SCOTLANDEUROPA

"Meeting The Challenge Of Sustainable Development In Scotland:

A Partnership Approach"

A Scotland Europa Members Paper on environmental standards, practice and future challenges in Scotland

SCOTLAND Europa ***Environment Group***

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Scotland Europa Environment Group

The Scotland Europa Environment Group comprises a broad range of agencies, utilities and companies which are members of Scotland Europa. The Group aims to identify, and to contribute to, relevant European Union environment-related legislative, policy and funding issues which are of importance either to individual members or to Scotland in general. The Environment Group also seeks to explain and share Scottish environmental issues and practices to European partners and decision-makers.

The Scotland Europa Environment Group members have a wide range of experience in the protection and improvement of Scotland's environment. As well as the national agencies created to protect Scotland's natural heritage and environmental standards, the group includes major power companies, the Scottish water authorities and other prominent companies and associations in Scotland for whose operations environmental concerns are central.

Scotland Europa Environment Group Members

British Energy
Committee of Scottish Clearing Bankers
Convention of Scottish Local Authorities
East of Scotland European Consortium
East of Scotland Water Authority
General Accident
Maclay Murray and Spens
North of Scotland Water Authority
Royal Bank of Scotland
SAC International
Scotch Whisky Association
Scottish Chambers of Commerce
Scottish Council (Development & Industry)
Scottish Enterprise
Scottish Environmental Protection Agency
Scottish Environmental Industries Association
Scottish Homes
Scottish Hydro-Electric
Scottish Natural Heritage
Scottish Power
Scottish Tourist Board
Scottish Water & Sewerage Customers Council
Stevenson College
The Scottish Office
The Robert Gordon University
University of Edinburgh
University of Glasgow
University of Paisley
West of Scotland Water Authority

The Scotland Europa Centre in Brussels provides a focal point for promoting Scottish interests with the institutions of the European Union. It was opened in May 1992. Around sixty separate Scottish organisations are represented. Scotland Europa aims to create a higher profile and coherent image for Scotland as a whole, across the EU institutions and other regional offices in Brussels, as well as sharing Scotland's experiences of it relationship with the EU with others.

Introduction

The aim of this paper is to outline the distinctive elements of Scotland's environment in relation to the current priority of sustainable development. The paper demonstrates that there is much in the area of environmental action and practice in Scotland today which is relevant to the priorities and concerns currently facing governments, businesses and agencies across Europe. Environmental standards in Scotland are high, but more work is required across the board to assist in those sectors where problems continue.

The paper identifies the environmental challenges and opportunities in Scotland and the partnerships and practices that exist to tackle problems. Specific annexes provide individual best practice examples of the activities being carried out by Scotland Europa members to meet the considerable challenges of sustainable development and environmental protection. The range of organisations demonstrates the cross-sectoral approach to environmental impacts that is required in a developed and integrated society. The Group cannot represent every particular Scottish viewpoint nor any official voice, and does not seek to do so.

The paper also seeks to indicate the general approach taken within Scotland to ensure growth in business development while maintaining high environmental standards that satisfy all sectors of society. As environmental impact assessment, cost-benefit analysis and environmental agreements between industry and public authorities are integrated increasingly into strategic planning, the experience of effective Scottish co-operation can serve as an example.

The European Union faces two potentially conflicting environmental challenges - reaching acceptable levels of sustainable development (particularly in keeping with the Agenda 21 proposals from the UN Conference on Environment and Development 1992), while acceding to membership applications from an increasing number of the post-Communist states of Central and Eastern Europe. Members of Scotland Europa are willing to make an active contribution towards ensuring the completion of both.

Scotland's environment

Scotland's distinctive natural environment is of primary importance to the development, livelihood and national identity of the country. The population of Scotland (five million) is 1.4% of the EU total (see *figure 1).* With a surface area of 77,080 ,km², amounting to 2.3% of the EU total, the population density in Scotland is less than 60% of the EU average.

Figure 1 Scotland - basic statistics

	Scotland	**UK**	**EU 15**	***% of UK***	***% of EU***
Population ***(millions)***	**5.1**	58	368.7	*8.8*	*1.4*
Area ***('000 km²)***	**77.08**	244	3,337	*31.6*	*2.3*
Population density ***(inhabitants per km²)***	**66**	238	110.5	*27.7*	*59.7*

(1993-94 figures)

Land

Located on the north-west corner of the current European Union, Scotland is encompassed entirely by the sea except for the southern land border with England, which is under 150 kilometres long. More than twenty major islands make up the Inner and Outer Hebrides off Scotland's west coast and the Orkney and Shetland Islands that lie to the north of the Scottish mainland.

Over half of Scotland's area is composed of the elevated Highland and Southern Upland regions separated by the Lowland central belt. Less than 1% of the land use is urban in the Highlands and there are only 9 inhabitants per square kilometre. This can be compared to over 50% urbanisation in the Central Lowlands around Edinburgh and Glasgow, where there are 538 inhabitants per square kilometre. Arable and improved grassland accounts for the majority of non-urban land use in the Lowland belt and in the coastal regions of south and east Scotland.

Changes in industrial and urban patterns in Scotland have affected land use significantly, particularly in the last 30 years as heavy industry has declined rapidly. As many as 13,000 hectares in the west of Scotland have fallen out of use in the period, making the reuse of land and buildings, and the renovation of derelict sites a major priority of current urban land use.

The creation of Environmentally Sensitive Areas (ESA) in Scotland assisted in the move towards environmentally sustainable agricultural production proposed in the 1992 reform of the Common Agricultural Policy. By the end of 1995, over 1,000 farmers and crofters in Scotland had signed agreements with the Scottish Office under the Environmentally Sensitive Areas Scheme.

Water

Scotland's water is a crucial asset of the country. Overall rainfall in Scotland is high, five times greater in the north-west of the country than on the east coast, and this ensures that the surface water flow per person per year is almost four times the European average. Surface water accounts for the majority of Scotland's supplies, with only 3% coming from ground water. Throughout virtually the whole of Scotland there is no shortage of water.

There are over 30,000 Scottish lochs (Scottish term for a lake), half of which are in the north, east and western Highlands and Islands. Although Scottish lochs provide water for power generation, public consumption, angling/fish farming and recreation, 82% of the largest or most significant lochs were measured in 1995 as being unaffected by human activity[1].

Scottish rivers are also used for power generation, for drinking water and increasingly for irrigation, but are better known for salmon fishing and for providing water to the 85 Scotch whisky distilleries (which produce Scotland's second largest export)[2]. There are 950 separate river systems in Scotland and 97.3% of the water they contain is graded at Class 1 quality.

The long and varied Scottish coastline (approx. 3,900 km) supports a variety of fisheries/aquaculture, tourism and recreation. 96.5% of the coastline is classified as Class 1 (excellent) or Class 2 (good)[3]. Tidal waters of the North Sea to the east of Scotland - such as the Firth of Forth - demonstrate a high capacity for self-cleaning while the more enclosed and sensitive waters of the west coast can also self-clean. 95% of Scottish estuary waters are classified Class 1 or 2[4].

Recent years have seen the re-establishment of species in estuary waters, such as the return of salmon to the Clyde River in 1983 - despite the Clyde River's earlier history as the world's largest ship-building location. Combating pollution of inshore waters remains critical for the survival and sustainability of Scottish aquaculture, given the economic and social importance of fish cultivation to the economy of rural Scotland. Nevertheless, the waters of Scotland's coast are among the cleanest in Europe. Scotland is also one of the world leaders in the treatment of drinking water to reduce its plumbosolvency and thereby its overall lead content.

The provision and management of Scotland's drinking water and wastewater treatment is carried out by three geographically-defined public sector Water Authorities[5]. The regulation of drinking water quality is carried out by The Scottish Office with customer interests are represented by the Scottish Water and Sewerage Customers Council[6]. The protection and enhancement of water resources and, more generally, river basins is the responsibility of the Scottish Environment Protection Agency[7] (SEPA) and the Water Authorities.

[1] *State of the Environment Report*, SEPA, 1996; p. 44.
[2] See Annex F.
[3] SEPA op.cit.; p; 73.
[4] SEPA op.cit.; p; 73.
[5] See Annex G.
[6] See Annex H.
[7] See Annex A.

The Scottish Water Authorities collect and treat approximately 90% of the population's domestic wastewaters. They also treat the wastewater generated by industry - equivalent to the discharge of an additional three million people and the sludge by-product that arises from wastewater treatment.

Air

Air quality in Scotland is monitored both at national level by the UK network supported by the Department of the Environment, and at local level by Scottish local authorities. Air quality is measured by the presence of a number of key pollutants, and described in terms of levels of effects on human health. Sulphur dioxide levels did not exceed EC limit values from 1993-95 and have fallen by two-thirds since 1980. Nitrogen dioxide levels have reduced by 50% from 1980. Most large urban areas of Scotland are now covered by Smoke Control Orders (Edinburgh has lost its nickname *Auld Reekie* - "Old Smoky" - as a result). UK and EC legislation has played a significant part in this process. The Large Combustion Plants Directive requires progressive reductions in emissions of sulphur dioxide and nitrogen oxides from such plants[8]. The Environmental Protection Act 1990 put in place a regulatory regime controlling emissions to air, land and water.

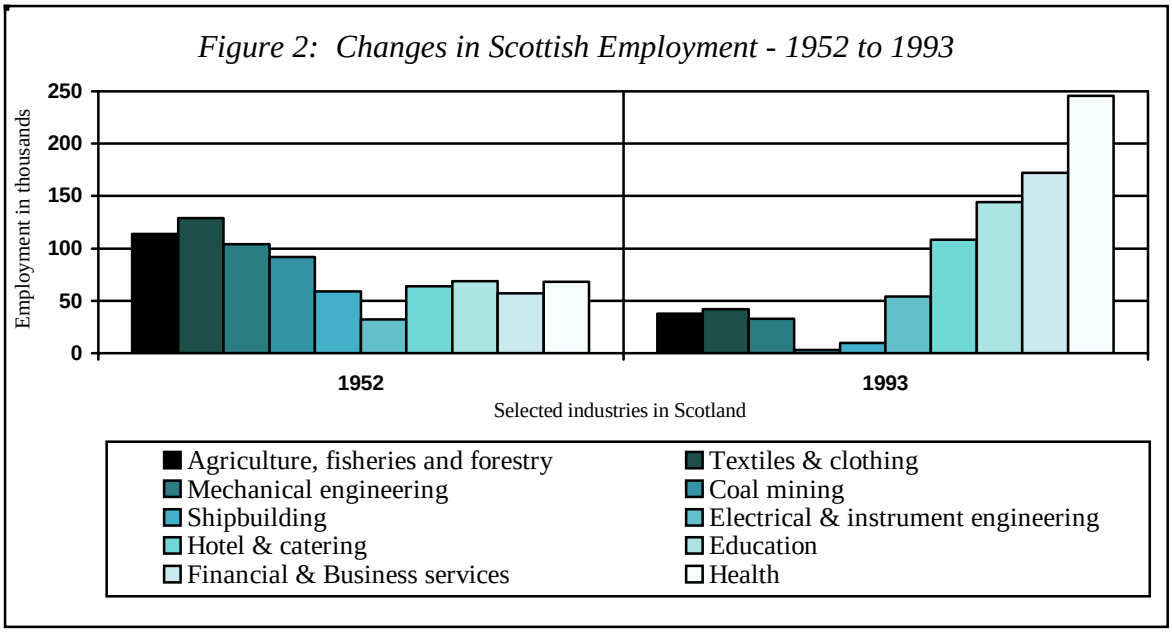
These regulatory functions, which were formerly administered by HM Industrial Pollution Inspectorate, River Purification Boards and local authorities, are now undertaken by the Scottish Environment Protection Agency. It also has a reserve power to require local authorities to make Smoke Control Orders, and other powers relating to Air Quality Management Areas. The Environment Act 1995 gives local authorities new duties to review air quality and take effective action where problems are identified. Where air quality objectives are not being met, a local authority will designate an Air Quality Management Area and draw up a plan to remedy the situation.

[8] See Annex E.

Scotland's economy

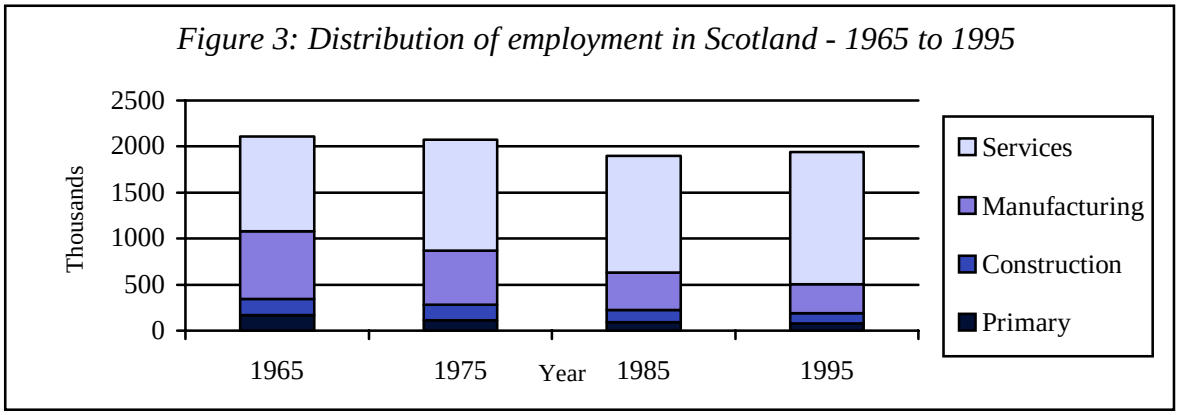
The Scottish economy has undergone radical change since 1945. A high proportion of heavy engineering with larger numbers of relatively low skill employees has been replaced by high capital manufacturing and services with high skill levels in many occupations based mainly in emerging high technologies (see *figure 2*). Since 1950, manufacturing employment in Scotland has more than halved. Of 25 shipyards active in Scotland in 1950 only 4 remain, while 113 coal pits open at the same time have been reduced to 2.

Figure 2: Changes in Scottish Employment - 1952 to 1993



That overall employment in Scotland has remained noticeably stable throughout this period is an indication of the scale of growth in the service sector, which has grown almost at the same pace as manufacturing has declined (see *figure 3*).

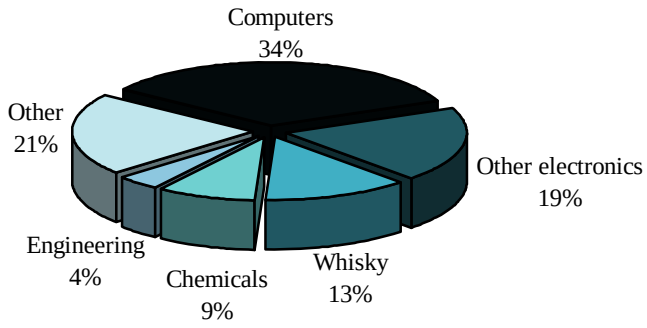
Figure 3: Distribution of employment in Scotland - 1965 to 1995



One exception to the general pattern of employment in Scotland has been the growth in oil and gas extraction from the North Sea and the service industries related to it. Unknown to Scotland in 1952, this sector was directly responsible for 17,000 jobs by 1993. This has replaced the traditional importance of other means of energy extraction, for example coal-mining, which have reduced substantially.

The nature of the Scottish economy today is reflected in its main exports (excluding "exports" of energy), which are dominated by the office machinery, computer and other electronic goods production which has grown up in the central belt of Scotland (see *figure 4*). Whisky remains Scotland's only other single export item, and is one which is totally dependent on the environment within which it is produced.

Figure 4: Scottish exports by industry in 1995



As a result of the changing economic structure, the economic pressures on Scotland's environment have altered dramatically. The previous reliance of manufacturing industry on large scale energy sources, plentiful raw materials and abundant water has fallen as those industries have declined, taking much of the traditional strain off Scotland's resources but leaving at the time a considerable legacy of land pollution and, to a lesser extent, water and air pollution.

Nevertheless, growing service industries - such as tourism - have brought their own challenges for the Scottish infrastructure and natural environment. Scotland now hosts approximately 6 million tourists each year, 1.3 million of whom travel from beyond the United Kingdom. The importance of tourism to Scotland grows in pace with the pressure that the sector puts on Scotland's natural heritage. Increased tourism has brought with it greater traffic volume, more intensive hotel and leisure activity and increased pressure on the countryside - for example through the growing erosion of footpaths.

These trends - the growth in international tourism, the decline of resource intensive manufacturing industry - are two symptoms of a general shift to a more global, "knowledge-based" economy. Goods, services, capital and people are becoming more mobile across borders; sources of wealth and value have moved from physical resources through to capital and on to the skills of individual people and the knowledge of organisations. As suggested above, these shifts are likely to pose their own particular problems, but the general trend in Scotland as elsewhere is likely to be towards a lower use of physical resources in economic activity.

The EU environmental agenda

As the Treaty of Rome in 1957 provided no common policy on the environment it was not until October 1972 that a conference of Heads of State or Government insisted that a common policy was needed. The result was a series of environmental action programmes which the Council of Ministers has been endorsing since 1973. This beginning coincided with the accession of the United Kingdom into the then EEC.

The environment policy built into the Treaty by the Single European Act of 1987 was extended by the Treaty on European Union of 1992. This allowed the use of majority voting on environmental legislation and introduced the concept of sustainable growth which respects the environment, as a principle of Treaty law. While leaving scope for national action and allowing Member States to take even tougher protection measures than those agreed at Union level, the Treaty requires Union policy to aim "*at a high level of protection*", at rectifying environmental damage at source, and to be based on taking preventive action and making the polluter pay.

The current Community Action Programme on the Environment is the fifth (for the period 1992-2000). Entitled "*Towards Sustainability*", as well as promoting sustainable development, it emphasises the need to complement legislation with the use of market-based instruments to change environmentally-damaging behaviour.

In addition to economic instruments, the Treaty of Rome requires the integration of environmental considerations into other policy areas and the Fifth Action Programme seeks to develop partnerships with shared responsibilities between government, business and general public. Five key sectors were targeted in the Programme because of their environmental impact: industry, transport, tourism, energy and agriculture. Transport remains a key concern for a region with the topography and settlement pattern of Scotland, while the last three are also of particular importance to Scotland today.

The current reform of the Treaty on European Union taking place within the Intergovernmental Conference (IGC) is considering various proposals from Member States and the European Commission to strengthen the basis for environmental action at EU level. Proposals include making sustainable development an EU objective and the incorporation of environmental protection into Community economic activities. The IGC is scheduled to be completed, and new Treaty amendments agreed, in June 1997 at the Amsterdam European Council

As important as the integration of sustainable environment measures with other Community and national policies is the establishment of effective systems of implementation and enforcement. Whether new policies on sustainable development are policed and verified by the Commission itself, the European Environmental Agency, or by arrangements within the Member States themselves, such policies must provide proof of success in order to lead by good example as well as punishing bad practice.

Scottish Environmental Regulation

The Scottish Office

The Scottish Office, under the Secretary of State for Scotland, has the responsibility for the day-to-day administration of Scotland. The stated aim of the Scottish Office as a whole is to:

"Create an environment in which the public and private sectors work together to improve the economic, social and environmental conditions in which people in Scotland live and work."

Environmental policy is overseen by the Scottish Office Agriculture, Environment and Fisheries Department the functions of which are to:

- *foster efficient and competitive agriculture, fishing and food industries while at the same time protecting and enhancing Scotland's environmental and natural heritage*;

- *contribute to the well-being of rural life in Scotland having particular regard to the needs of sparsely populated communities*;

- *ensure satisfactory standards in the provision of water supply and sewerage services, the protection of the public and the health and welfare of animals; and*

- *promote agricultural and biological research.*

The Scottish Office Agriculture, Environment and Fisheries Department holds responsibility for agriculture, environmental protection, water and sewerage services, sustainable development, rural affairs, the natural heritage and fisheries. The Department is responsible for the Scottish Environment Protection Agency; for Scottish Natural Heritage; and for the Water Authorities.

In many areas of environmental care, statutory regulations determine the rights of individuals to take actions which may affect the enjoyment of the environment by others: for example, in relation to the emission of pollutants and waste waters - the "voluntary principle". In others (for instance, the care of historic buildings or archaeological sites) protection is secured through statutory scheduling or listing and planning law.

In February 1997 the Scottish Office published its latest report on progress in Scotland towards sustainable development. *"Common Sense, Common Purpose"* included personal reports from the Chairmen of the main public bodies with the shared responsibility of encouraging sustainable development.

Scottish Environment Protection Agency/Scottish Natural Heritage

The Scottish Environment Protection Agency (SEPA) is a new agency, set up under the 1995 Environment Act. It began work on 1 April 1996, taking over responsibility for pollution control and environmental protection from a number of predecessor organisations which included the Scottish River Purification Boards, District and Islands Councils and the Industrial Pollution Inspectorate.

Scottish Natural Heritage[9] (SNH), which was established in 1992, is responsible for the conservation, enhancement and enjoyment of Scotland's natural habitats, wildlife and landscapes. The Act establishing SNH introduced the term *sustainable* into UK legislation for the first time.

Although the thrust of their everyday works differs, SEPA and SNH share a range of common interests, including:

- integrating environmental protection, conservation and enhancement
- monitoring and providing information on the environment
- encouraging a sustainable approach to development, and
- helping people understand and enjoy the environment.

A unique "*Memorandum of Understanding"*, signed by the Chairmen of the two organisations, is based on the principle of mutual consultation and sets out working arrangements for the co-ordination of SEPA's and SNH's activities.

Local authorities

Local councils in Scotland have a number of important regulatory functions in relation to the natural environment, including; land use planning, local environmental protection and the management of road traffic. The successful integration of land use and means of transportation, for which councils have responsibility, are contributory elements to sustainable development. Council Environmental Health Officers also provide a considerable number of services including the monitoring of air quality. The Convention of Scottish Local Authorities (CoSLA) has sought to co-ordinate a local response in Scotland to the promotion of sustainable development[10].

Links with business and industry

The relatively small size of Scotland and its workforce means that operating in partnership with other areas of the private or public sector is relatively straightforward. This is especially true in the Central Lowland belt where most of the population, industry and government bodies are located.

Scottish Enterprise and Highlands and Islands Enterprise

Scottish Enterprise and Highlands and Islands Enterprise are responsible for economic development in Scotland through business development, training, property and environmental improvement. Both HIE and SE have sought to incorporate principles of sustainable development across their strategic objectives for the Scottish economy. This means taking a long term perspective in decision making, including issues such as resource use efficiency, energy and waste minimisation, and new business opportunities, as well as principles of community engagement and access to opportunity.

Scottish Enterprise and Scottish Natural Heritage jointly sponsor a series of Environmental Regeneration Awards for rural and urban areas. Highlands and Islands Enterprise, again in conjunction with Scottish Natural Heritage, have discovered that employment associated with

[9] See Annex B.
[10] See Annex D.

environmental management accounts for 1,356 jobs in the Highlands and Islands, while many more are linked with tourism and recreation.

The Scottish Enterprise Environmental Development Team supports the activities of Scottish Local Enterprise Companies (LECs) in developing and establishing environmental practice and policy. Tourism, Inward Investment, Urban Regeneration and Land/Property Development account for 90% of the spending on the environment by the Scottish Enterprise Network - particularly in such areas as town and city improvement, recycling derelict land and refurbishing buildings. In the Scottish Borders, the Tweed Horizons Centre is a leading international example of sustainable development applied in a rural area, supporting businesses and communities in the area[11].

Water Authorities

The Scottish Water Authorities - which remain within the public sector - are responsible for managing the capital investment programmes to meet European legislation on drinking water standards and the collection, treatment and disposal of domestic waste water and trade effluent discharges from industry. As a group they are currently one of the leading investors in environmental improvements in Scotland.

Industrial discharges (known as trade effluents) to the public sewerage system are licensed and monitored for compliance by the Scottish Water Authorities operating within a regulatory compliance framework of quality/quantity standards. Trade effluent charges, based on the "polluter pays" principle are made.

[11] See Annex C.

The balance between economic development and environmental protection in Scotland

Economic development

The principle of sustainable development within the various sectors of the Scottish economy has been approached in various ways. The annexes attached include examples such as the making of Scotch Whisky - a traditional source of livelihood and development in rural Scotland, Scottish electricity generation - a sector faced with some of the heaviest structural challenges and environmental responsibilities, and the operation of Scottish Borders Enterprise - an economic development agency which has sought to combine economic diversification with environmental sustainability.

Scottish Enterprise and Highlands and Islands Enterprise, the two agencies responsible for economic development, are both committed to sustainability within their development work. For instance, as a major landholder, Scottish Enterprise influences a large extent of land use in Scotland. With the assistance of Scottish Office funding, and within the remit of economic development, Scottish Enterprise has been looking at the reclamation of contaminated and derelict land following industrial decline in Scotland.

A survey carried out in 1993 estimated the costs of reclamation and re-use of land in 40 selected sites as ranging from 45 million to 175 million pounds. The Convention of Scottish Local Authorities has indicated that it is willing to assist the Scottish Office and SEPA in the identification and improvement of contaminated and derelict land when the new Contaminated Land Regime comes into force.

As outlined above, Scotland's largest export by value at present is electronic/computer goods. The electronics industry in Scotland has been contributing to the innovation of product take-back/recycling measures and the University of Abertay, Dundee has been investigating possible uses for recycled and reclaimed electronic circuitry.

Tourism in Scotland is heavily-dependent on a healthy environment and several areas are developing the principle of sustainable tourism to cope with the large number of visitors that Scotland hosts each year. The Scottish Golf Course Wildlife Group seeks to integrate the interests of wildlife, landscape and history with the management of golf courses through their advice and assistance. There are over 450 golf courses throughout Scotland so this initiative could eventually cover a sizeable area of Scotland. It is an apt demonstration of the creative co-operation between competing interest groups in Scotland. Sustainable tourism has been encouraged within tourism management schemes in Scotland, and the natural heritage of Scotland is responsible for growing interest in "wildlife tourism".

Environmental concerns remain central to the energy-generating industry, given the contrast in the country between comparatively high outputs from nuclear and hydro-electric energy and the high potential for alternative energy sources such as wind and wave power. The historical shift in Scotland from traditional sources of energy production and heavy industry to lighter manufacturing has not substantially reduced Scotland's reliance on energy generation - whether fossil fuel or nuclear - both of which have the potential for substantial environmental impact. The Scottish Office has sought to develop competitive renewable energy sources in Scotland in part as a means of lightening this load.

Energy consumption in Scotland remains comparatively high, due in part to the inclement climate. Scottish Homes, the Scottish national housing agency, has sought to improve

Scotland's poor record of energy inefficient housing - housing which produces 25% of CO^2 emissions in Scotland. This commitment is within an overall objective of creating sustainable communities, both urban and rural. Such activity in Scotland is also now covered by the Home Energy Conservation Act and the Energy Efficiency Standards of Performance.

European Structural Funds

It is in the allocation of European Structural Funds that some of the greatest positive or negative external impacts on the standard of Scotland's environment can be discerned. Approximately 85% of the Scottish population live in an area designated for Structural Funding. A division within the Scottish Office Development Department has responsibility for the implementation of European Structural Funding within Scotland.

The funding of projects and programmes within these areas is central to their subsequent development and, as such, requires considerable sensitivity to be shown towards balancing land-use, water quality and emission control considerations with economic development objectives. The new Structural Funds regulations do provide that programmes should include a definition of environmental objectives and an advance assessment of forecast impact.

Action to promote economic development needs to be pursued in a way which is environmentally sustainable. While the goal of development and sustainability are often portrayed as contradictory, in practice they are becoming increasingly complementary, not least where quality of life will play a great role in enhancing a region's attractiveness for investment and tourism. Building a strong link between EU's structural policies and environmental policies will be very important in this respect. Scotland Europa and its members are discussing the prospects for European Structural Funding post-1999, and such concerns will feature in their discussions.

The potential environmental impact - both positive and negative - of structural funding on Scotland can be demonstrated with the results of the Strathclyde Integrated Operation ERDF Action Programmes from 1988-92:

- In the area of Industrial Sites and Premises, the programmes developed 900 hectares of new/improved sites and created 459 new units.

- Under Tourism Development, funding provided 4 new/improved all weather facilities and 6 new/improved museums and galleries, which contributed to an additional 3 million visitors to the region.

- Transport and Communications were extended by 47 km of new roads and 120 km new/improved railway lines.

- Notably, for Underground Services and Waste Disposal, the programmes provided for 4 new/improved water treatment plants, 3 waste disposal plants and 1 major new sea out-fall.

- The programmes also included measures for Environmental Improvements, which led to 1,800 hectares of improved land, 122 km improved transport corridors and 139 enhanced buildings.

Environmental protection

The interdependent nature of environmental concerns was recognised in the creation of the Scottish Environment Protection Agency. SEPA provides Scotland with an integrated system of pollution control which should assist sustainable development goals across economic sectors. Regulations to control emissions will, if properly enforced, reduce the negative impacts of economic development in Scotland, but consultation by SEPA with the public and private sectors, local and central government and the public will also increase co-operation and activity towards sustainable development outwith the legislative sphere. Regular reports and performance indicators will also provide a framework for measuring environmental improvement throughout Scotland.

Education

Education must provide the key to full integration of environmental protection and sustainable development into other Community policies. Scotland is proud of its record in education, both in schools and higher education - where Scotland produces the highest number of graduates per capita in the EU. The "*Learning for Life*" Working Group on Environmental Education produced for Scotland one of the few national strategies for environmental education. All trainee primary teachers in Scotland now receive environmental education training. Following the "*Learning for Life"* report, the *Education for Sustainable Development Group* was established by the Scottish Office to advise the Secretary of State for Scotland on the report's development and other relevant issues.

However, education of environmental concerns must be directed not only at school and university students, for implementation in future decades, but at current professionals as well. Vocational training in the principles of sustainable development is recognised by agencies such as SNH and SEPA as an essential investment if the benefits of better environmental performance are to be secured. They are working with educational and professional institutes to develop suitable occupational competencies (training objectives) and are helping in the design of training packages.

Despite formal, home-based and community education, it is work-related and vocational education that produces the most efficient understanding of changing environmental priorities and the most immediate implementation of new policies. Such activity is a priority - demonstrating the financial savings that can be made from the application of good environmental "house-keeping" such as minimisation of waste or energy use.

Outstanding environmental problems and challenges

Land

Post-industrial vacant and derelict sites still present considerable challenges to industry and to regulators and remain a substantial liability for local authorities. The Scottish Office carried out a Scottish Vacant and Derelict Land Survey in 1994 to measure the scale of the problem - which stems from energy extraction, agriculture and manufacturing decline. Over 6,000 individual sites were identified, 72% of which were in the Scottish central belt. It is thought that between 5,000 and 10,000 hectares of the identified land also remains contaminated. The Scottish Office, Scottish Enterprise, CoSLA and SEPA are all working to implement new regulations which are intended to be introduced in the near future for the identification and improvement of contaminated land.

SEPA has proposed a Scottish Waste Strategy to begin constructing a framework for waste management in Scotland and also regulates producer responsibility for packaging waste. The consumption of raw materials is comparatively high throughout Europe, and Scotland is no exception. Member States are likely to have to face reduction targets with respect to household and commercial waste production. Currently in Scotland, approximately 88% of controlled waste goes to landfill, and some 7% of household waste is recycled.

Increasingly high standards are being required of landfill operations, with consequential burdens (increased landfill charges) resulting from the application of the "polluter pays" principle. Improved regulation is designed to eliminate badly run landfill sites which can give rise to environmental damage such as the generation of uncontrolled landfill gas, and the pollution of groundwater. The use of economic instruments such as the Landfill Tax is intended to encourage industry to consider such options as minimising, reusing, recycling and treating prior to disposal. There is some concern that the tax will bring about an increase in illegal tipping; but SEPA is aware of this and intends to be vigilant.

Agriculture and forestry practices, both in cultivation and in artificial treatment of land, can still cause considerable environmental problems, not least the scale and nature of run-off created. Soil erosion and degradation can also be caused by both forestry and agriculture. In line with a recommendation by the Royal Commission for Environmental Pollution in its report on "*The Sustainable Use of Soil*", the UK is developing a national strategy for soil protection.

Southern Scotland received relatively high levels of radioactive deposition resulting from the 1986 Chernobyl accident, although levels remained well within those recommended as safe. As a result, 27 sites were located in Scotland for the UK Radioactive Incident Monitoring Network (RIMNET) and Scotland has also undertaken monitoring of general radioactivity under the EURATOM Treaty since 1992.

Water

The river purification boards (which formed part of the Scottish Environment Protection Agency at its creation) were largely successful in the improvement of Scotland's rivers. Nevertheless, certain urban watercourses still require particular attention to meet EU directives on water quality and some sewage treatment facilities are either overworked or no longer sufficient for the their task. Improvements are underway at waste water treatment works and coastal bathing sites to achieve environmental objectives. The quality of drinking

water in the major centres of population is very high. However, the more rural supplies are often ill equipped to deal with the variable conditions they encounter. The water authorities have improvement programmes in place to bring about compliance with EU directives.

While attributable sources of pollution have largely been identified and controlled, non point-source water pollution remains an appreciable problem particularly in rural areas where run-off of agricultural fertilisers is one of the most prevalent sources of diffuse pollution. The creation of the Scottish public water authorities has not prevented increased abstraction of surface and ground water by industries seeking alternative water sources. This, combined with alterations in river flows due to river-based hydro-electric schemes and increased summertime irrigation by farms has made the preservation of water sources in Scotland a priority concern.

Other issues which SEPA are addressing include the accumulation of water in abandoned coal mines, a legacy of Scotland's changing economic structure, which is continuing to produce localised groundwater and river pollution; and fish farming which has grown extensively as an economic activity in Scotland. However, its impact on the environment is not yet fully understood. Specific problems can include the use of particular chemicals in foodstuffs and the effect of the resultant discharge on plant and animal life in, or bordering, the water.

The last decade has produced an unusually large number of floods on some of Scotland's major rivers - particularly the Clyde, the Tay and the Earn. Rivers in many other parts of Scotland have either recorded unusually high levels, or unusually high frequencies of moderately large floods, over this period[12].

Air

Urban air quality in Scotland does not generally give cause for concern, although there are localised pollution hot-spots where EC air quality levels are occasionally breached. In many urban areas transport pollution has become the dominant source of air pollution. While traffic emissions are not currently subject to the same controls as industry, new initiatives being implemented as part of the National Air Quality Strategy will allow local authorities to carry out roadside vehicle emission testing and serve fixed penalty notices on traffic pollution offenders. Ten per cent of vehicles are responsible for 50% of emissions. Traffic growth is currently continuing at over 5% per annum.

Energy consumption and the production of CO^2, sulphur and nitrogen oxides remains high in the United Kingdom overall and second highest in the EU overall behind Germany. Nevertheless, the figures are considerably lower for Scotland, with CO^2 and NOx emissions half of the UK level and SO^2 at one-tenth of UK levels. It should be also be remembered that much of the acid deposition in the UK comes from outwith this country - around 35% of sulphur falling here originates from land based sources in continental Europe.

Agencies in Scotland are also studying the potential influence of climate change upon Scotland, in particular drier conditions for land. Estimates indicate that 8% of Scotland's soil may become subject to drought as a result of changes in precipitation.

[12] See Annex J.

Scotland Europa Environment Group - a partnership of environmental interests.

One of the unique elements of the Scotland Europa Environment Group is the partnership which its members represent. The development and provision of high environmental standards within UK and EU parameters is sought through collaboration between public agencies, local government, power companies, private utilities, educational bodies, employers and voluntary organisations. The existing high standard of the Scottish environment, the complexity of potential risks and the relative size of the country make such co-operation both necessary and possible.

Individual papers annexed

- *Scottish Environment Protection Agency*

- *Scottish Natural Heritage*

- *Scottish Borders Enterprise*
  The Scottish Borders - Action towards Sustainable Economic Development

- *CoSLA*
  Local Government and Sustainable Development in Scotland -CoSLA's Role

- *Scottish Power*
  Coal Fired Generation and Sustainable Development - Finding a way forward

- *Scotch Whisky Association*
  Copper Recovery

- *East Of Scotland Water*

- *Scottish Water And Sewerage Customers Council*
  Understanding and informing the consumer

- *Royal Bank Of Scotland*
  Sustainability and the Financial Services Sector

- *General Accident/University of Dundee*
  Flood Hazards

- *The Scottish Environmental Industries Association.*

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THE ROYAL BANK OF SCOTLAND

Sustainability and the Financial Services Sector

Recent years have seen a significant widening of both individual and corporate interest in the natural environment. One particular area of concern is the effect of continuing economic development on that environment, together with the challenge of dealing with past pollution. This has contributed to the concept of "sustainable development", which could be regarded as the ability to maintain an equitable balance between economic activity, environmental impact and the needs of society, both now and in the future.

The Financial Services sector - banks, insurance companies, investment houses etc - may reasonably claim that their *direct* impact on the environment is relatively small, and to the extent that they can reduce energy consumption, minimise waste/maximise recycling etc, many will have already established effective practices not least because they recognise good business management now embraces good environmental performance with a measurable benefit to the bottom line. There are some, however, at the "greener" end of the spectrum who maintain that through their ability to provide or withhold funds (whether as equity or debt), or to insure property, the *indirect* influence of financial institutions is arguably broader and greater than that of any single sector with the potential to pollute. In addition, they might argue that not only should investors or lenders avoid companies with a poor environmental record, but they should also actively target businesses whose products or services contribute to a sustainable future.

In the United Kingdom there is little doubt that the implementation of environmental legislation since 1990 represents a watershed for the commercial response to both the treatment of past contamination and the need to prevent future pollution. Although there is a legislative history well before the use of Environment (with a capital 'E'!) and some banks have an earlier record of environmental engagement, the whole topic is undoubtedly a theme of the current decade, and is unlikely to have peaked despite a reduction in popular support for " green politics" - or at least a Green political party. Scottish banks have been active on a number of fronts, from publishing their own Environmental Policy Statements to references in Annual Reports; in terms of their own 'housekeeping', by commitments to both international and local initiatives to generate improved performance; and by contributing to the growing awareness of their business customers, particularly the small to medium sized enterprises which may not - particularly as the economy emerged from the last recession - have been able to find the resources to devote specifically to the issues of environmental management.

The Committee of Scottish Clearing Bankers has therefore discussed the banking sector's interests with the relevant arms of both central and local government in Scotland, working closely with the British Bankers' Association (BBA) which represents over 300 banks of all nationalities active in the UK. This industry association established, in early 1993, an Environmental Issues Advisory Group to take up the challenge of protecting the lender's position in the face of the legislation which has followed the Environmental Protection Act 1990, liasing nationally with other bodies such as the Confederation of British Industry, and with its fellow associations across Europe via the Federation Bancaire de l'Union Européenne in Brussels.

Over the last four years the BBA has, therefore, devoted much of its effort in addressing the UK governments legislative initiatives to the issue of Lender Liability and an industry stance (which is essentially unchanged today) was first set out in a Position Statement entitled "Banks and the Environment" in mid -1993. Several important points were made in that document and they bear restating; *inter alia*,

- The ability of banks to influence businesses through the normal lending (and banking services) relationship is generally exaggerated.
- Lenders are not environmental specialists, nor should they be used as environmental policemen.
- If lenders were faced with a potentially unlimited contingent liability for, say, the clean- up costs of their borrowers' contaminated land holdings, their regulators would be hard pressed to assess the adequacy of the capital which they are required to maintain to support quantified risk assets.
- There are fundamental differences in the legal regimes within Europe. In the UK a lender usually enforces his security by taking possession, or more likely appointing an Agent to do so; in most continental European jurisdictions, however, the whole enforcement process is conducted by the court on the secured creditor's behalf, so that no potential liability can fall on that party.
- Finally, as evidenced by the experience of the financial sector in the United States, even a degree of uncertainty in this area can inhibit further funding, both to those industries which may most need finance to improve their current environmental performance, and to property owners as the possible remediators and redevelopers of brownfield site.

In summary, banks are very rarely involved in the commercial management or operations of their customers simply by lending money: therefore they should not be rendered liable for clean-up and compensation costs for contamination caused by their customers (or by previous owners/occupiers of their customers' land) merely by:

- Lending,
- Holding land or other assets as security,
- Monitoring a borrower's performance,
- Helping a customer trade out of difficulty,
- Taking steps to recover their debt or realise their security, or
- Leasing.

It has been instructive to note that as a more realistic approach has been adopted in the United States, recent legislation relating to the exclusion of lenders defined participation in management as "*exercising decision making control over environment compliance... such that the person has undertaken responsibility for the hazardous substances handling or disposal practices...*"

It is important, therefore, that both legislation and business practice embody strictly defined circumstances within which a lender, by deliberately choosing to exercise effective control over its assume legal liability for that customer's environmental risks so that bankers retain the scope to integrate the judgement of their customers' environmental performance into normal credit assessment and thereby contribute to a growing awareness of -and pragmatic response to- the issues surrounding sustainable development.
Those banks which have become signatories to the United Nations Environment Programme Statement on Environment and Sustainable Development have also been encouraged to develop green products. In practice, this has proved to be an area more effectively led by investment institutions, a number of which have launched - or are likely to establish - ethical or green investment. Again, it is hoped that from a strict performance standpoint these will, once sufficient history exists, show a comparable return to more conventional funds, and are more likely to claim a small but increasing share of the market.

Just as there has been a UNEP commitment for banks, so more recently has UNEP established a similar commitment from insurance companies. A number of major institutions from different countries, including Scotland, have already made public their concern that the increase in recent years of natural disasters such as hurricanes is scientific evidence for global warming, which in turn may be influenced - if not driven - by the effects of certain forms of economic activity. While this may still be an area for dispute, insurers are already taking an appropriate actuarial view of their property risks with regard to damage from storms, flooding etc.

It is, therefore; no exaggeration to say that the Scottish financial services sector is actively addressing not only environmental challenges & opportunities but also, more broadly, the issue of sustainability as they affect both their customers and themselves, in a European context.

SCOTTISH POWER

Coal Fired Generation and Sustainable Development - Finding a way Forward

Introduction

Agenda 21 identifies the availability of affordable energy as being an essential pre-requisite to Sustainable Development but that energy will have to be generated increasingly in such a way as to avoid harmful emissions. The European Union White Paper on Energy re-iterates these points, but goes further in recognising that secure energy supplies are required, and that means not becoming overly dependent on any one energy source.

Coal fired generation represents a very significant percentage of electricity production in most member states of the European Union but the EU's targets in relation to reducing acidification damage and its commitments on global climate change mean that the sulphur dioxide (SO2), nitrogen oxides (NOx) and carbon dioxide (CO2) emissions arising from fossil fuel generation will have to be considerably reduced. It has to be recognised too, that considerable financial resources are already deployed in coal extraction and coal fired power generation assets. Unless cleaner ways of using these can be fund, their value will be considerably reduced.

Renewable energy offers considerable prospects, as does the scope for energy efficiency and energy saving, but these themselves are unlikely to grow rapidly enough to secure our energy needs over the next few decades. Indeed the Green Paper on Renewable Energy sets a target of only 12% of energy from renewable sources by 2010. Additionally renewable energy is expensive when compared to that of the existing coal fired power plant. Rapid closure of coal fired generation could disadvantage the EU by rapidly increasing energy costs.

Gas fired generation is increasingly playing a part in the generation portfolios of a number of member states. Gas burns more cleanly, emits virtually no SO2 much less NOx and about half the CO2. However, there are fears that indigenous EU gas reserves may rapidly be depleted and the Union might rapidly become dependent on imports from the former Soviet Union and North Africa, potentially confounding the security of supply aims of the Energy White Paper.

This problem is not unique to the European Union and indeed may developing economies (such as those in China and India) are rich in coal reserves and hungry for new energy supplies. There therefore exists huge export potential for cleaner coal fired power generation technologies.

Scottish Power

Throughout Scottish Power much work is being done in developing a renewable energy portfolio and in promoting energy efficiency amongst customers. The Generation Wholesale Division, which operates the existing power stations, finds itself challenged by the questions in determining the future of its generation portfolio in Scotland. Sixty percent of generation comes from nuclear sources and about ten percent from renewables (mainly hydro). The remainder comes from sour gas and coal fired generation.

As a result of Government policy decisions prior to the privatisation of the electricity industry in 1990, there is considerable over-capacity so, although they are modern and efficient, the Scottish coal fired stations at Longannet (one of the largest in Europe) and Cockenzie are not fully utilised. This situation has been eased a little by the full development of trade with England and Wales following privatisation. Both stations benefit from Scotland's indigenous coal reserves (which the stations use) which have among the lowest sulphur content in Europe. The question facing Scottish Power was how a way could be found to reduce emissions further to avoid loss of asset value and to still remain competitive in the electricity market as emission controls rose. Could a way forward be found for coal?

The low sulphur coals offered immediate advantage in that their emission rates of SO2 were less than half of those from equivalent stations in England and Wales. Additionally a cost-effective means of reducing these emissions by a further 90% by means of a technique called sea water scrubbing was identified for when controls tightened further. NOx and CO2 emissions were however comparable with those of competitors stations. For these stations, particularly Longannet - as the larger station and that with the greatest potential life - a way of reducing these had to be found.

Scottish Power examined the available techniques going beyond the low NOx burners that had already been fitted. A technique (similar to that used in motor vehicles) known as Selective Catalytic Reduction (SCR) could achieve the greatest reduction and was in use in a number of Member States. However that technique was very expensive and difficult to retrofit. Another technique, Selective Non Catalytic Reduction (SNCR), involving the injection of ammonia into the furnace, offered potential for cheaper abatement. However this technique was highly dependent on boiler geometry and would not work on the Longannet boilers. It also has the potential to release ammonia, itself a pollutant, to the atmosphere. In addition, neither of these techniques offered any CO2 reduction and so could not contribute to reducing the risk of exposure in the event of a carbon/energy tax as proposed by the EU being accepted.

During the survey of techniques, Scottish Power had identified a novel technique which involved injection of gas above the coal flame to reduce the formation of NOx at source. The gas although not a fuel as such, rather an abatement chemical, does yield its heat content. This technique offered the potential to reduce NOx by as much as eighty percent, well above the forty percent achievable by low NOx burners and not far short of the expensive SCR technology. The technique reduces carbon dioxide (and sulphur dioxide) by that amount too, because just under twenty percent of heat from coal is displaced by gas.

This gas reburn technique had been demonstrated on small boilers, but never on full scale power generation plant boilers such as those at Longannet. Scottish Power therefore saw the opportunity to improve their competitive position by reducing emissions in a more cost effective fashion and by protecting asset value. The side benefits of making the UK less dependent on gas as a clean fossil fuel source (until renewables develop further in the longer term) were also apparent. The export potential of the technology was also clear (estimated at £1.1bn based on 10% market penetration).

Scottish Power therefore decided to pursue the technique and to seek funding from the EU's clean coal technologies programme THERMIE. A partnership of EU companies, including British Gas, ESB of Ireland, ENEL of Italy, Electricité de France and boiler manufacturers Ansald Energia and Mitsui-Babcock was formed. In recognition of the strategic importance of the project £5,5 m was awarded (against total project costs of £12m) by THERMIE. Design work began in 1994 and the £12 million installation was completed at the end of 1996, being one of the largest engineering projects undertaken in Scotland. The trials which form the key part of any such project are now underway. It is from these trials that the full set of design tools needed to apply this technology to a wide range of boilers will be derived. Initial results are very promising indeed.

Gas reburn itself is not pure sustainable development. Fossil fuel reserves will run out and emissions can never be entirely eliminated. However it does represent a real and practical step to aid us down the road to sustainable development by reducing emissions effectively; by preserving the use of coal, arguably a much lower grade fuel than natural gas; by preserving the capital tied up in mid life major coal fired generation plants; and by holding down electricity costs.

Scottish Power has now followed up this work by contributing to another partnership seeking a further THERMIE award to demonstrate the cleaner technique of solid fuel gasification at their Kincardine site. It has the potential to become profitable in the future. Although not currently economic, it might in the future offer ways to use a range of materials, such as solid waste and biomass, together with coal as a power generation source.

THE SCOTTISH ENVIRONMENTAL INDUSTRIES ASSOCIATION

Over the past few decades, environmental issues have continuously increased in importance for both members of the public and businesses. In the 1990's, the concept of sustainable development has made plain the integration which is required between business and environment to ensure that economic development is not accompanied by a decline in environmental standards. The legacy of derelict and contaminated land in central Scotland shows that this has too often been the case in the past; but, in addition, the development of new, cleaner industries can also contribute to wider economic development goals.

In response to these challenges, the environmental technology (envirotec) sector has also been expanding in recent years, from an estimated global market of £190 billion in 1992, to an expected £250 billion in 1997. Companies active in the sector address such issues as:

– development of clean technologies, maximising the benefits of limited raw materials and reducing polluting wastes;
– provision of consultancy services to both private and public sector organisations, helping them reduce their impacts on the environment;
– development of remediation and restoration methods, allowing wastes and derelict land to be brought back into productive use; and
– development of processes to re-use and recycle waste materials.

Why an Association in Scotland?

The Scottish Environmental Industries Association (SEIA) exists to promote the work of its member businesses, all of whom are active in the fields of environmental technologies and services. Scotland has much to recommend it for the development of such industries - the Scottish environment is marketed as a tourist attraction world-wide, the envirotec sector provides a new outlet for the tradition of engineering work and product innovation, and the development of the sector will contribute to job creation and economic efficiency.

However, as a relatively new sector, the environmental industry as a whole is relatively unconsolidated. SEIA was therefore formed in 1995 by thirteen interested companies to help focus the development and integration of the sector and ensure that Scotland's envirotec industries play a full part in the industry at international level.

The Association aims to do this through a range of networking and promotional activities, such as:

– facilitating information exchange between members, and from other agencies locally, nationally and internationally;
– organisation of workshops, enabling members to meet potential clients from both public and private sectors, regulators and academic professionals;
– promotion and representation at trade fairs and conferences.

The Association facilitates for its membership a range of business development and support services designed to make them more competitive. At the same time, it provides a catalyst for the development and commercialisation of environmental technology and a public voice for the sector, commenting on industry-wide issues such as training, government policies, changes to the regulatory framework and dissemination of good practice. The Association also helps 'cluster' those working in the field to enable members to put together combined bids for larger projects, working in partnership with public, private and research organisations.

Member Organisations

There are currently around 40 members of the Association, providing a range of services in the environmental field, including:

Clean air technology
Water, wastewater and sewerage treatment
Waste treatment, recovery, recycling and management
Biotechnology
Contaminated land remediation
Energy generation, recovery and conservation
Monitoring, measurement and control technology
Legal services
Conservation of natural resources.

Member companies have experience in markets across the world, with clients in industries including energy, manufacturing, chemical, water and horticultural sectors. Companies range in scale from consultancies employing a small number of experts to much larger organisations where environmental issues are dealt with as part of wider corporate activity.

European Context

European environmental policy has evolved, as described elsewhere in this paper, from looking at end of pipe solutions and specific problems. The achievement of sustainable development, however, implies a more holistic view of the wider environment, and the interaction of different pollutants and activities which affect it - but also the recognition of the economic benefits which follow from environmental activity. This view was highlighted in guidance provided by the Commission in the context of the recent review of structural funds.

Future legislation from Europe is likely to focus further on energy and resource use efficiency and waste management, and on the continued integration of environmental concerns into all areas of public and private activity. Envirotec industries have a key role to play in these areas; the Scottish Environmental Industries Association is committed to ensuring the delivery of these aims.

GENERAL ACCIDENT AND THE UNIVERSITY OF DUNDEE

Flood hazards

The hazard presented by flooding has caused significant damage in some areas of Scotland in the last 10 years. This short paper describes recent events and their impact, then goes on to describe the main responses in terms of assessing risks and responding to them.

The last decade has produced an unusually large number of floods on some of Scotland's major rivers. Two floods are deserving of particular attention:

- In January 1993 the Rivers Tay and Earn flooded some 52 km^2 of agricultural land and caused flooding in a number of urban areas, most notably Perth.
- In December 1994 the River Clyde and other rivers and urban watercourses draining through the Glasgow area all recorded unusually high levels, damaging residential and commercial properties to an estimated total cost of £100 million.

Rivers in many other parts of Scotland have either recorded unusually high levels, or unusually high frequencies of moderately large floods, over this period.

Awareness of flood hazards has been heightened by this recent experience, and climatic uncertainties are such that future risks must be considered carefully. Many climate change scenarios include an increased prevalence of westerly airflow over north-west Europe, and hydrological experience suggests that this would be associated with increased flood risks, especially in areas exposed to the west, such as the west of Scotland. The postulated changes in weather patterns may also result in an increase in coastal flooding risk. The increase in river flood frequency over the last 10 years may be indicative of future behaviour, and is similar to recent changes in western Norway and parts of Germany.

Flooding in developed areas always produces economic and social damage. The fabric and contents of domestic and commercial properties are often worst affected, but other economic impacts often include:

- disruption of and damage to communications infrastructure,
- loss of crops, damage to soils and agricultural infrastructure, and
- the costs of emergency procedures (warnings, evacuation, clear-up costs).

Social costs are difficult to quantify, but arise from the evacuation of householders (often for many months), loss of valued possessions, subsequent anxiety and health effects. Occasionally, lives have been lost. Although extensive floods are generally rare in Scotland, their sporadic occurrence represents an important diminution of quality of life in local areas. The avoidance or mitigation of flooding is an important element of the efficient running of a local economy, and represents sound resource use from a sustainability perspective.

Planning offers an important opportunity for local authorities to control development where flood risk has been identified. In 1995 the Scottish Office issued a National Planning Policy Guideline (*'Planning and flooding'*), directing local (planning) authorities to exercise the precautionary principle when considering development applications for flood-prone areas. Such applications will therefore be refused unless specific reasons for doing otherwise exist. In conurbations where land is at a premium, say for industrial development, tensions may arise between the needs of economic development and flood hazard avoidance. In practice, technical solutions in relation to the design of new buildings and the erection of structural defences can ensure that an appropriate balance is achieved.

New powers and duties have been assigned to the Scottish Environment Protection Agency and local authorities in relation to the flood hazard. Under the 1995 Environment Act, SEPA now has "*the function of assessing as far as it considers appropriate the risk of flooding in any area of Scotland*", and also to collect flood level data in support of this function. These activities will enhance the scientific basis on which future decisions are made in relation to flood risk, e.g. planning applications, the design of bridges, flood defences or other major structures. Because much of the 1994 Strathclyde flooding resulted from blocked culverts, local authorities are being given new duties for the maintenance of waterways within their built-up areas, to avoid the risk of similar events being repeated.

There is also an important insurance perspective on the flood hazard. The UK is distinctive in having an insurance system where risks are carried entirely in the private sector, and it follows that the insurance industry

is keen to ensure that there is an appropriate level of awareness to the flood hazard. Recently, a programme of research has been begun at the University of Dundee in collaboration with General Accident plc, building on complementary interests in flood risk assessment and methods of assessing possible damage costs. The products of this work should help more realistic management of flood hazards to be achieved through combining hydrological and insurance claims data, and may help decision-making on flood defence in a broader sense, where new developments are proposed in the future.

Whether recent events are the result of an isolated sequence of storms, or part of a more general shift of climatic conditions, the level of awareness of flood hazards in Scotland has certainly been increased in recent years. This can only be seen as beneficial: SEPA and the local authorities now have new responsibilities targeted at improving flood data collection and channel maintenance. Planning authorities are now able to consider much more directly the risk of flooding associated with new developments, and insurers are becoming much more involved with flood issues - such that the total costs of flooding to the community in future years can be sensibly managed. These recent developments suggest a complementary approach to a hazard which affects many elements of the community, with a clear commitment to a sustainable approach to the use of resources.

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