III: Examples of Good Practice

The following examples illustrate actions similar to those in the Action Plan, which are already implemented in some Member States, at EU level or outside Europe.

### Integrated policy approaches

Since 1994, the regional energy agency "O.Ö. Energiesparverband" of Upper Austria has been implementing an Energy Action Plan designed to promote energy efficiency. In the period 1994-1999, it achieved 30 % renewable energy take-up (14 % hydro, 14 % biomass, 2 % solar), a 30 % reduction of the energy consumption in new housing and the creation of 15 000 new jobs. During the period 2000-2010, the objective is to double the share of biomass and solar energy, and to increase the overall energy efficiency of the Region by 10 %.

New energy-efficient environmental technologies are being supported via an integrated approach that puts together demand-side measures (e.g. information and awareness raising, provision of energy advice, financial support, legal measures) and supply-side measures (e.g. training and education, standardisation and quality control, R&D programmes, networking and co-operation).

One of the renewable energy technologies promoted in this plan is wood pellets and wood chip heating using advanced and environmentally-friendly installations. There are more than 100 municipalities that using biomass for heating with 15 000 biomass heating installations and 200 district heating plants.

### Public/private research and development programmes

In the United Kingdom, a Faraday Partnership is an alliance of organisations and institutions, which can include research and technology organisations, universities, professional institutes, trade associations and firms, co-operating in research, development, transfer and exploitation of new and improved science and technology. Faraday Partnerships cover a wide range of disciplines, including one called FIRST which facilitates research, training and technology transfer for the remediation of polluted land and water by biological as well as physical and chemical methods, especially in the subsurface environment. The partners of the project develop and perform multidisciplinary collaborative R&D projects with industry, with emphasis on industrially focused market-driven projects. Moreover, industrially focused training is a major part of the activities, and another major aim is to generate new, technologically derived business through the creation of intellectual property.

The "Sustainable Enterprise" (SUSPRISE) project, recently launched under the ERA-NET and financed by 6$^{th}$ EU FP, aims to strengthen efforts to achieve sustainable industrial development by enhancing European co-ordination and co-operation of national sustainability RTD programmes. The project will:

- set up a continuous, structured and systematic exchange of national programme information;

- benchmark, co-ordinate and synchronise national programme features towards a common programme design and towards a common programme implementation strategy for industry and research infrastructure;

- identify and analyse aspects that encourage or hinder mutual opening of national programmes;

- establish a framework for a joint programme.

Project deliverables include a common knowledge base on the state of the art of the programmes involved, common programme design cases (evaluation, monitoring and project criteria), common target group implementation cases (sectorial RTD, cross-cutting RTD and non-technical), a high-level integration conference and a framework for a joint programme, including an ex-ante evaluation.

**Dissemination**

Established by the European Commission in 1995, the key task of the 70 Innovation Relay Centres (IRCs) located throughout Europe is to facilitate the transfer of innovative technologies to and from European companies or research departments (see for further information: http://irc.cordis.lu/ircnetwork/faq.cfm). Over the past years, the IRC network has become a leading European network for the promotion of technology partnerships and transfer, mainly between SMEs. The IRCs are innovation support service providers mainly hosted by public organisations such as university technology centres, chambers of commerce, regional development agencies or national innovation agencies. The IRCs have an active Thematic Group "Environment" comprised of representatives of some 29 IRCs in 14 countries and which is specifically concerned with the transfer of *environmental* technologies. Thanks to their specific strengths (e.g. their closeness to the marketplace, their integration in the technology landscape in the regions of Europe in which they are located and their intensive contacts with local enterprises, primarily SMEs) the IRCs can play a valuable role in implementing ETAP, particularly in the areas of information provision, dissemination and awareness-raising.

**Demonstration projects**

The EU has allocated approximately €300 million to the LIFE-Environment programme for the period 2000-2004. The rate of Community co-financing can be up to 30 % for projects generating substantial net revenue, 50 % in other cases. The purpose of the programme is to bridge the gap between research and development results and their large-scale application. To this end, demonstration projects based on the results of projects which have been supported under past or ongoing technological research and development programmes are encouraged. The dissemination of results is an essential element of the programme.

Example of a successful LIFE-project: an Austrian semiconductor producer supplies diodes used in fluorescent light tubes, computers, monitors, television sets and electronic automobile components. The processes to produce diodes involve the use of sintered molybdenum pins. Before using them in the process, the oxide layer on these pins must be removed. In the past, this was done by etching with nitric, sulphuric and hydrochloric acid and then washing. The waste water, which had a very high molybdenum content, was discharged into a local river, and subsequently into the Danube. In this LIFE project, it was demonstrated that the etching could be replaced by a new coating process (pre-soldering) prior to manufacturing the pins. The new process is easily transferable and is now being set up at a similar plant in Hungary.

**Public procurement**

The Environmental Association of Vorarlberg represents the environmental interests of 96 municipalities in this province of Austria. Through an ecological procurement service, a common tendering and procurement of products and services to using ecological and economic criteria is offered to the municipalities. Expert teams draw up tenders and place basic agreements with the "best bidder". "Ecology" is included in the award criteria (apart from price and other criteria) using "environmental specification sheets" which consider criteria such as durability, energy consumption, construction and choice of material, packaging and information.

**Provision of information**

The Internet Portal "Cleaner Production Germany"[49] is hosted by the Federal Environmental Agency and provides comprehensive, in-depth information on the performance of German environmental technologies and services. The portal is especially useful for establishing contacts between German and international operators active in the field of cleaner production.

The system provides information on:

- environmental technologies in Germany giving an overview of the tools used in Germany for operational and industrial environmental protection as well for the promotion of research. Directories of key operators in business, research and management are also available;

- a large number of eco-technological projects aiming to improve the environmental performance of production methods and processes. The visitor can access project contents and results, as well as additional background information.

The European GreenLight programme is an ongoing voluntary programme whereby private and public organisations (referred to as Partners) commit to adopting advanced technologies to reduced their lighting consumption. In return they benefit from large energy and costs savings as well as receiving broad public recognition for their effort in protecting the environment.

A network on contacts points in 26 countries promote the GreenLight programme. The number of GreenLight Partners is steadily increasing as awareness of the programme increases. More than a hundred public and private organisations have so far signed the GreenLight partnership, among which major players such as cities of Zurich, Lyon, Hamburg, Turin, large multinational companies as well as SMEs. These organisations have changed the way they make decisions about investments in energy-efficiency. They now use up-to-date information and Life-Cycle Cost analysis, going for the most cost-effective lighting solutions using energy-efficient light sources, electronic ballasts, lighting control systems, and proper design and maintenance.

[49] http://www.cleaner-production.de

The Programme has shown that such an initiative can further the Energy Service Companies (ESCOs) business. Many ESCOs operating in the lighting field have emerged and have become GreenLight endorsers.

While the Commission does not provide funds for the lighting upgrades, it does provide a comprehensive range of information resources to help address implementation barriers, including databanks of lighting equipment, lighting contractors, and financing sources, as well as tools for preparing and analysing lighting upgrades. Through advertisements, articles, a GreenLight Partners logo and media events, the Commission provides public recognition for the GreenLight programme and its Partners. However most of the effort is paid for or provided by the partners themselves.

**Training**

Through the Norwegian Society of Chartered Engineers, the Norwegian government finances the transfer of know-how programmes on cleaner production strategies and assessment to several Central and Eastern European countries and Newly Independent States. These programmes are designed to facilitate implementation of economically profitable and environmentally beneficial restructuring of industrial processes. Cleaner production assessments have been carried out in 100-500 production companies in each country involved over a period of one to six years. In addition, 200-800 qualified "cleaner production advisors" have been trained in each country. Specific goals are to educate a minimum of 35-60 authorised local instructors in the first one to two programme cycles, and to educate 200-750 authorised advisors during the following two to five years (to be conducted by authorised local advisors). The programmes combine classroom studies, group work, in-company project work and in-company advice. Programmes have been established in the Czech Republic, Poland, Slovakia, Lithuania and the Russian Federation.

**Promoting environmental technologies on world markets**

It is essential from a climate change perspective that, complementary to 'domestic' EU actions, substantial efforts of the developed world are geared towards assisting and supporting developing nations towards sustainable development. Within the UN Framework Convention on Climate Change, several funds have been established. There is currently a portfolio of projects totalling more than €9 billion in 70 countries. In addition, the Kyoto Protocol already includes the CDM as an instrument to promote technology transfer and sustainable development in "non-Annex I" countries. CDM projects are primarily driven by the private sector.

The Commission has proposed linking the CDM and JI to the EU Emissions trading scheme, thereby providing a stronger demand from European businesses for emission reduction through CDM projects.

At the Johannesburg summit, several initiatives have been taken in the field of energy, in particular the EU-Energy Initiative, the JREC and Energy Efficiency Partnership and the Mediterranean Renewable Energy Partnership.

In March 2003, the European Commission adopted a Communication[50] outlining an extensive action plan along four strategic priorities:

– raising the policy profile of climate change;

– providing support for adaptation to climate change;

– providing support for mitigation of climate change;

– promoting capacity development.

A framework for a Common Renewable Export Strategy has recently been developed by the European Renewable Energy Council. It identified a number of foreign markets of significant renewable energy potential in the near and longer term. It has also identified a number of measures needed to promote EU renewables exports.

**Regional co-operation**

The Baltic 21 Institute for Sustainable Industry was established to catalyse the work for sustainable development in the industrial sector in the Baltic Sea region. It is a network with representatives in the different countries in the region. The purpose is to extend co-operation on research and development and transfer of knowledge and technology. This initiative improves the network of research institutes, universities, environmental engineering businesses, manufacturing businesses and government stakeholders. Information technology plays an important role and the homepage (http://www.baltic21institute.org) allows visitors to search for business partners, funding opportunities and other relevant information.

50 COM(2003) 85 final Climate Change in the Context of Development Co-operation,

## ANNEX IV: Areas to be examined with the EBRD

This would include but not be limited to:

(1) **Credit line(s) to, or risk-sharing facilities with, local commercial banks to finance energy efficiency investments in the SME sector, as well as measures which curb greenhouse gas emissions.** The EBRD is developing this scheme in Bulgaria with grant support from the Kozloduy International Decommissioning Support Fund, to which the EU is the major donor. Typically, the grant element is used to pay for project screening and appraisal, capacity building within participating banks and incentives for both banks and end-borrowers;

(2) **Credit lines to local commercial banks to finance water pollution reduction investments in the SME sector.** With GEF support, the EBRD has set up the first such environmental credit facility in Slovenia to help clean up the Danube River Basin. The facility aims to promote environmental investments by private-sector companies and smaller municipalities.

(3) **A framework facility to support renewable energy projects in acceding states.** The framework would include a range of instruments aiming to:

(a) *address the "equity gap"* by financing project developers with a subordinated loan of up to 20 % of the total investment;

(b) *cover incremental cost.* A grant is needed to pay for the incremental costs compared to the existing electricity prices based on the present value of future electricity sales. The grant's availability is conditional on government policy introducing effective pricing and taking externalities into account. The grant will be capped and incremental costs must be justified;

(c) *secure investments against off-taker risk.* In some cases existing credit insurances can be used by project operators to secure their investment against off-taker risks. The Facility can provide a guarantee to partly compensate the project developer for the lost income if the electricity off-taker does not pay;

(d) *create Renewable Financing Company*. The proposed financing company takes equity participations and co-invests in renewable energy projects for eight to ten years together with the project developer. A financing company is better able to improve the managerial capabilities and operations than, for example, a credit line with local banks.

(4) **A framework facility to support ESCO projects in acceding states**. ESCOs are a proven and very efficient private sector method to reduce energy consumption in both the public and private sectors. Well-structured ESCO projects offer a "win-win" solution to the client (reduced energy costs) and the ESCO sponsor (profit is earned as a result of achieving or exceeding energy reduction targets). However, ESCO development in acceding states is

constrained by a number of obstacles. The EBRD, with EU support would provide technical assistance and contingent grants and/or payment guarantees.

The first two activities could be combined to form a regional EU/EBRD framework facility along the lines of the successful EU/EBRD SME Facility, focusing on the financing of environmental technology projects.

## FINANCIAL STATEMENT

**Policy areas: 07 Environment and 08 Research**

**Activity: Management and Support Expenditure**

**TITLE OF ACTION: COMMUNICATION "ENVIRONMENTAL TECHNOLOGIES ACTION PLAN"**

### 1. BUDGET LINE(S) + HEADING(S)

| | | |
|---|---|---|
| ENV | 07 01 04 01 | Legislation, awareness-raising and other general actions based on the Community action programmes in the field of the environment - Expenditure on administrative management |
| RTD | 08 03 | Nanotechnologies, intelligent materials, new production processes and devices |
| | 08 06 0101 | Sustainable energy systems |
| | 08 06 0102 | Sustainable surface transport |
| | 08 06 0103 | Global change and eco-systems |
| | 08 08 01 01 | Supporting policies and anticipating scientific and technological needs |
| | 08 08 01 02 | Horizontal research activities involving SMEs |
| | 08 08 01 03 | Specific measures in support of international cooperation |
| | 08 13 01 | Research programme for steel |

### 2. OVERALL FIGURES

**2.1. Total allocation for action (Part B): €23.676 million until 2008, of which DG ENV constitutes €1.58 million and DG RTD €22.096 million.**

**2.2. Period of application: indefinite**

**2.3. Overall multi-annual estimate of expenditure:**

(a) Schedule of commitment appropriations/payment appropriations (financial intervention) *(see point 6.1.1)*

€ million (*to three decimal places)*

| | Year 2004 | 2005 | 2006 | 2007 | 2008 | 2009 and subs. Years | Total |
|---|---|---|---|---|---|---|---|
| Commitments | | | | | | | |
| Payments | | | | | | | |

(b) Technical and administrative assistance and support expenditure*(see point 6.1.2)*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Commitments | 5.700 | 4.014 | 5.144 | 3.674 | 5.144 | 0.000 | 23.676 |
| Payments | 3.800 | 4.576 | 4.767 | 4.164 | 4.654 | 1.715 | 23.676 |

| Subtotal a+b | | | | | | | |
|---|---|---|---|---|---|---|---|
| Commitments | 5.700 | 4.014 | 5.144 | 3.674 | 5.144 | 0.000 | 23.676 |
| Payments | 3.800 | 4.576 | 4.767 | 4.164 | 4.654 | 1.715 | 23.676 |

(c) Overall financial impact of human resources and other administrative expenditure *(see points 7.2 and 7.3)*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Commitments/ payments | 1.157 | 1.157 | 1.157 | 1.157 | 1.157 | | 5.783 |

| TOTAL a+b+c | | | | | | | |
|---|---|---|---|---|---|---|---|
| Commitments | 6.857 | 5.171 | 6.301 | 4.831 | 6.301 | | 29.459 |
| Payments | 4.957 | 5.733 | 5.924 | 5.321 | 5.811 | 1.715 | 29.459 |

* Payment appropriations for the period after 2008 will depend on the level of the commitment allocations

The estimated requirements for this plan will be covered within the allocations of appropriations for the budget lines mentioned under section 1 above and granted to the managing DGs (DGs Environment and Research) in the context of the annual budget procedure.

**2.4. Compatibility with financial programming and financial perspective**

[X] Proposal is compatible with existing financial programming.

Proposal will entail reprogramming of the relevant heading in the financial perspective.

Proposal may require application of the provisions of the Inter-institutional Agreement.

**2.5. Financial impact on revenue:**

[X] Proposal has no financial implications (involves technical aspects regarding implementation of a measure)

OR

Proposal has financial impact – the effect on revenue is as follows:

***(NB All details and observations relating to the method of calculating the effect on revenue should be shown in a separate annex.)***

(€ million to one decimal place)

| | | Prior to action | Situation following action | | | | | |
|---|---|---|---|---|---|---|---|---|
| Budget line | Revenue | [Year n-1] | [Year n] | [n+1] | [n+2] | [n+3] | [n+4] | [n+5] |
| | *a) Revenue in absolute terms* | | | | | | | |
| | *b) Change in revenue* | Δ | | | | | | |

***(Please specify each budget line involved, adding the appropriate number of rows to the table if there is an effect on more than one budget line.)***

## 3. BUDGET CHARACTERISTICS

| Type of expenditure | | New | EFTA contribution | Contributions from applicant countries | Heading in financial perspective |
|---|---|---|---|---|---|
| Non-comp | Diff | NO | NO | NO | **No** [3] |

## 4. LEGAL BASIS

Treaty establishing the European Community (in particular Article 174). Decision 1600/2002/EC of the European Parliament and of the Council laying down the Sixth Community Environment Action Programme, OJ L 242, 10.9.2002, p. 1-15, and Decision No 1513/2002/EC of the European Parliament and the Council concerning the sixth framework programme of the EC for research, technological development and demonstration activities, contributing to the creation of the European research area and to innovation (2002-2006) (OJ L 232, 29.08.2002, p. 1).

## 5. DESCRIPTION AND GROUNDS

### 5.1. Need for Community intervention

5.1.1. Objectives pursued

To increase the development and uptake of environmental technologies.

5.1.2. Measures taken in connection with ex ante evaluation

In order to pave the way for a Community approach to environmental technologies, Communications were adopted by the Commission in March 2002 and March 2003, the latter launching a stakeholder consultation. From this it became clear that the development of such an approach at European level was broadly welcomed. Actions have been proposed for their capacity to deliver balanced environmental, economic and social benefits.

5.1.3. Measures taken following ex-post evaluation

This will be covered by the regular reports mentioned under 8.2.

### 5.2. Action envisaged and budget intervention arrangements

Following adoption the Communication will be transmitted to the Council and to the European Parliament for discussions. Legislation or policy initiatives on particular aspects of ETAP may well be required in the future.

All parties who come into contact with environmental technologies are concerned by the policy.

There may be a need to revise these spending estimates in the light of the results of the ongoing discussions between the Commission and the European Investment Fund on measures for leveraging investment in environmental technologies. At present no Commission contribution to such funds has been included: in any case, this contribution will be covered by the existing allocations of the two managing DGs.

### 5.3. Methods of implementation

Promotion of the plan itself will be largely an information-led exercise. The further development of the particular actions will necessitate a combination of legislation, encouragement (name and fame), co-operation and information. These financial estimates are based on the assumption that only one set of long-term targets (point 4.2.1 in Communication) will be investigated at any one time. Should several be worked on in parallel then the resource implications will have to be reassessed. Any additional resources for this will be covered by the existing allocations.

In general most of this Action Plan will be implemented through studies and projects as many of the actions are in their initial stages. In addition, as some of the work will make use of existing structures, including working through existing mechanisms, the number of meetings is often small.

## 6. FINANCIAL IMPACT

### 6.1. Total financial impact on Part B - (over the entire programming period)

*(The method of calculating the total amounts set out in the table below must be explained by the breakdown in Table 6.2)*

*6.1.1. Financial intervention*

Commitments (in € million to three decimal places)

| Breakdown | 2004 | 2005 | 2006 | 2007 | 2008 | Total |
|---|---|---|---|---|---|---|
| Action 1 | | | | | | 0 |
| Action 2 | | | | | | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| etc. | | | | | | 0 |
| **TOTAL** | 0 | 0 | 0 | 0 | 0 | 0 |

*6.1.2. Technical and administrative assistance, support expenditure and IT expenditure (commitment appropriations)*

| | 2004 | 2005 | 2006 | 2007 | 2008 | Total |
|---|---|---|---|---|---|---|
| 1) Technical and administrative assistance | | | | | | |
| a) Technical assistance offices | | | | | | |
| b) Other technical and administrative assistanc e:<br><br>- intra muros:<br><br>- extra muros:<br><br>*of which for construction and maintenance of computerised management systems* | | | | | | |
| Subtotal 1 | | | | | | |
| 2) Support expenditure | | | | | | |
| a) Studies | 5.35 | 3.784 | 4.884 | 3.384 | 4.884 | 22.286 |
| b) Meetings of experts | 0.35 | 0.23 | 0.26 | 0.29 | 0.26 | 1.39 |
| c) Information and publications | | | | | | |
| Subtotal 2 | | | | | | |
| **TOTAL** | **5.7** | **4.014** | **5.144** | **3.674** | **5.144** | **23.676** |

**6.2. Calculation of costs by measure envisaged in Part B (over the entire programming period)**

Commitments (in € million to three decimal places)

| Breakdown | Type of outputs (projects, files ) | Number of outputs (total for years 1to 5) | Average unit cost | Total cost (total for years 1to 5) |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4=(2X3) |
| Improving research | | | | |
| - expert consultations | Meeting reports | 32 | 0.004 Mio € | 0.128 Mio € |
| - studies | Final reports | 8 | 2.073 Mio€ | 16.586 Mio €[52] |
| Right market conditions | | | | |
| - expert consultations | Meeting reports | 30 | 0.004 Mio € | 0.120 Mio € |
| - studies | Final reports | 9 | 0.122 Mio € | 1.100 Mio € |
| Acting globally | | | | |
| - expert consultations | Meeting reports | 0 | 0.004 Mio € | 0 Mio € |
| - studies[51] | Final reports | 3 | 1.5 Mio € | 4.5 Mio € |
| Moving forward | | | | |
| - expert consultations | Meeting reports | 23 | 0.004 Mio € | 0.092 Mio € |
| - studies | Final reports | 1 | 0.1 Mio € | 0.100 Mio € |
| TOTAL COST | | | | 22.626 Mio € |

The allocation of studies to the five actions is indicative. The average cost conceals large variations. Those actions covered by the 6FP are considerably more expensive.

[51] This is covered by DG RTD research co-operation which is expected to improve the situation for environmental technologies in third countries.

[52] The main part of this budget (€13.5 million) will be used to launch the pilot phase of four testing networks and three technology platforms through financing coordination actions or specific support actions. The remainder is for setting up common EU databases and directories on environmental technologies (€1.25 million), the financing of national and regional programmes coordination actions (i.e. ERA-NET) (€0.835 million), and studies on how best to stimulate stakeholders to be more active in the demonstration component of the Framework Programme and to examine possibilities for using article 169 (€1.001 million).

## 7. IMPACT ON STAFF AND ADMINISTRATIVE EXPENDITURE

The needs for human and administrative resources will be covered within the allocation granted to the managing DGs (Environment and Research) in the context of the annual budget procedure.

### 7.1. Impact on human resources

| Types of post | | Staff to be assigned to management of the action using existing and/or additional resources | | Total | Description of tasks deriving from the action |
|---|---|---|---|---|---|
| | | Number of permanent posts | Number of temporary posts | | |
| Officials or temporary staff | A<br>B<br>C | 5.3<br>1<br>1 | | | Desk officers and management<br>Study contracts, payments, informatics<br>Secretarial support |
| Other human resources | | | | | |
| Total | | 7.3 | | | |
| | | | | | |

Posts covered by the research budget are classified as permanent posts. Calculated on the basis of 1 A grade for 0.2 B and 0.2 C grades. Values taken as the average over 2004-2008. This breaks down as 5.3 posts for DG RTD per year and 2 for DG ENV.

### 7.2. Overall financial impact of human resources

| Type of human resources | Amount (€) | Method of calculation * |
|---|---|---|
| Officials<br>Temporary staff | 0.791 Mio € | 7.3 x 108,000 € |
| Other human resources<br>(specify budget line) | 0 | |
| Total | 0.791 Mio € | |

The amounts are total expenditure for twelve months. This breaks down as €0.57 million for DG RTD and €0.21 million for DG ENV.

### 7.3 Other administrative expenditure deriving from the action

| Budget line | Amount Mio € | Method of calculation |
|---|---|---|

| | | |
|---|---|---|
| (number and heading) | | |
| **Overall allocation (Title A7)**<br><br>A0701 – Missions<br><br><br><br>A07030 – Meetings<br><br><br><br>A07031 – Compulsory committees [1]<br><br>A07032 – Non-compulsory committees [1]<br><br>A07040 – Conferences<br><br>A0705 – Studies and consultations<br><br>Other expenditure (specify) | <br><br>€0.026<br><br><br><br>€0.340<br><br><br><br>covered under 6.2 | <br><br>20 x €1300 (based on two-day missions including €300 indemnity + €850 travelling + €150 accommodation)<br><br>Average over five years with €20,000 per meeting |
| **Information systems (A-5001/A-4300)** | | |
| **Other expenditure - Part A** (specify) | | |
| Total | €0.366 | See above |

The amounts are total expenditure for twelve months.

[1] Specify the type of committee and the group to which it belongs.

| | | |
|---|---|---|
| I. | Annual total (7.2 + 7.3) | €1.157 Mio |
| II. | Duration of action | 5 years |
| III. | Total cost of action (I x II) | €5.783 Mio |

## 8. FOLLOW-UP AND EVALUATION

### 8.1. Follow-up arrangements

The Commission proposes to review the effectiveness of the ETAP every two years following its publication. For this purpose the Commission will prepare a report which will be published and submitted to the institutions.

### 8.2. Arrangements and schedule for the planned evaluation

The precise procedures for the implementation will have to be arranged.

## 9. ANTI-FRAUD MEASURES

The proposed activities only consist of expenditure on personnel, expert meetings, study contracts and missions. Contracts will be subject to the Commission's usual control mechanisms and therefore there is no need for supplementary anti-fraud measures.