Design for Sustainable Development

Support Systems for Small and Medium-Sized Enterprises

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Introduction

This report forms one element of the study for the European Foundation for the Improvement of Living and Working Conditions concerning SME Support Systems for Sustainable Development, Project No. 0204, Contract No. 99-3030-6. The study forms part of the Foundation's wider Design for Sustainable Development programme and focuses on support initiatives for industrial/commercial SMEs.

The report describes the general situation in the EU, and to a lesser extent the USA and New Zealand (one example), broadly with regard to eco-efficiency, eco-design and more sustainable manufacturing. In doing this it provides a snapshot rather than an exhaustive coverage. Case studies are used to illustrate the range of initiatives under way. The report complements the electronic database of initiatives which has been developed for the Foundation's website (http://www.eurofound.ie/themes/sustainability/sdonline.html).

Chapter 1 Aims and objectives

The overall aim of the study is to increase understanding of how 'support systems' (see definitions below) can be used to deliver sustainable development more effectively into small firms in the EU. It aims to do this by providing an overview of the range of support initiatives in the EU, and to a lesser extent in the USA, so as to inform and stimulate those delivering and receiving support.

The target audience is therefore very broad, including the European Commission, national governments and agencies, regional/local governments and agencies, regulatory bodies, the social partners (including SMEs themselves), not-for profit organisations etc.

More specifically the project objectives are to provide:

- An inventory of SME support initiatives (projects, programmes and networks) relating to more sustainable industrial and commercial activity - an electronic database accessible from the Foundation's web site, containing 61 entries from across Europe and a small number from the USA and New Zealand (one entry);
- Several case studies highlighting the more innovative initiatives where possible describing their organisation, activities, achievements and messages for other initiatives.
- A concise complementary overview describing the current situation in terms of such SME support systems in the EU and USA.

This report covers the second and third items, drawing on the range of material included in the database and some additional material gathered during the study.

It should be noted that to make the project manageable (in terms of budget and time constraints) we have restricted ourselves to initiatives relating to eco-efficiency, eco-design, more sustainable working environments and sustainable manufacturing as defined in Section 3.2. It should be noted that while we have searched for initiatives relating to all types of industrial and commercial activity, the vast majority of support initiatives appear (from this and other studies) to be aimed at the former, largely because of the significance of its impacts. There is, however, merit in providing support to other enterprises and we have covered a small number of interesting initiatives relating to the retail and construction sectors.

It should also be noted that we have deliberately not included large and well-known international/EU programmes and networks such as the UNEP Industry and Environment programme and the Office for the Promotion of Energy Technology (OPET). Some of these are already covered in a complementary Foundation publication, the Networks Directory. Neither have we covered EU-funded research and demonstration programmes such as LIFE and those under the 5th Framework Programme although some of the specific projects are supported by these programmes.

Chapter 2 Method of approach

Overview

The work has been conducted through a series of methodological steps:

- Confirmation of project aims and objectives with the Foundation project officer;
- Clarification of key definitions;
- Development of an initiative classification scheme for use on the database;
- Development of criteria for initiative inclusion;
- Development of a case study format;
- Review of existing literature including:
  - ECOTEC reports (e.g. for UK Government, DGXVI, Asturias Regional Government);
  - Foundation documents (e.g. Networks Directory);
  - other existing literature (e.g. from the Dutch Ministry of Environment, US EPA,).
- Search of Internet sites and relevant databases;
- Direct consultation - telephone interviews with:
  - government departments and agencies;
  - project/programme personnel.

Definitions

In terms of definitions it is worth defining what we (ECOTEC) mean by support systems for sustainable development in the context of this project:

"a mechanism for providing some form of assistance relating to the provision and/or transfer of skills and knowledge concerning more sustainable ways of operating (e.g. manufacturing), for example in terms of more efficient resource use and practices less damaging to human health and the environment"

Support initiatives can therefore include all sorts of programmes and projects including centralised national programmes, regional support networks and centres (i.e. those providing facilities, for example in the form of a resource centre) and even large company supply chain initiatives (SCIs). We have also included funding programmes where the objective is to support projects which provide assistance with regard to more sustainable industrial and commercial activity.

In terms of the nature of initiatives it is worth making a distinction between 'active' and 'passive' support. Our definitions are as follows. Passive support is mainly dissemination-based, providing general information with which companies can help themselves. This can be a one-off process or a repeated process. Active support is more 'hands-on' and interactive, helping a company to improve through examination of specific company issues. This type of support naturally tends to be more prolonged although at its briefest could involve a single on-site environmental review.

What needs most explanation are the various topic categories that one can address. Using UNEP definitions and other schemes we have chosen to classify initiatives under four main headings. These are defined below (in the context of this project) going from the more common approaches, which seek to improve things within the constraints of regular production and consumption patterns as we know them today, to more radical approaches which aim to fundamentally change production and consumption behaviour.

Eco-efficiency

We have defined Eco-Efficiency as the more resource-efficient and less damaging means of operating, in relation to 'normal' (typical) manufacturing and business practices. The term therefore relates to processes rather than products and revolves around waste minimisation and resource maximisation, recently popularised through the Factor Four and Factor Ten philosophies.

Eco-efficiency therefore encompasses process optimisation[1] (including energy efficiency), reduced use of toxic materials (e.g. certain chemicals) and the adoption of 'cleaner technology'. In terms of the latter we mean technology that inherently leads to reduced resource use and less pollution, including end-of-pipe equipment where this allows the reuse of a resource such as effluent (e.g. membrane systems) or hot gases (e.g. regenerative oxidisers). Projects promoting environmental management systems (EMAS and ISO 14001) have been included in this eco-efficiency category as they encourage preventative action.

[1] The improvement of existing processes and procedures to give higher yield from raw materials and hence less waste at source.

Eco-design

We have defined Eco-Design as the approach to the creation (through design and specification) of products that are inherently more resource-efficient and less damaging than 'normal' (typical) products. Eco-design therefore encompasses product optimisation[2], increased use of renewable and secondary (waste/recycled) materials, reduced use of toxic materials (e.g. certain heavy metals) and design for reuse and recyclability (e.g. use of single materials, avoidance of certain adhesives etc.). We have also included 'green procurement' under this heading as it is closely related, i.e. in terms of companies buying goods which they themselves have not designed or specified but which they can have an influence over.

More sustainable working environment

We have defined More Sustainable Working Environments (Working Env.) as those which allow reduced health and safety risks for employees and reduced risk to the broader environment (e.g. outside a factory) through an integrated approach to Health, Safety and Environment in the workplace. A good example here would be an initiative to reduce the risk imposed by fugitive emissions of solvent vapours (VOCs) through supporting the adoption of water-based adhesives.

Sustainable manufacturing

We are defining Sustainable Manufacturing (SM) as production that operates within the carrying capacity of the environment (in its broadest sense including socio-economic factors), for example by primarily using renewable materials (e.g. natural fibres rather than plastics), recycled/waste materials (e.g. through waste exchange), renewable energy (e.g. wind power) and soft/green chemistry (e.g. without the use of toxic chemicals, high pressures and temperatures). In a sense it is the industrial equivalent of organic farming, a truly sustainable approach. The terms Industrial Ecology and Sustainable Production and Consumption (SP&C) are also used in this context.

While it is useful to classify initiatives in these terms it should be noted that the distinctions between the categories are not always clear. The various terms are used loosely their meaning being interpreted in many ways. In reality also there are many overlaps between the different categories. Eco-efficiency schemes may, for example, quite naturally address workplace health and safety issues or sustainable production. Relatively minor adjustments in the manufacture of wool textiles (natural dyes and energy from renewable sources), for example, can produce a completely sustainable process. Waste exchange, a common approach, is the basis of an industrial ecology system where the waste from one process is the feedstock for another.

Where initiatives cover, or have elements of, more than one topic area we have indicated this on the database. Some initiatives, for example the Business & Ecology Demonstration Project in the UK (Manchester), cover almost all aspects from compliance to eco-design, dealing with the specific needs of particular SMEs.

[2] e.g. Design for purpose using the minimum of materials.

Classification scheme

Using the various definitions noted above we have established a classification scheme for the database initiatives. This is set out in the box below.

Initiative Classification Scheme

Type of Initiative
- Information Dissemination/Technology Transfer
- Support Centres/Business Parks
- Network/Club (e.g. *green business clubs etc)*
- Supply Chain Initiatives (*often led by larger companies)*
- Funding Programmes
- Others

Nature of Initiative
- Active/Passive
- Short, Medium or Long Term

Topic Coverage
- Eco-efficiency
- Eco-design
- More Sustainable Working Environment *(integrated health safety and environment)*
- Sustainable Manufacturing

Services Offered
- Co-ordination/facilitation
- Information and advice on paper (reports, case studies, checklists, guides, libraries etc)
- Electronic information (e.g. databases)
- Workshops and seminars
- Consultancy services (telephone helpline, visits etc.)
- Others

Geographical Scope
- International, national, regional, local

Initiative selection criteria

Time and budget has not allowed us to identify and cover every single initiative in the EU let alone the US. We have, however, tried to cover the range of initiatives in terms of the main 'types' while also highlighting some of the more innovative[3] approaches. The main selection criteria are listed in the following box.

[3] By innovative we mean those that are taking an approach that has additional elements to the majority of support initiatives, that is combining elements in an unusual or new way or that is taking a fundamentally different approach to the mainstream. Obviously this requires a somewhat subjective judgement based on our own knowledge of what is happening across the EU and elsewhere.

Criteria for Initiative Selection

- Must be a programme or project at the international, national, regional or local level;
- Must be EU-based unless of a particularly innovative or exemplary nature;
- Must provide 'support', i.e. one of the service categories and/or funding;
- Must provide support to external bodies, not just internal support (e.g. within a company);
- Must include SMEs and preferably be focused on this group;
- Must cover at least one of the key topic areas (eco-efficiency, eco-design etc.);
- Must operate on a not-for profit basis (e.g. not a commercial provider such as a consultancy);
- Must have an email address and/or a web site for easy database updating.

The last point in the table is important in that it has limited us to initiatives that are in some way electronically accessible. This has been done for practical reasons, allowing for easier database updating. While there are a large number of initiatives which do not have a web site, the vast majority (in our experience) do have e-mail facilities. In the course of this particular project we did not come across a single initiative that did not have e-mail access. We do not believe, therefore, that this criterion has in any significant way limited the range of initiatives covered.

Data gathering

In preparing the database and this report we have drawn on previous ECOTEC work and certain other references as listed at the end of the report. Use of the internet has allowed us to search more widely and gather data in a cost-effective manner. The process has involved:

- general searches using key words - e.g., 'sustainable business'
- more specific searches - e.g. 'clean technology centres' etc.
- Access to specific web pages - e.g. EU Environment/Industry Ministries, other European networks, for example the European Academy of the Urban Environment (EAUE).

Where appropriate we have also made use of databases. The most useful of these has been the European Social Fund (ESF)-supported ADAPT programme projects database. We have also made numerous telephone calls to obtain contact information and to conduct interviews. Some of this work has been done from our Madrid office and through a German subcontractor.

Case studies

Case studies have been selected from the database entries, some of the more innovative and interesting initiatives being chosen. More detailed data has then been gathered for these case studies through:

- collection of additional publicity material;
- e-mail discussions;
- telephone conversations.

While face-to-face visits could have been conducted, sufficient information was gathered by the means noted above. To allow some sort of consistency in the case study work, a format was devised to cover the most relevant points and make them easily accessible to the reader. This format is shown in the Box below.

Case Study Format

- Type of Initiative (background, aims and activities)
- Partners and Sources of Funding;
- Services (i.e. the support provided);
- Achievements and The Way Ahead;
- Messages for Other Initiatives (e.g. barriers, solutions, key success factors).

Chapter 3

The current state of SME support

Background - the sustainable manufacturing hierarchy

Environmental advice and support for business has been available for many years in most parts of the EU. In general the Northern Member States have led a process that has progressed, in terms of the leading-edge of activity, through a number of stages (as defined above) that one could perhaps term the Sustainable Manufacturing Hierarchy (SMH) as set out in the box below.

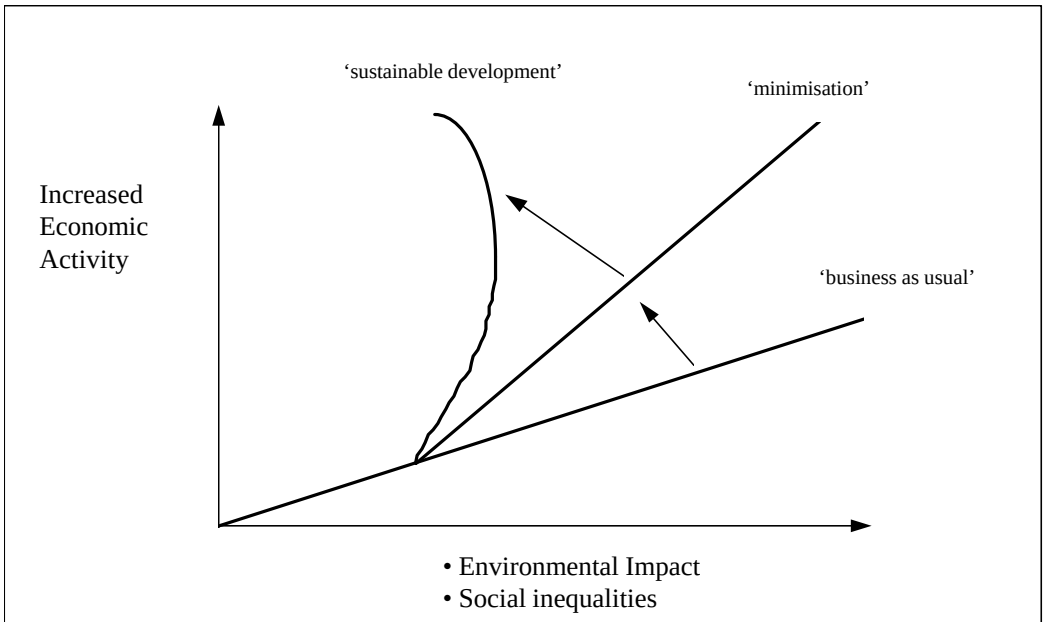
The sustainable development hierarchy

- pollution control and compliance - end-of-pipe approaches;
- eco-efficiency – process optimisation (waste minimisation, yield maximisation);
- eco-design - product optimisation, design for recyclability etc.
- more integrated approaches - e.g. relating health, safety, environment and quality;
- sustainable manufacturing – more fundamentally sustainable production: 'industrial ecology'.

One can make significant improvements through each of these approaches. Waste minimisation is essentially about incremental improvements that are relatively easy to achieve, some requiring little investment. The adoption of clean technologies and eco-designs generally involves more effort (R&D) and investment but can bring far greater improvements. Truly sustainable manufacturing requires some completely new approaches and hence long term effort, not just in terms of R&D but also in terms of society's attitudes, the way economic systems operate etc.

These ideas are expressed in Figure 1 below, the goal being to produce more from far less (i.e. the Factor Four and Factor Ten concepts) and ultimately to use no non-renewable resources and to create no pollution (beyond the carrying capacity of the environment).

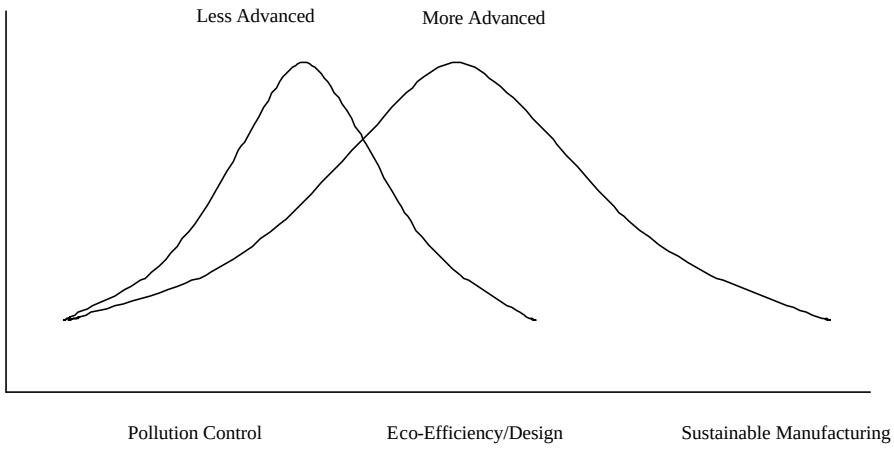
Figure 1: *Shifting development paths towards sustainable development*



Source: *ECOTEC for DGXVI European Commission*

It is important to note that countries do not simply move stepwise from one stage of the hierarchy to the next. Rather than dealing with each level of the hierarchy in isolation, a combined approach is often taken, adding the more advanced elements to existing elements or dealing with the same elements but to a greater degree (e.g. the move from partial effluent reuse to zero-discharge). Even in the more advanced Member States, such as the Netherlands, all levels of the hierarchy are represented although the emphasis is less on pollution control than in less advanced Member states. This idea is represented in Figure 2 below. Gradually the more advanced ideas and practices move into the mainstream as technology and understanding develops.

Figure 2: *Development of support activities in Member States*



The remainder of this section briefly summarises current activity in the EU, and to a lesser extent the USA, outlining the various types of initiatives, taking examples largely from the database.

Eco-efficiency initiatives

Eco-Efficiency initiatives are now numerous across the EU, the study having gathered information on many such initiatives. The most common cover waste minimisation, energy efficiency, clean technology and environmental management systems (EMS, e.g. ISO 14001).

Waste minimisation, clean technology and energy efficiency

In terms of waste minimisation, clean technology and energy efficiency, at the EU level there is now a DG III programme (linking with certain national programmes) and the Office for the Promotion of Energy Technology (OPET) network. The latter is run as a series of centres throughout the EU, the aim being to disseminate information on energy efficiency and renewable energy. In terms of support for eco-efficiency R&D, there are several EU initiatives including the Fifth Framework Programme (e.g. the 3rd theme, Competitiveness and Sustainable Growth, and the CRAFT programme for SMEs), LIFE, Save and PREPARE. The latter, the Preventative Environmental Protection AppRoachEs in Europe, links many relevant organisations throughout Europe.

At the national level good examples from the database include the Environmental Technology Best Practice Programme (ETBPP) in the UK, the Clean Production Programme 2 (CPP 2) in the Netherlands, and the ATYCA and DBU industry funding programmes in Spain and Germany respectively. ATYCA is wide-ranging in that it supports all sorts of innovation, including eco-efficiency and design. The DBU programme in Germany is also a wide-ranging funding initiative that encompasses elements relating to eco-efficiency, eco-design and sustainable manufacturing. In the USA there is a large EPA-run programme, covering both the private and public sectors, called WasteWise.

Clean Production Programme 2 (Netherlands)

In the Netherlands the CPP 2 provides eco-efficiency support and is particularly focused on SMEs. The programme operates through regional innovation centres (Senter) and the Company Environmental Agencies (BMDs) and while it is mainly an information dissemination programme, also offers limited consultancy advice. CPP 1, which ran to 1995, was very successful, with over 9,000 SMEs being given advice, 4,500 through regional meetings, 3,000 through activities undertaken in the various industry sectors and 1,800 through obtaining individual advice. The results indicate that the programme reached a very broad spectrum of SMEs. The success of CPP 1 can at least in part be attributed to the co-operation between the Senter, BMDs and other organisations including trade bodies and unions.

Environmental Technology Best Practice Programme (UK)

The UK Government's ETBPP has provided support at the national level since 1995. This centralised programme provides:

- self-help Good Practice Guides, case studies, computer disks;
- workshops and seminars;
- an Environment and Energy(telephone) Helpline;
- limited one-site consultancy advice;
- part-funding for R&D (clean technology) projects.

All services are free. There are now over 200 guides and case studies covering everything from solvent use in the printing sector to investment appraisal. It is estimated that the ETBPP is helping UK businesses to achieve savings of around £60 million each year. To date the Helpline has been able to offer advice and information to over 100,000 callers while in 1998 over 300 SMEs took advantage of free on-site counselling visits. The ETBPP is complemented by an Energy Efficiency Best Practice Programme (EEBPP), which provides very similar services on the energy side.

At the regional level there are very many eco-efficiency initiatives including the UK waste minimisation schemes (Sabina being one of around 40) and similar initiatives throughout Europe including OKOPROFIT in Austria, Efficienz-Agentur Nordrhein-Westfalen in Germany, Mimosa MilieuManagement in the Netherlands and the Barcelona Cleaner Production Centre in Spain. Spain also has an SME energy-efficiency programme for Objective 1 regions run by IDAE in Madrid. A search for initiatives in Germany indicated that most Lander, if not all, have some sort of eco-efficiency initiative underway.

At the more local level, there are many UK initiatives involving organisations such as Groundwork (which has various trusts in most industrial areas of England and Wales). Two interesting examples come from London and the South East of England. The first, run by an organisation called Wastebusters, involves very small companies, many being in the retail and service sectors (see box below). The second is an ESF-funded ADAPT project called Waste and Energy Awareness in SMEs (WEAS, led by Greenwich Environmental Management Services) which provides support to companies of all varieties. One interesting element of their work has involved Carillion, a construction company, in a supply chain initiative related to the construction of a hospital (see box below). An interesting project in Finland called ENCO, involves environmental awareness training for small companies in the retail sector.

It is worth noting that in many cases such initiatives involve partnerships between not-for-profit organisations, local authorities, regulatory bodies (such as the Environment Agency in the UK) and sometimes trade (employer) organisations and unions (employee bodies). While such partnership working is common across the EU, the involvement of the social partners (trade unions) is far less common in certain member states (e.g. the UK) than in others (such as The Netherlands, France and Denmark).

Waste Alert Clubs (UK)

The Waste Alert schemes, run in the London area by an organisation called Wastebusters, deal in the main with micro-SMEs and cover shops, pubs, clubs, restaurants and even museums and colleges as well as small manufacturing facilities. For as little as £24 (for companies with less than ten employees) companies get an information pack and a half-day consultation visit. Optional extras include a telephone helpline, workshops, a newsletter and access to a waste materials exchange. The South Thames Waste Alert Club is the oldest of five clubs having been formed in 1998. Collectively the five clubs have around 200 members which are now saving around £95,000 a year, mainly through minimisation, recycling and waste exchange. One business, for example, makes furniture from reclaimed wood provided by other members (e.g. a school) while a local museum is diverting waste for composting.

WEAS and the Supply Chain Hospital Construction Project (UK)

Carillion is the construction arm of Tarmac, a large UK company. On winning the contract to build the Swindon Hospital, Carillion got involved with one of the WEAS partners (see above) who persuaded them to adopt a more sustainable approach to their construction project through a methodology known as The Natural Step (TNS). This approach led them to set out a sustainability action plan and to involve their suppliers which in turn developed action plans to address the key issues. This has resulted in a variety of measures from improved energy-efficiency in the building design through a shared subcontractor transport arrangement to increased use of recycled construction waste and the composting of organic wastes on site. It is expected that 80,000 tonnes of waste will be diverted from landfill over the life of the project while the hospital is expected to be one of the most energy efficient of its kind.

Environmental management systems

Many initiatives support the uptake of environmental management systems (EMS) in the form of ISO 14001, EMAS and other simplified systems. At the EU level, the Commission is to establish an external 'helpdesk' to provide information on EMAS.

At the national level good examples include the Danish EPA Programme for the Promotion of Environmental Management in SMEs and the NUTEK (National Board for Industrial and Technical Development) Environmental Management in SMEs programme in Sweden. These free programmes disseminate information through publications, seminars, telephone helplines, CD Roms etc. and provide funding. Spain also has a national programme, Initiative Environment SME, which provides technical assistance (information and consultancy) to small companies wishing to implement an EMS (e.g. ISO 14001).

In the UK, the Government supported the adoption of EMAS in small companies through its subsidised Small Company Energy and Environmental Management Assistance Scheme (SCEEMAS), however this attracted little interest and was abandoned in 1998. Funding has been diverted to the ETBPP/EEBPP Helpline.

At the regional/local level there are many small-scale initiatives. In the UK organisations like Groundwork run subsidised EMS courses for local companies. Until recently an organisation called Business Environment Association (BEA) ran a scheme (with ESF ADAPT funding) called Enviromark to provide simple step by step EMS accreditation, with various levels up to full ISO

14001 standard. This scheme, which can be of benefit to those SMEs not wishing to immediately go for full ISO 14001 or EMAS accreditation, is now run on a commercial basis (through the internet) and hence is not included on the database. There are also examples of local schemes in the Netherlands (Interne Milierzorg in Arnhem), Italy (Improving the Environmental Efficiency of SMEs in Milan) and Spain (Formacion en Medioambiente Industrial in Madrid).

As with other support initiatives, EMS projects often involve several partners and sometimes trade bodies. In the Netherlands, for example, the printing sector body (the KVGO) has supported its members in the adoption of EMS systems while in France an initiative called ADEGE (Action de Developpement de la Gestion Environnementale) offers EMS (ISO 14001) support to plastics sector SMEs (see box below).

ADEGE – EMS Support for the Plastics Sector (France)

ADEGE (Action de Developpement de la Gestion Environnementale) aims to assist SMEs in the plastics sector to adopt ISO14001. The project was initiated by the Plastic Manufacturers Federation and is being implemented through Plasturgie Services, its business support arm. ADEGE 1, which began in 1995, assisted almost 100 SMEs while ADEGE 2, which is funded through the EU ADAPT programme, aims to assist 300 SMEs. The programme works in two main ways:

- collective activities, where firms are brought together for seminars, allowing them to ask questions, share experiences, ideas etc.
- company-specific on-site work where consultants work with the relevant staff to help develop the environmental management system.

Throughout the programme (12 to 18 months for most companies) the relevant member of staff benefits from several days of methodological training. He or she is also advised on how to train other members of staff, being given relevant training material including video cassettes and guidance documents. By October 1999, 196 enterprises had participated in the programme and 5 had obtained ISO 14001. The key benefits identified by the majority of participants included:

- better understanding of regulation;
- better management of waste (e.g. segregation and sale) ;
- better understanding of environmental risk;
- improved image with clients;
- better relations with the regulator;
- staff involvement in a global approach.

The programme is moving on to deal with other industrial sectors and to involve companies in the UK and Germany.

It is worth noting that many schemes are part-funded by the European Social Fund (ESF) or the European Regional Development Fund (ERDF). It is also worth noting that some large companies such as Rover and Jaguar cars in the UK (see box below) are supporting their suppliers in terms of the adoption of EMS. Finally it is worth noting that there are many commercial organisations providing consultancy advice and short courses covering ISO 14001 and EMAS.

Rover Cars – EMS Supply Chain Initiative (UK)

Rover Cars in the UK is offering direct EMS assistance to 1st and 2nd tier suppliers. In 1991 Rover established a pilot scheme to introduce EMS (BS7750 at that time) into 6 of its major suppliers. This was achieved, in part through Rover-run workshops. This pilot activity was a great success, with these suppliers making savings of between £10,000 and £100,000. Rover have subsequently encouraged all 700 1st tier suppliers to adopt ISO 14001 or EMAS. About 2/3rds have now started the process assisted by Rover who have provided:

- on-site ISO14001 workshops;
- guidance material;
- on-site 'mentoring' with the assistance of Coventry Council Environmental Advice Services team.

The process is now moving on to the second tier suppliers, using 1st tier suppliers to assist in workshops and share their experiences.

Centres and business parks

There are many environment centres across the EU. Examples include the Wales Environment Centre (WEC) in the UK, the Clean Technology Centre in Cork (Ireland), the Cleaner Production Centres (e.g. Vienna, Graz) in Austria, the Centre for Cleaner Production Initiatives (CCPI) in Barcelona (Spain) and the Clean Technology Centre in Athens (Greece) Greece. In general these centres disseminate information, for example from national programmes, provide links to other organisations and networks and provide advice through training seminars, limited consultancy work etc. In general such centres also have library's where firms can access all sorts of data on paper and on electronic formats (e.g. the Best Practice Environmental Database at the CTC in Ireland). Most centres are involved in providing assistance with audits and the implementation of EMS.

The Cleaner Production Centre for Greek SMEs (Greece)

CPC was established in September 1994 in Athens. A total of 83,000 ECUs were provided for the establishment and initial year operation of the CPC. 50% provided by the European Foundation for Living and Working Conditions and 50% by Greek national sources (Ministry of Urban Planning, Environment and Public Works, National Research Centre "Demokritos", CPC partners).

To date CPC has developed training seminars, a library, an Internet network, a quarterly newsletter, sectoral studies and lectures. Additionally, it prepares funding proposals for cleaner production programmes.

Centre For Cleaner Production Intiatives (Spain)

The Centre for Cleaner Production Initiatives (*Centro de Iniciativas para la Producción Limpia* in Spanish) is the tool by which the Department of the Environment encourages Catalan companies to adopt practices and technologies leading to a significant reduction in the amount of wastes they produce through waste minimisation, clean technology, reuse and recycling. The Centre particularly focuses on hazardous wastes and the support of SMEs, essentially acting as an information dissemination centre. In particular the Centre:

- gathers, collates and catalogues information about tried and tested cleaner technologies;
- analyses the technical and economic feasibility of projects;
- facilitates industrial pilot programmes with proposed technologies;
- promotes and manages the organisation of training activities;
- facilitates international relations between companies and other organisations;
- publishes catalogues, leaflets, handbooks, etc, to support projects;
- provides general information and advice on subjects related to waste minimisation.

There are also examples of Eco business parks including the Hartberg park in Austria, the Turin Environmental Technology Park (EnviPark) in Italy and the UK Urban Mines Sustainable Growth Park in Yorkshire. In general such 'parks' provide more sustainable 'eco-friendly' premises and landscaped surroundings and aim to attract companies that offer environmental technologies/services as well as companies that are trying to manufacture in a more sustainable way. The Hartberg Park also encourage waste exchange while the EnviPark specifically offers SME support in terms of eco-efficiency and eco-design and support for R&D ventures.

Eco-design initiatives

Eco-design is an area that is attracting more and more attention across the EU, activity being stimulated by the introduction of EU and national eco-labels and related product Life Cycle Assessment (LCA) work. Current and forthcoming producer responsibility/take back legislation, for example the Packaging and Packaging Waste Directive and the Waste Electrical and Electronics Equipment Directive, is also stimulating activity in this area as manufacturers look to reduce the costs of recovery and recycling.

Our research has highlighted a range of eco-design initiatives, these including those supported by the Centre for Sustainable Design in the UK, the Ecodesign Demonstration Project in Belgium and the Environmentally Superior Products Scheme in Ireland. These projects all aim to disseminate information relating to more 'sustainable' products while some provide consultancy support and funding.

Eco-Design Initiative (Belgium)

The local authority of West-Vlaanderen, with various partners including the Flemish Institute of Technological Research (VITO), is running a LIFE project to identify ecodesign opportunities in 50 companies (a combination of large companies and SMEs) and support them in ecodesign implementation. The project uses the Dutch PROMISE methodology:

- Step 1 – Planning
- Step 2 – Reference Product Selection
- Step 3 – LCA Analysis (use of EcoScan tool)
- Step 4 – Identification of Feasible Options
- Step 5 – Development of Alternative Concept

Other relevant projects from the database include the Energi och Miljo project in Sweden. This interesting project aims to raise environmental awareness in terms of purchasing decisions. Another initiative of note is the STEP (Special Training for Environmentally-Sound Production) project (not to be confused with The Natural Step) which includes life cycle assessment (LCA) and product supply chain considerations as two of the three key elements, the third being EMS. The initiative began in Finland but now has projects running in several Member States, each providing relevant training materials to assist industry.

There are also innovative and interesting programmes in the USA including the Inventions and Innovations Program (Department of Energy) and the well-established and well-known EPA Design for the Environment (DfE) Program. The former relates to energy saving inventions, providing funding and assistance with technology commercialisation.

Eco-design and Training for Manufacture, Use and 'End of Life' – ETMUEL (UK)

ETMUEL is a training programme, run by the Centre for Sustainable Design) focusing on the implementation of environmental considerations in product development and design in electronics sector SMEs. The initiative will run for two years from 1999 - 2001 and the target audience is SME electronics manufacturers, component suppliers, designers and recyclers. Through this project CFSD is developing eco-design tools that can be implemented both directly with SMEs (manufacturers, recyclers and design consultancies) and indirectly through the supply chains of large companies (Supply Chain Partnerships (SCPs). With regard to SCPs, CFSD will work with manufacturers and systems integrators to communicate and implement eco-design issues throughout the supply chain. For both groups activities will be supported by a series of workshops aiming to explore problems and opportunities involved with the implementation of eco-design. Existing eco-design checklists covering management and technical aspects will be made available to participants and new eco-design tools will also be developed. A follow-on ecodesign training programme will be developed for a limited number of individual companies.

More sustainable working environment

The research has highlighted only a small number of initiatives relating to the integrated approach to health, safety and environment to provide more sustainable working environments. The European database examples are from Denmark (Integrated Management for SMEs), Norway (ROS) and Portugal (Marco-C) although there are thought to be similar projects in other Member States.

The Danish project focuses on introducing management systems to SMEs which integrate environment, health, safety, hygiene and quality and involve all staff including those on the shopfloor. The Portuguese project is similar but focuses specifically on the construction sector. The Norwegian project focuses on Risk and Vulnerability Analysis methodologies for SMEs providing handbooks and tools.

Small Workplace Programme (Finland)

The Small Workplace Programme is a nationwide funding programme, running from 1995 to 2000, its aim being to contribute to the improvement of the working environment for people employed in small enterprises. This is to be achieved through stimulating improvements in health, safety and occupational health. The projects, which mainly involve the development of training materials, have resulted in the preparation, by the Finnish Institute of Occupational Health, of a wide selection of practical information including booklets, checklists, manuals and databases, which can be used directly by small companies and by occupational health units. In 1999 the programme consisted of 15 active projects involving about 15,000 people in over 500 workplaces. Experts from 15 occupational health service units are also involved.

It is also worth mentioning the Good Neighbour Project in Massachusetts (USA), which brings together industry, government, academic institutions and communities to look at sustainable ways of dealing with environmental and health hazards in an integrated way.

It should be noted that some of the eco-efficiency initiatives inherently include health and safety elements. To give an example, an ETBPP-supported company in Birmingham has introduced a new 'zero-discharge' (clean technology) chemical mixing plant. While this has been done primarily for business reasons (cost/quality) the health and safety benefits for the employees have been considerable. This has helped to 'sell' the project (which has involved some redundancies) to the employees.

Sustainable manufacturing

Perhaps the most interesting area of activity is that relating to sustainable manufacturing and so-called 'industrial ecology'. A number of the more advanced Member States (in terms of the SM hierarchy already described) are now beginning to look at ways of fundamentally changing manufacturing practices, making greater use of renewable resources, including non-food agricultural crops and renewable energy, and waste/recycled materials.

The research has highlighted a small number of initiatives which include such approaches as a significant element of their work. In the EU these include the EET (Economy, Ecology and Technology) programme in the Netherlands (see box), the Ecological Sustainability project in Sweden, the Swiss-based ZERI initiative, the activities of the German Nova Institut and the UK Bio-Wise and Sustainable Technology Initiatives (STI). It should be noted that the EET project and the STI project are supporting research and development activity rather than the uptake of the technologies.

While it is not aimed at supporting SMEs as such, the EET programme is particularly interesting in that it funds consortia research and development projects under a number of key themes including eco-design and the use of renewable raw materials. During 1996 two projects were funded in this area relating to a) cellulose technologies and products and b) biopolymers (from vegetable oils) to replace synthetic latex and rubber. The German BDU funding programme also supports sustainable manufacturing projects, for example those using renewable materials.

The Deutsche Bundestiftung Umwelt - Federal Foundation for the Environment (Germany)

The DBU was established in to promote and financially support environmental protection projects. Particular emphasis is given to projects initiated by SMEs and to the states of the former East Germany. The initiative covers nine particular areas including:

- Innovative process technology for recycling, disposal and reduction of emissions;
- Environment and agriculture – use of renewable raw materials, development of environmentally friendly production processes;
- Environment and transport – reduction and avoidance of traffic.

The German Environmental Award, presented by the DBU is worth 1 million DM. The award honours exemplary achievements.

Economy, Ecology and Technology (EET) Programme (Netherlands)

The EET programme which has been operating since 1996 with the aim of enabling consortia (scientific institutions and companies) to develop fundamentally new technological solutions. The programmes themes cover process water, industrial waste, eco-design, traffic and transport, renewable raw materials and renewable energy. !2 consortia received a subsidy in 1996 and a further 14 in 1997 (90 million guilders total). Interesting projects to date have included:

- Preparation of biodegradable latex and rubber from renewable raw materials;
- Zero-discharge fermentation of bakers yeast;
- Vegetable resin as a binder in paint;
- Inulin (from chicory root) to replace petrochemical derivatives;
- Oil from biomas at a competitive price.

The Swedish Ecological Sustainability Project, while not restricted to SMEs, promotes the use of renewable and recycled materials through dissemination and consultancy support activities. The ZERI initiative is actually a network involving many projects across the world, the common aim being the spread of more sustainable production and consumption activities. In the UK some work has been done by ZERI in the Brewery sector.

In the UK the national Bio-Wise programme encourages companies, through publications, seminars and workshops, to utilise bio-technology in manufacturing and pollution control applications. The UK Government has also just announced the launch of the Sustainable Technologies Initiative (STI) which will support the development of new clean technologies and sustainable production techniques, in the main by providing funding. The project is in some ways an extension of the ETBPP and is similar to the Dutch EET program.

Also of interest in the UK are projects being supported through the Tweed Horizons centre in Scotland and the Wales Environment Centre. The former has helped a firm in the Scottish Borders to develop a process to manufacture polyurethanes from vegetable oils while the latter has been involved with a project (lead by the Bio-composites Centre at the University of Wales in Bangor) to manufacture non-woven glass fibre and plastic substitutes from hemp and flax. The market for such non-woven fibres is believed to be around 50,000 tpa in the UK alone.

There are also interesting programmes in the USA including the By-Product Synergy Program and the ReTAP Program. The former supports local/regional 'industrial ecology' projects by bringing together a number of companies which can use each others wastes as feedstocks. The latter is a programme to support firms wishing to use recycled/waste materials in their products, providing detailed material handbooks and consultancy support. The two programmes clearly complement each other.

Chapter 4 Summary and conclusions

Level of SME-specific support

The main aim of the project was to identify initiatives providing sustainable development support tailored to SMEs and micro firms. We have been able to find a large number of such initiatives, particularly on the eco-efficiency side, mostly originating in the last few years. In a number of cases SME- specific initiatives have developed as part of more general 'all industry' initiatives.

This seems to reflect the realisation that a) SMEs are crucial to the EU economy and b) that they are different from larger companies, particularly in terms of their limited in-house resources and expertise.

It is notable that while many of the eco-efficiency initiatives are aimed at SMEs, most of the eco-design and sustainable manufacturing initiatives do not specifically target SMEs. This can be explained by the fact that smaller companies tend to be some way behind larger companies in terms of adopting new ideas. Our experience in the UK and the Netherlands indicates that most SMEs are still focused on legislative compliance and that only a minority are getting involved in eco-efficiency and eco-design.

Small and new firms, however, are often in a good position to innovate having yet to develop the 'baggage', i.e. an interia against change, associated with larger firms. It is, therefore, good to see that there are some initiatives (e.g. Tweed Horizons and the Flanders Eco-Design Initiative) that are specifically aiming to support SMEs.

Topic coverage

Overall our work suggests that the vast majority of initiatives in the EU are in the eco-efficiency area, the majority dealing with waste minimisation, clean technology, energy efficiency and EMS, often as single topics rather than as an integrated package. It seems that far fewer initiatives are dealing with eco-design, integrated approaches (for example including workplace health and safety) and more fundamental approaches to 'sustainable manufacturing'.

While it is difficult to generalise, on the basis of the work conducted it would seem that the Member States are at various stages in terms of their leading edge activities. Encouragingly all Member States now seem to have initiatives dealing with eco-efficiency matters. Quite a few (including Belgium, Germany, Ireland and the UK) have eco-design initiatives of one kind or another while some Member States (e.g. Denmark, Portugal) have initiatives dealing with health and safety alongside environment in an integrated way.

A very small number (including Germany, the Netherlands and the UK) having begun to make progress in terms of 'sustainable manufacturing' encompassing such things as the use of renewable energy and materials (such as non-food agri crops) and the greater co-ordinated use of wastes and recycled materials. While we cannot be certain, our work suggests that there may be fewer initiatives in the Southern Member States than in the North. This is not to say that there is nothing happening in these Member States. Spain, for example, has many initiatives at the national and regional level.

As noted earlier (Section 4), we can see that where Member States have introduced programmes relating to eco-design and sustainable manufacturing, these are almost always complementary to, or part of, programmes covering lower levels of the hierarchy, i.e. waste minimisation, energy efficiency and even end-of pipe control. The EET in the Netherlands complements the CCP while STI in the UK complements ETBPP and the EEBPP.

Most of the activity in the sustainable manufacturing area is, quite naturally, aimed at supporting research and development/demonstration projects rather than mainstream implementation. One has to note, however, that some of what passes as waste minimisation or clean technology activity can actually be very important in sustainable manufacturing terms. In the UK, for example, some of the 'future practice' work undertaken by the ETBPP has involved zero-discharge manufacturing through the introduction of wastewater treatment and recirculation. Other UK projects have involved large scale waste-exchange between companies within specific sectors (e.g. ceramics) and between sectors (ceramics and cement).

The nature of the support

In terms of the nature of the support, most of the initiatives are involved in 'passive' dissemination, irrespective of the topic coverage. The mechanisms employed are various and include paper guides, electronic databases, CD Roms, telephone helplines, seminars etc. More and

more data is, of course, available through the internet and web sites such as that from the Sustainable Business Network provide a genuinely useful resource for SMEs. More 'active' approaches generally involve the limited use of subsidised consultancy work, for example in terms of providing one-off eco-efficiency reviews, telephone counselling etc.

In many cases the support is provided through 'centres' which provide a long term resource for companies to use at the local or regional level. Local/regional business clubs and networks, while not generally involved in specific initiatives and hence not represented on the database, are also common in many parts of the EU, providing useful and low cost general support. Supply chain initiatives have been difficult to identify, perhaps because they are generally private sector affairs, although a number are known to exist.

In the main support initiatives operate at the local/regional level, working with companies with whom they have developed good relationships. In some cases regional bodies (e.g. the BMD and Senter in the Netherlands) are being used to implement national programmes (CPP 2 in the case of the Netherlands). There are also some dissemination activities and R&D support programmes that are EU-wide (and in some cases worldwide), these including programmes such as the OPET network and LIFE and networks such as PREPARE, ZERI and STEP.

Key success factors

The study did not specifically set out to analyse each initiative so as to judge how successful it had been or to gather evidence as to the key success factors. We did, however, explore these issues to a degree, noting where initiatives seemed to be engaging a large number of SMEs and/or resulting in clear achievements (e.g. ISO 14001 accreditation, environmental improvements, cost savings etc.). In addition some organisations themselves noted factors that they felt had been important to the success of their initiatives. These factors have included:

- Working through partnerships;
- Working through supply-chains;
- Careful advanced planning;
- Careful targeting of support to make it practical and SME/sector-specific;
- Integrated approaches that involve all functions of the business;
- Use of experienced 'quality' personnel, particularly with regard to consultancy support.

In our experience SMEs particularly benefit from information that is a) simple, b) specific to their needs (at least sector specific in most cases unless related to generic issues such as new cross-sectoral legislation) and c) requires little time and money to implement. Many of the initiatives on the database are at least providing information in an accessible and appropriate form. It is also clear that SMEs benefit greatly from more active 'hands-on' and extended support, providing continuing on-site help over months or years rather than just 'self-help' information, limited training or brief environmental reviews. This more in-depth support is, of course, more expensive to provide.

Despite this, some initiatives, such as the UK waste minimisation schemes, the eco-design initiative in Belgium and the ReTAP initiative in the USA, are providing this, supporting companies through the whole change process rather than just the very initial stages. It is worth noting in this context that in the UK various graduate placement schemes (e.g. Student Force for Sustainability) allow appropriate students (e.g. from environmental engineering or management courses) to be put at the disposal of SMEs as a low-cost resource. In this way the gap can be bridged between the existing staff, who have the company specific knowledge but no time, and the student who has both the time and the generic environmental knowledge.

As a final point it is worth noting that SME support must also be well-co-ordinated to be effective. In the UK, and possibly other Member States, the number of initiatives is such that SMEs (and even larger companies) get 'swamped' with information and offers of assistance. In most cases they have no means of determining what is worth pursuing and hence do nothing. Uncoordinated support is counter-productive leading to initiative fatigue.

In our view what is required here is a co-ordinated approach at the regional/local level whereby companies have a single point of contact and each initiative/organisation has a clear role within an overall strategy that exploits organisation strengths and synergies. An approach of this kind, developed with ECOTEC's assistance, is currently being piloted by the Welsh Development Agency and certain local authorities in South Wales.

Chapter 5 Concluding remarks

There are many initiatives across the EU (and in the USA) aimed at supporting manufacturing companies in a shift from 'business as usual' to more sustainable practices that are less damaging in terms of both resource use and pollution load. Many of the initiatives are specifically tailored to meet the needs of SMEs, especially small and micro firms, or at least are applicable to such firms in terms of the type of support provided.

The initiatives described in this report and on the database cover many topic areas from eco-efficiency (essentially optimisation approaches) and eco-design through more integrated multi-topic approaches to more fundamentally challenging approaches to truly 'sustainable manufacturing' based on renewable resources. The eco-efficiency, eco-design and working environment initiatives tend to be more related to implementation support, the ideas and techniques having already been developed, while the sustainable manufacturing initiatives are mainly aimed at research and development/demonstration.

Clearly it is important to continue to support projects across the whole spectrum, however one has to take a careful approach that suits the circumstances in particular Member States, in particular sectors and even particular SMEs. In terms of mainstream industrial and commercial SMEs, it makes sense to focus on getting across eco-efficiency ideas before introducing the more difficult and sometimes esoteric messages of 'sustainable manufacturing'. The Business and Ecology Demonstration Project in Manchester (UK) provides a good example in that it had no single topic focus. The SMEs involved determined what support was provided (in this case by university postgraduates), this ranging from legal advice on compliance to help with water pollution and product eco-design.

Even in the more 'advanced' Member States the majority of SMEs (industrial and commercial) are still relatively untouched by even basic eco-efficiency ideas and hence there is still a need to increase activity, or at least maintain it, in this regard. That is not to say that SMEs cannot play an important role in these fundamentally new approaches. In fact start-up funding and other support, of the various kinds described in this report, can help to develop whole new sectors, based on small innovative companies. SME support is therefore vital to allow the industrial restructuring that will accelerate the move towards a more sustainable future.

The European Foundation, and other EU and international organisations, can continue to play an important role in disseminating information, in particular to those at the national and regional level, to ensure that organisations continue to provide the support that SMEs really need. Hopefully this report and the associated database will help in this regard, stimulating new and better SME support activity. As a final comment we would note that further useful work could be conducted to increase the usefulness of the database (see box below).

Possible Database Developments

- Extension to improve coverage of Supply Chain Initiatives, Social Partner Initiatives and Sector-Specific initiatives;
- Extension to include central and eastern European initiatives;
- Hyper links to the database initiative web sites, where in existence;
- Hyper links to other EU and national programme web-sites, through a database 'front end';
- Hyper links to other useful web-sites, for example relating to national regulation (e.g. NETREGS from the Environment Agency for England and Wales), again through a database front end;
- Translation facilities from English to perhaps French, German and Spanish.

Annex 1 Glossary of terms and abbreviations

BPS	By-Product Synergy programme (USA)
CFSD	Centre for Sustainable Design
CTC	Cleaner Technology Centre (EI)
CPC	Cleaner Production Centre (GR)
CCPI	Centre for Cleaner Production Initiatives (E)
CPP	Cleaner Production Programme (NL)
DBU	German Federal Foundation for the Environment
EEBPP	Energy Efficiency Best Practice Programme (UK)
EET	Economics, Ecology and Technology (NL)
EMS	Environmental Management Systems
ERDF	European Regional Development Fund
ESF	European Social Fund
ETBPP	Environmental Technology Best Practice Programme (UK)
NUTEK	National board for industrial and technical development (S)
ReTAP	Recycling Technology Assistance Partnership (USA)
SME	Small and medium sized enterprises (< 250 staff)
STEP	Special training for environmentally sound production
STI	Sustainable Technology Initiative
VITO	Flemish institute of technological research (B)
ZERI	Zero emissions research initiative

Annex 2

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