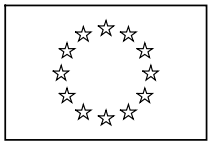

COMMISSION OF THE EUROPEAN COMMUNITIES

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COMMUNICATION FROM THE COMMISSION

Developing an action plan for environmental technology

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EXECUTIVE SUMMARY

In March 2002, the Commission issued a Communication on "Environmental Technology for Sustainable Development" which argued that environmental technology could contribute to sustainable development by protecting our environment and at the same time contributing to economic growth. However, at present market barriers and a number of other obstacles prevent them from realising their full potential.

The Commission therefore proposed to the Barcelona European Council that it develops with stakeholders an action plan to tackle obstacles to the development, take-up and use of environmental technologies. The Barcelona European Council approved this proposal in March 2002, confirming the political importance of environmental technology.

To deliver a strategic and concrete action plan requires the participation of all stakeholders throughout the whole policy chain. To facilitate this process, the Commission services have prepared this Communication on the first findings as a starting point of the consultation with stakeholders. We intend to put forward an action plan on environmental technology to be adopted by the Commission by the end of 2003.

In developing the action plan the Commission has decided to focus on four environmental issues: climate change, soil protection, sustainable production and consumption, and water. These issues are all linked to the priority areas identified in the 6th Environmental Action Programme. They are also covered by the Sixth Framework Programme for Research, and are relevant to the decisions at the World Summit on Sustainable Development.

The aim is to identify promising technologies, any barriers holding them back, and the appropriate measures to overcome these barriers. Already it is apparent that there are similarities in the barriers across different environmental fields: for example, economic barriers such as pricing structures that do not penalise pollution, poor access to finance coupled with long investment cycles, poor dissemination of new technologies, technical barriers that need to be overcome through targeted research efforts, organisational barriers and a lack of awareness and skills.

This Communication sets out a number of issues emerging from its preliminary analysis, and invites feedback from stakeholders on them. It also invites Member States and Candidate Counties to participate in the debate.

1. INTRODUCTION

As set out in the Commission's March 2002 Report[1], environmental technologies – all technologies whose use is less environmentally harmful than relevant alternatives[2] - not only protect our environment, they also have the potential to contribute to economic growth, in a number of ways. Provided they reduce the costs of environmental protection, they allow us to get more environmental protection for less money, or to meet current standards at a lower cost. They also help to de-couple environmental pollution and resource use from economic growth, allowing our economies more scope to grow in the long run without compromising social well-being and quality of life.

Therefore, environmental technologies can be an important bridge between the Lisbon Strategy objective of making the European Union "*the most competitive and dynamic knowledge-based economy in the world*" and the environmental dimension of the Sustainable Development Strategy agreed at the Göteborg European Council in June 2001.

Reflecting the potential "win-win" character of environmental technologies, the Commission published its Communication "Environmental Technology for Sustainable Development"[3] in March 2002, proposing the development of an Action Plan for environmental technologies. The Barcelona European Council responded by approving this proposal, giving a clear mandate to the Commission.

The Action Plan should be seen in the context of the Lisbon Strategy. Fostering technological progress and renewing the EU's capital stock are major aims of the Lisbon Strategy, which sees the need for policies that could raise the growth rate of the EU economy to around 3%.

To help technological progress, the rate of investment growth in Research and Technological Development needs to be substantially accelerated - the European Council has set a target of 3% of GDP for the overall level of public and private spending on research. Building the European Research Area can harness the efforts of both the public and private sectors and exploit the synergies between European and national efforts. Measures in this area will also encourage investment in environmental technology[4]. In addition, EU and national innovation policies, that focus on removing barriers to the transfer of technology, will also contribute to promoting environmental technology. However, there are a number of factors specific to this field that also need to be addressed, such as market prices which do not reflect environmental impacts. The environmental technology Action Plan will overcome these general and specific barriers to investment in environmental technology.

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1 COM(2002) 122 final of 13 March 2002.

2 As set out in chapter 2 of the Commission's March 2002 Report, the concept of environmental technology should not be limited to a small number of core activities. It includes both low and high-tech applications as well as skills and know-how. For instance, relatively modest adaptations in industrial processes by means of piping, screens, filters, tanks etc, can be just as important – and more accessible - as high-tech applications.

3 COM(2002) 122 final.

4 These measures are discussed in the Communication "More Research for Europe - Towards 3% of GDP" COM(2002) 499.

The purpose of this Communication is two-fold:

- to set out the preliminary analysis in a limited number of areas;
- to form the base for a dialogue with stakeholders.

Chapter 2 provides a summary of the process, explains the choice of issues, and sets out the role for stakeholders. Chapter 3 provides some examples of current research areas and the markets into which they will enter. Chapter 4 reports on the assessment of the European Climate Change Programme from a technology perspective. Chapters 5 and 6 report on preliminary analyses in the areas of sustainable production and consumption and water, whilst Chapter 7 sets the scene for analysis in the area of soil protection. Chapter 8 details a possible way forward and invites feedback from stakeholders on the key issues.

2. PROCESS FOR THE ANALYSIS AND FOR STAKEHOLDER INVOLVEMENT

The EU already has in place policies and instruments designed to promote environmental technology. For example, Integrated Pollution Prevention and Control[5] is an important driver for the dissemination and development of environmental technology, as operators of certain industrial installations must apply for a permit based on best available techniques. Also, the EU Research Framework Programmes provide financial support for research in relation to environmental technologies and the LIFE[6] Programme finances demonstration actions in this domain.

However, the Communication "Environmental Technology for Sustainable Development" identified the potential value-added from a specific policy effort targeted towards environmental technologies. This is why the Commission proposed "*an Action Plan based on a rigorous analysis of the issues as well as a broad consultation of stakeholders from industry, the research community, NGOs and governments, both within the EU15 and the Candidate Countries*". Stakeholders include the producers and users of environmental technologies, trade unions, as well as the providers of training and education who ensure that people are suitably qualified to develop, use and maintain new technologies.

It will include:

- a survey of some relevant (environmentally, economically and socially) promising technologies that could address some of the main environmental problems;
- the identification, with stakeholders, of the market and institutional barriers that are holding back development and use of specific technologies;
- the identification of a targeted package of measures to address these barriers, and building on existing instruments.

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5 http://europa.eu.int/comm/environment/ippc/index.htm

6 http://europa.eu.int/comm/environment/life/home.htm

2.1. Process for the Analysis

The process being followed includes a number of steps to ensure that the final Action Plan is also endorsed by stakeholders.

- The Communication of March 2002, "Environmental Technology for Sustainable Development", laid the ground for the development of the Action Plan, and set out its broad mandate.

- This Communication is designed to report on progress: providing a report on early findings including some broad orientations for future action points in order to provide the basis for an efficient consultation, without pre-empting the content of the Action Plan.

- A Communication towards the end of 2003 will include a more comprehensive identification of promising technologies, barriers to them and action points to overcome these obstacles.

2.2. Choice of Environmental Issues

Four issues have been chosen so that focused analyses can be carried out leading to operational and specific action points. These issues have an environmental focus, to allow for a problem-solving approach and also to facilitate stakeholder involvement. For each of these issues horizontal topics such as technology transfer and Information Communication Technologies will be covered. The work is and will be carried out by 'Issue Groups' on:

- Climate Change

- Sustainable Production and Consumption

- Water

- Soil Protection

These issues are all linked to priority areas identified in the 6th Environmental Action Programme[7] and are covered in the Sixth Framework Programme for Research[8]. They are also relevant to the discussions at the World Summit on Sustainable Development in Johannesburg and to the EU's Industrial Policy[9]. Together, the work of these four Issue Groups will form the basis for the Action Plan.

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[7] Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laid down the Sixth Community Environment Action Programme. Details can be found at http://europa.eu.int/comm/environment/newprg/index.htm

[8] http://www.cordis.lu

[9] See the Commission's Communication Industrial Policy in an Enlarged Europe – COM(2002) 714 final of 11 December 2002.

2.3. Stakeholder Involvement

As part of Green Week 2002, the Commission held a conference on environmental technology designed to elicit the initial views of stakeholders on the development of the Action Plan[10]. During the discussions, it was noted that stakeholders would contribute only when they saw that the Commission was committed to the issue. This is one of the reasons for this Communication, which also provides the basis for a constructive dialogue.

For the preliminary analysis reported in this Communication, external stakeholders were consulted either through existing consultation mechanisms or through bilateral consultations. From 2003 onward, the Commission wants to increase the involvement of stakeholders. In particular, the Commission will publish reports on the analysis undertaken in an Environmental Technology website[11] and invite stakeholders to participate in each of the Issue Groups. A number of questions are also asked at the end of this Communication.

3. TRENDS IN RESEARCH, AND THE MARKET FOR THE TECHNOLOGIES OF THE FUTURE

It is useful to have in mind some 'promising' technologies, to ensure that the analysis of the barriers is operational. It is not possible to provide a comprehensive list of all promising technologies. Instead, this Chapter gives a picture of what is going on at the moment in the research community of Europe, and a brief description of the market for the technologies which may emerge.

3.1. Trends in research and the technologies of the future

Prior to the adoption of the Sixth Framework Programme for Research, the Commission invited the research community to submit Expressions of Interest. Their ideas have been taken into account to a considerable extent by the research work programme. An examination of these ideas, combined with the preliminary analysis of the Issue Groups and stakeholders provide a snapshot of some technologies researched at European level. Of course, research at national level also covers some additional key technological areas.

Some examples of key research areas are given below.

3.1.1. Climate Change

- Hydrogen production, transport, storage and end-use from fossil, renewable and other sources; fuel cell systems for clean decentralised energy supply; greenhouse gas-free energy options and technologies to sequester carbon dioxide from fossil fuels; Renewable Energy Sources such as wind, biomass, photovoltaics, wave or ocean energy.

- Surface and aeronautical transport technologies that can lead the way towards near zero emission engines including more efficient internal combustion engines.

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[10] The papers and a summary of the discussion from Green Week Sessions 8, 12, 16 and 21 on environmental technology can be found at http:/europa.eu.int/comm/environment/etap

[11] http:/europa.eu.int/comm/environment/etap. For example, the working papers underlying this Communication are available on this website.

– Work organisation and innovations in workplace design that cut work-related travel and lead to more efficient use of office facilities.

3.1.2. Sustainable Production and Consumption

– Resource-based approaches to move us from quantity to quality, and away from mass produced single-use products towards value added services (intangible value creation).

– Nano-science and nano-technology; clean processes, products and materials accompanied by an emphasis on life cycle thinking.

– Technologies for the treatment of waste, including hazardous waste, with recovery of materials.

3.1.3. Water

– Improved water metering and leak detection systems; decentralised distribution and sewage water systems; technologies for sustainable water recycling/reuse from rain, grey and black water.

– Remote sensing, standards for measurement methods and data collection; multi-sensors, mathematical models and civil works for flood prediction/prevention and impact mitigation.

– Membrane based technologies, advanced oxidation, innovative separation and recycling technologies; tailor-made biofilms and advanced biological nutrient removal processes; anaerobic treatments; sewage sludge technologies.

3.1.4. Soil Protection

– Biotechnology and life science technologies that improve our understanding of soil microbiology and microbial diversity, and are relevant to bio-remediation of contaminated soils.

– Technologies that fight land degradation, desertification, and soil contamination and help protect vulnerable ecosystems.

– Techniques for soil monitoring and the development of agri-environment indicators on soil erosion and degradation.

3.1.5. Cross-cutting enabling Technologies

– Information Communication Technologies for better control of industrial production processes (such as sensors, actuators, control systems) that improve data integration and standardisation, management and monitoring; "eBusiness" in general.

– Environment-related applications of biotechnology.

– Global Navigation Satellite Systems, Global Monitoring for Environment and Security and the Galileo programme for Radionavigation by satellite.

– Socio-economic research into developing policy analysis tools: for example, tools to internalise environmental costs into pricing and accounting systems.

3.2. The environmental technology context

Technologies that become economically and environmentally attractive will be taken up by business, governments and households. It is important to understand their future market. Statistics specifically on environmental technology are not available, but there are statistics for the European ecoindustry (the producers of many environmental technologies) that provide an indication of market trends[12]. These are provided in the box below.

Box 1 Market for environmental protection and resource management

♦ The EU eco-industries supply some 183 Bn euros of goods and services a year (around 500 euros per person). Pollution management and cleaner technologies accounts for around 127 Bn euros and resources management (excluding renewable energy plant) around 56 Bn euros.

♦ In real terms, total pollution management and cleaner technologies expenditure has risen by 5% per annum since 1994. The private sector is increasingly important, accounting for 45% of total expenditure in 1994 and 59% in 1999.

♦ Direct employment in the EU in eco-industries amounts to over 2 million jobs. Total direct employment resulting from pollution management and cleaner technologies has risen by around 500,000 jobs since 1994.

♦ In the Candidate Countries, pollution management and cleaner technologies eco-industries supply around 10.3 Bn euros of goods and services a year (equivalent to 1.9% of their GDP).

4. CLIMATE CHANGE

Climate change has been tackled in a different way to the other issues examined in preparation of the Action Plan and discussed in the Chapters below. Instead of carrying out a new analysis, the Issue Group sought to build upon the experience accumulated in the European Climate Change Programme (ECCP). An analysis of the ECCP was therefore undertaken from a technology perspective with the aim of identifying best practice and identifying technology analysis and research needed in the future. A summary of the work undertaken so far and to be continued in 2003 by the Climate Change Issue Group is given in this chapter.

4.1. Background of the European Climate Change Programme

The ECCP was established in June 2000 as a multi-stakeholder consultative process, to help identify the most environmentally sound and cost-effective additional measures enabling the EU to meet its target under the Kyoto Protocol. The first phase of the ECCP was finalised in 2001[13]. The second phase of the ECCP is ongoing, and designed (1) to ensure that the most

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[12] The figures in this section are based on the study:"*Analysis of the EU eco-industries, their employment and export potential*", Ecotec, 2002, available at http://europa.eu.int/comm/environment/enveco/studies2.htm#industry-employment

[13] The final report of the first phase of the ECCP formed the basis for the Communication from the Commission "on the implementation of the first phase of the European Climate Change Programme" of October 2001 COM(2001) 580 final.

advanced measures of the first phase are translated into concrete policy proposals and (2) to investigate further a number of specific policy areas and (3) to consider research needed for the post-Kyoto period.

4.2. The Concept and Promotion of Environmental Technology

From the start, the ECCP has been developed as a policy oriented program, rather than a technology oriented one. Work therefore focussed on bringing potential policy measures to the surface and analysing them in terms of emission reduction potential, costs and possible other consequences. In this process, the uptake of environmental technologies available, or to become available, as a consequence of a specific measure, is of course a key component of the assessment.

The technologies that enable the ECCP measures to be implemented include low and high tech solutions, production processes, management, and both available but not adopted technologies and technologies still at the research phase.

4.3. The Identification of Barriers

The ECCP has confirmed that there is a great emissions reduction potential, but that much of this potential has remained unrealised because of obstacles that hinder the market penetration of the relevant technologies. This is why, within the ECCP, a number of different barriers have already been identified along with specific actions to overcome them.

4.3.1. Technical Barriers

In the initial stages of development, technical barriers dominate. Purely technological problems need to be overcome by research and development. A number of specific recommendations were made regarding the need to invest in new methodologies and technologies to make mitigation more cost effective and socially acceptable, giving particular emphasis to interdisciplinary break through technologies.

4.3.2. Regulatory barriers

Regulation that is not conducive to new technologies can slow down market penetration. One example, is the question of how the regulations (planning, safety etc) need to be adapted to facilitate the introduction of hydrogen, bio-fuels or natural gas as an automotive fuel. In such areas, the New Approach - a combination of technical regulations that are limited to essentials and standards that can more easily be adapted to technical change – may be able to play a useful role.

4.3.3. Economic Barriers

Technically mature technologies can be held back by inconsistent pricing structures and non-internalisation of external costs. Several priority measures in the ECCP addressed this important aspect, by allowing support schemes (proposal on combined heat and power[14],

[14] COM(2002) 415 final.

Directive on renewable energy sources for electricity[15]) or improving taxation and/or charging systems (e.g. transport infrastructure use and charging)[16].

In addition, the step from pilot projects towards large-scale application usually needs to be accompanied by considerable investment but:

- Investment is more likely if there is sufficient confidence that there will be demand for the technologies, while increased demand is dependent on the cost reductions that arise from large-scale application. The setting of targets in the bio-fuels proposal[17] created more certainty for long term investment decisions.

- The needed investment requires access to financing (equity, loans), but investors may be put off by perceived risks of the new technology.

Barriers to market penetration for competitive technologies can arise from 'split incentives', i.e. when the owner/buyer of equipment does not pay the running cost. This can mean that 'win-win' solutions are not adopted, for example, in relation to insulation or energy efficient heating of rented housing.

4.3.4. Social Barriers

General lack of awareness, data/information or experience can be a barrier to adoption. This is why, for example, a public awareness campaign and a campaign for takeoff on energy efficiency are deemed necessary.

4.4. Next Steps

The ECCP demonstrates the importance of integrating climate change into other policy areas. This process needs to be strengthened and widened:

- The 10 new Member States joining the EU are expected to show rapid growth, supported by substantial EU funds. In order to prevent greenhouse gas emissions from rising accordingly, and given the long-term effects of investments in the transport, energy and waste sectors, the Issue Group will explore ways to better integrate climate change considerations into investment decisions.

- The CAP reform proposals[18] include a number of instruments to better integrate environmental concerns, which are expected to contribute directly to greenhouse gas mitigation and create increased possibilities for Member States to insert climate change considerations into their national Rural Development Plans.

Setting politically agreed, long-term targets - in combination with adequate policies and measures - convinces market players to invest and lift emerging technology to large-scale application, thereby realising a "technology push". The scope for further technology push will be examined in the context of the "Coalition of the Willing".

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15 (RES-E) - 2001/77/EC – see: http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_283/l_28320011027en00330040.pdf

16 see the Transport White Paper (COM(2001) 370).

17 COM(2001) 547 final.

18 COM(2002) 23 final.

The Issue Group will also assess future RTD needs for policy support in climate change and related areas and ways of mainstreaming research with policy making. Already Technology Platforms and Public-Private co-operation can be identified as relevant options. Forward looking analysis for the time horizon of Kyoto and beyond carried out currently in European institutes will set the stage.

A comprehensive analysis of the support being given to promising technologies (e.g. hydrogen, fuel cells and photovoltaics) will be undertaken to assess whether their market breakthrough can be better supported.

5. SUSTAINABLE PRODUCTION AND CONSUMPTION

The concept of sustainable production and consumption (SPC) covers a wide range of issues such as production processes, the eco-design of products, new concepts of products-services, and consumption and lifestyle aspects. A number of barriers in this domain can be illustrated with the example of technologies in the area of waste management both in relation to material recovery (e.g. recycling and composting), energy recovery (e.g. incineration, pyrolysis and gasification) and final disposal (landfills)[19].

5.1. Barriers

5.1.1. Regulatory Barriers

Waste legislation is designed to give rules ensuring the sound management of waste. These rules need to be controlled and enforced. This implies administrative procedures that may be perceived as a regulatory barrier. Most prominently, this has led to a debate on the definition of waste (e.g. the distinction between waste and non-waste).

Complying with Community and national rules on waste management also means that local authorities cannot decide on all aspects of waste management themselves. In particular, the principle that waste for recovery is subject to the application of internal market rules[20] means that local authorities cannot oblige private actors to deliver waste to particular installations. This can be a barrier - for example if expensive high standard installations risk not getting the waste necessary to fill their capacity. This underlines the need for harmonised minimum requirements at Community level for recovery installations to avoid the waste going to cheaper, less performing installations. Community legislation therefore has a crucial influence on whether waste management technology is viable.

Whilst technical standards may boost the direct re-use of component recycled materials by increasing confidence in the quality and properties of the material, they may in some cases also act as a barrier.

Similarly, authorisation procedures are necessary for safety reasons but the lack of a uniform authorisation procedure can force a company to go through separate, and often lengthy, approval procedures for every Member State.

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[19] This paragraph builds on the preliminary analysis undertaken by the IPTS in the context of the work of the Sustainable Production and Consumption Issue Group.

[20] With certain limited exceptions.

5.1.2. Economic Barriers

Price signals are a significant barrier if they dissuade business from investing. High cost of collection, sorting and recycling operations in comparison with alternative waste management options may influence the competitiveness of recycling industries and of those providing "cleaning" technologies. This is particularly true for the recovery of materials from "difficult" waste streams (e.g. households wastes) for which even demand can sometimes be insufficient and dissuades investment in more advanced technologies.. Promising technologies are often more likely to pay off in the medium to long term. However, this is not yet sufficiently well recognised, leading to too many decisions focusing on the short-term. On the other hand, long natural investment cycles involving pay- back times of up to 30 years, may act as a barrier to short-term changes in production processes.

5.1.3. Social Barriers

The acceptance of specific technologies in the area of waste management (e.g. Anaerobic Digestion as a form of material recovery) is often hampered by an imprecise knowledge of the associated environmental and economic benefits.

Recycling activities may be constrained by quality and safety constraints (e.g. in the case of recycled tyres where concerns over safety stand in the way of their increased market share).

Relevant actors are not always aware of promising waste management options. This points to the need to stimulate co-ordination of actions and exchange of best practices[21]. A good example of which is the ongoing work on a Best Available Technology Reference document on waste treatments in the context of the Integrated Pollution Prevention and Control.

There is insufficient investment in human resources with training needed to develop, use and maintain new technologies.

Even though many new eco-materials are available, they are often not demonstrated on a large-scale basis. More generally, dissemination is a particular problem in the international context where countries may fail to take advantage of potentially efficient technologies or adopt obsolete technologies.

5.2. Next Steps

In its further work, the Issue Group will concentrate on:

- production processes (including input of raw materials and energy, process design, organisation of production)
- products (including eco-design, and new concepts of "products/services")
- consumption and lifestyle aspects such as e-work

[21] See in this respect, for example, the recent EEA topic report 2/2002 "Case studies on waste minimisation practices in Europe" which contains a catalogue of successful examples of waste prevention, recycling and cleaner technology in Europe.

- a number of specific sectors (both industrial sectors and non-industrial ones) in order to illustrate barriers and identify good practice that could add value elsewhere

The Issue Group will combine the analysis of environmental technologies of a horizontal, cross-sector nature with the assessment of sector specific ones. Examples of cross-sectoral technologies that will be considered are biotechnology, eco-design and the concept of product-services. Examples of sectors that will be examined are: pulp and paper; iron and steel; non-ferrous metals; refineries; waste management; mining and quarrying; plastics; construction; as well as agriculture and fisheries if appropriate.

5.3. Stakeholder Consultation

To complement the Commission's own expertise, an Advisory Expert Group will be set up consisting of around 30 participants from research, industry, NGOs, and public bodies. Where necessary, more specific issues (both cross-sector and sector-specific) will be examined by separate Working Groups. These may be specifically established for this purpose or, ideally, take advantage of existing frameworks.

6. WATER

The serious environmental and socio-economic concerns in the water area, combined with the innovation-friendly approach of the Water Framework Directive, have created a favourable background for the development, dissemination and use of technologies. For example, new environmental quality objectives make technologies that today are not economically competitive become so. However, barriers still exist.

6.1. Barriers

6.1.1. Technical Barriers

The passage from laboratory developments to full-scale applications often takes too long or is not completed. This dissuades investment in promising technologies, especially from SMEs without the financial strength to see through this period. A good example of how this problem was overcome was when the Netherlands government launched a three-year applied research programme aimed at removing Nitrogen and Phosphorus from existing waste water treatment plants. By involving end-users and water industries, and because of the specific focus of the programme, innovative technologies were quickly identified and introduced.

6.1.2. Regulatory Barriers

EU water-related legislation sets binding environmental and/or health standards, but provides full flexibility as to how to achieve these objectives. Legislation thus permits and encourages progress in environmental technology. However, the sector of water supply, distribution, collection and treatment is traditionally “conservative” because of the size and long-term nature of infrastructure investment. This conservatism is one reason why concepts such as decentralised systems, multiple networks, and vacuum sewers are often not adopted.

This conservatism can also be reflected in the poor use of existing technologies. For example, the Court of Auditors noted that "A large number of projects were designed a long time before their construction started and had not always been adapted to take account of population and pollution increases or technological changes."[22]

The projects and infrastructure financed through public funds have a general tendency to apply conventional and well-known technologies, even though the assessment of the proposed technologies is based on their environmental impact as well as on cost-benefit analyses.

6.1.3. Economic Barriers

Water pricing often does not take into account the resource costs and the external environmental costs, and so lead to water being either wasted or polluted. This can be seen, for example, in the low take-up of water saving technologies by households.

6.1.4. Social Barriers

There may be insufficient benchmarking and identification of best practice projects.

6.2. Next Steps

This preliminary analysis reported above will be developed into a more comprehensive analysis concentrating on barriers and packages of measures. This work will include a focus on:

- The role of public funds in promoting clean technologies with, in particular, the forthcoming review of Structural Funds to be borne in mind.
- Economic measures and incentives in the context of the Water Framework Directive, which has as one of its key pillars water-pricing based on cost recovery including environmental and resources costs.
- Improving the diffusion of high quality information at all levels, from specialist to general public and, in particular, whether there is scope to improve the links between research programmes and demonstration programmes.

6.3. Stakeholder Consultation

For this preliminary analysis, the Water Issue Group held an initial consultation with 25 stakeholder entities representing experts, scientific associations, professional organisations, industrial organisations and NGOs. The replies provided a good spectrum of views on promising technological evolution and the barriers slowing down the innovation process. This stakeholder consultation will be continued and expanded.

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[22] Extract from: European Court of Auditors, special report n°3/98 concerning the implementation by the Commission of EU policy and action as regards water pollution.

7. SOIL PROTECTION

The pressures of population and development (agricultural, industrial and other) have increased and, with them, so have concerns about environmental impacts on soil. In response, soil protection was addressed by a recent communication[23] and the 6th Environmental Action Programme requires a Thematic Strategy on Soil Protection.

The proposed Thematic Strategy for Soil Protection will identify needs and deliverables related to protection and sustainable use of soil. In particular, soil erosion, organic matter and contamination will be dealt with. A legislative initiative on soil monitoring has been scheduled for 2004. The emphasis will be on a comprehensive approach including *integration* of soil protection issues into Community policies.

Given the complexity and, in some respects, evolving policy framework, it was decided not to start the analysis of soil protection until 2003. This will allow the Issue Group to learn the lessons from the preliminary analysis of the other environmental issues. It will also allow the analysis to be developed in parallel with the development of the Thematic Strategy, and taking into account the considerable research into environment technologies for soil protection.

8. THE WAY FORWARD

The analysis so far has confirmed that there are promising technologies that can deliver both environmental and economic improvements. Some of these technologies are still under development but have the potential to result in not just incremental but also fundamental innovation. Other technologies are ready to be used but are unable to penetrate the market because of a number of technical, economic, regulatory and social barriers.

In particular, economic barriers are consistently a problem with price signals, costs, competitiveness considerations and long investment cycles often deterring investment. Also, problems with the dissemination of new solutions seem similar across the board. There are though differences, especially with regards to regulatory barriers, which support the splitting of the analysis according to environmental issues.

8.1. Measures for discussion

Over the coming year it will be necessary to deepen the analysis and examine the emerging action points with stakeholders. The Commission does not wish to prejudge the outcome of any such debate by making concrete proposals for action. However, the preliminary analysis reported in this Communication suggests the following possible measures could act as the basis for a dialogue with stakeholders:

8.1.1. Technical Measures

- Targeting research using initiatives such as Technology Platforms, Public-Private co-operation in promising technologies, Investor's support, Decision maker's Forums and special applied research programmes

[23] COM(2002) 179final, "Towards a Thematic Strategy for Soil Protection".

- Organising and supporting co-operation between universities, research centres and industries using measures such as networks of excellence, standardisation, integrated projects and Stakeholder Forums.

8.1.2. Regulatory Measures

- Make sure that investment decisions relating to long-term infrastructure are innovation friendly. The Commission will examine the scope to do this in the context of the reform of the Structural Funds or other EU policy areas.

- Remove regulatory barriers to the market penetration of new technologies, including legislative requirements tailored towards any specific technologies.

- Assess the feasibility of existing and future regulation in terms of environmentally and economically viable technologies.

- Remove barriers to competition reviewing, for example, unnecessary delays caused by authorisation procedures that differ between Member States.

8.1.3. Economic Measures

- Ensure that markets are not sending the wrong price signals. For example, in the water sector, it is necessary to exploit the potential of the Water Framework Directive to this end especially in the context of the reform of the Common Agricultural Policy; in the context of sustainable production and consumption we need to ensure that private and public entities are properly informed and encouraged to adopt new technologies.

- Identify more specifically the barriers to integrated technologies (as opposed to end-of-pipe technologies) as a means of sustainable production and consumption.

- Develop sector specific measures to harness the ability of business to innovate: for example, using eco-efficiency approaches and Integrated Product Policy.

8.1.4. Improving the Diffusion of New Solutions

- Work with stakeholder to understand, and remove, the barriers to the diffusion of environmental technologies.

- Support the translation of pilot projects into large-scale applications building on experiences with demonstration programmes such as LIFE.

- Identify ways of improving the diffusion of cost-effective environmental technologies to countries outside the EU, and in particular water and renewable technologies in line with the agreement at Johannesburg. Ways to improve partnerships with developing countries including with the support of existing public funds and mechanisms such Clean Development Mechanism, Global Environment Facility, Development aid, international standardisation etc….).

Table 1 provides a summary of the potential measures for discussion with stakeholders, breaking them down according to the different environmental issues.

Table 1: Potential Issues for Discussion with Stakeholders

Issues Barriers	**Climate Change**	**Sustainable Production and Consumption**	**Water**
Technical barriers			
Technologies still at development stage	- Encourage promising technologies through national programmes and the 6th Framework Programme for Research - Give priority to environmental technologies in the European research Area - Improve co-ordination of research between scientific community and business		
Regulatory barriers			
Conservative use of public funds	Identify whether this is an issue	Identify whether this is an issue	Identify whether public procurement and infrastructure choices can be more innovation friendly
Legislative requirements	Assess whether existing legislation acts as a barrier to the market penetration of innovative technologies.		
Barriers to Single Market	Promote competition by facilitating standardised authorisation procedures.		
Economic Barriers			
Wrong price signals	Develop area specific measures, such as emission trading	Ensure a level playing field for recycling activities in comparison to other waste management options.	Develop water pricing that reflects environmental and social impacts in context of Water Framework Directive
Business potential not realised.	- Encourage business to use new technologies and in particular to invest in cleaner (integrated) technology rather than end-of-pipe technologies - Establish Technological Platforms - Identify measures to ensure development of new technologies is rewarded		
Diffusion of Technologies			
Dissemination slow	- Encourage exchange of information and best practice through networks, Integrated Pollution Prevention and Control, Stakeholder Forums, standardisation etc. - Design demonstration programmes (such as LIFE, RTD demonstration projects)		
Global technology transfer	- Possible review of export promotion measures - Develop research and innovation partnerships with developing countries		

8.2. Questions for Stakeholders

One of the main aims of this Communication is to facilitate future discussion with stakeholders, and develop with them concrete proposals. Over the coming six months it will be necessary to broaden and deepen the analysis for all of the issues. This can best be done by taking advantage of the research community, the businesses that produce the technologies and the people who use them. This is why the Commission wants to work with stakeholders to develop the action points.

As one means of enabling stakeholders to contribute, key questions for discussion are set out below. Responses are invited to these questions, but do not need to be limited to them.

1. What conditions must be met to ensure that environmental technologies, in addition to providing increased environmental quality, also contribute to growth and employment?

2. What is the scope for action at EU level in the area of environmental technologies? What lessons can be learned from experiences at national and international level? How should action at EU level build on such initiatives?

3. Have we identified the right barriers for the development and uptake of environmental technologies? What other barriers should we examine? At which stage of the innovation cycle (R&D, demonstration, market penetration etc.) are the most important barriers located?

4. What should be the role of different stakeholders (the research community, business, households, and public authorities) in eliminating the barriers? Should co-ordination and co-operation between these actors be improved and if so how?

5. How can specific areas of public policy including EU and national environmental, R&D, innovation, industrial, education, employment, trade, regional and transport & energy policy contribute to promote environmental technologies?

6. Which potential measures and issues do we need to examine further? In particular:

a) How can we encourage business to invest further in the adoption of environmental technology?

b) How can we shift investment from end-of-pipe to cleaner (integrated) technologies?

c) What economic measures should we examine at the different stages of the innovation cycle?

d) What measures should we examine in the area of diffusion of environmental technologies both within and outside Europe?

e) How can we improve global technology transfer and promote global partnerships?

f) What incentives can be given to invest more private funds in research for environmental technology?

g) How can we ensure that there are adequate education and training facilities ?

Responses are invited to these questions by 15 May 2003 to:

European Commission
Environmental Technology Consultation
DG Environment
Rue de la Loi/Wetstraat 200
B-1049 Bruxelles/Brussels

E-mail: env-technology@cec.eu.int

8.3. Next Steps

The Issue Groups will continue their analysis in line with the orientations set out in the Chapters above. For example, they will investigate further the reasons why markets are often biased against environmental technologies, the regulatory barriers to their uptake, and the

ways to motivate business to adopt them. Responses to the questions above from the public will be fed into the discussions of the Issue Groups when they are received. In particular, responses will be discussed in the Issue Groups with the expert stakeholders.

As noted above, these Issue Groups will include experts - 20 to 30 expert/stakeholders maximum - from industry, the research community, NGOs and government. The input of these experts will allow the Action Plan to identify the problems and the real needs of producers and users of environmental technology.

The Issue Groups will provide their draft recommendations in the autumn of 2003. The Commission will then publish its proposal for an Action Plan towards the end of 2003.