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ABSTRACT

In 1995, Austria, Belgium, Denmark, France, Greece, Italy, Spain, and the United Kingdom conducted a total of 34 case studies to analyze the impact of measures to protect the environment on qualifications and occupations in environment-related sectors. The primary objective was to identify the possibilities for action and cooperation for the various social partners. In each country, experts were interviewed about model projects in eight fields. An analysis of all 34 case studies conducted established that the inclusion of new environment-related skills is needed at every level of qualification from decision maker to unskilled worker. New occupational profiles, including the following, were beginning to emerge: environmental officer, waste disposal facility supervisor, environmental consultant, and river maintenance operative. Although the new occupational profiles represented a larger share of environment-related skills, they were still based on existing qualifications and often required two areas of competence (one relating to the environment and the other relating to another occupation). The eight countries studied were addressing the need to equip workers with new skills in various ways, by including environment-related skills in initial vocational training and by creating continuing training courses. (Appended is a table summarizing the case studies.) (MN)

1998

New qualifications and training needs in environment-related sectors

CEDEFOP
European Centre for the Development of Vocational Training

Synthesis of studies carried out in Austria, Belgium, Denmark, Spain, France, Greece, Italy and the United Kingdom

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CEDEFOP Preface

Action on behalf of the environment and to create jobs inevitably gives rise to a need for new competences. Introducing more environmentally friendly technology and working practices, implementing the environmental policy promoted by the European Union and evolving local initiatives linking the environment with jobs call for efforts in the field of education and training on the part of all concerned.

This realisation led CEDEFOP in 1995 to launch a research project in eight Member States - Austria, Belgium, Denmark, France, Greece, Italy, Spain and the United Kingdom - on changing occupations, new occupations and the development of occupational skills in the field of environmental protection.

The project's aim was to provide governments and the social partners with information as to how qualifications and occupations in the environmental field are evolving in order to encourage social dialogue on future training and job creation strategies at both national and Community level.

This project followed on a number of CEDEFOP studies that sought to identify environment-related occupational profiles in the chemical and metal industries and in government administration.

The research conducted in the eight countries in 1996 used case-studies to analyse the relationship between measures to protect the environment, jobs and the acquisition of new knowledge and skills. It involved a scrutiny of changes that had taken place in order to safeguard the environment, their impact on employment and qualifications, the ways and means whereby new competences were being acquired and the role played by training and the social partners.

Studies undertaken in the various countries related to model projects in eight fields whose results could be usefully applied in developing similar activities elsewhere:

- Reduction, collection, treatment and recycling of waste
- Environmental management
- Renewable energy sources and energy saving
- Air quality and changing modes of transport
- Urban ecology
- The treatment of polluted sites and soil
- Home help
- Organic farming
- Eco-tourism
- Protection of rural areas

Three meetings were held - in Austria in November 1996, and in France and Italy in January 1997 - with the social partners and others responsible in the social and industrial fields to discuss and validate the results of the national reports. They were attended by the experts who carried out the research in Belgium, Denmark, and France and representatives of the European Commission and of the Dublin-based Foundation on the Improvement of Living and Working Conditions.

The report summarising the results of the research shows that the impact of environmental activity on the employment market is mainly on existing jobs. A need for new, environmentally

related knowledge and skills exists at every level of employment and the role of the social partners is particularly important.

At the same time, an analysis of the projects selected for the various case-studies shows that the acquisition of new environmentally related knowledge and skills can lead to the emergence of new services, new areas of activity and hence to the creation of new jobs.

At present such new competences are mainly acquired through experience, though the case-studies show that training is developing and becoming an integral part of innovative projects in which environmental action, job creation and new skill-building all interact with"learning projects".

Mara Brugia
Project Coordinator

Introduction

1. Context/basic hypotheses

Environmental protection has been emerging as a major source of jobs in Europe since the early eighties. The Commission White Paper entitled "Growth, Competitiveness, Employment - the Challenges and Ways Forward into the 21st Century" published in 1993 proposes that technological change, economic development, employment and sustainable development be treated as an integral whole.

In its report Employment in Europe 1995 (published 26 July 1995) the Commission points to the certain creation of jobs but to some uncertainty as to timing: "Current predictions are that some 250 000 new jobs will be created in the environment sector in the European Community as a whole by the year 2000".

A survey carried out by the European Commission on local job creation initiatives refers to new sources of employment in 17 fields, including waste management, water management, the protection and maintenance of natural resources, pollution regulation and control and the related installations.

At the same time, developing education and training in matters concerning the environment is shown to be increasingly necessary in order to underpin the environment policy being fostered by the European Union.

The fifth Community action plan on the environment "Towards sustainability" requests the trade unions, non-governmental organisations and trade associations to take action at the level of information and training.

The unions at European level (ETUC) are requesting an extension of their responsibility in matters relating to the quality of life and a closer link between the world of work and the environment. Following a study in ten Member States, the IRENE network maintained by the European Foundation for the Improvement of Living and Working Conditions in Dublin recommends that the rights of workers in the field of environmental protection should be included in EU directives in the form, for example, of the right to information and consultation and that account be taken of the environment in initial and continuing training.
The objective of the present project, designed by CEDEFOP in 1996/97, is to provide government authorities and the social partners with information concerning the development of skills and occupations in the environment field.

The project is based on three hypotheses:

First hypothesis
Protection of the environment is one of the main sectors of job creation. Increasing demands for quality and improvement of the environment have a positive effect on both jobs and the environment.

Second hypothesis
Improving environmental protection involves new activities and new skills on the part of different groups - elected political representatives, company decision-makers, ordinary citizens, and professionals in the public and the private sector.

These changes affect a variety of jobs and call for training at all levels directed as much towards decision-makers as towards less skilled employees.

Third hypothesis
The role of the social partners would seem to be essential if the relevant training schemes and information campaigns are to be evolved.

These basic hypotheses will be illustrated and dealt with in more depth and detail in our discussion of research into a number of environment-related sectors.

2. Research objectives

Research focused on two aspects:

a) The impact on the job market of changes connected with environmental protection

- What factors lead to qualitative and quantitative changes?
- What changes have been brought about by activity aimed at improving environmental protection?
  - New corporate strategies
  - Changes in technology
  - New activities such as the creation of new firms, new activities in existing firms, new activities at local and regional government level, new organisations and associations, etc.
- What impact do these changes have on employment? What jobs are affected by the new activities? When does taking account of environmental problems help to create jobs?
- What forms of cooperation between the various agents (elected representatives, responsible officials, the social partners, company decision-makers, training officers, etc.) make such changes possible and contribute to their impact on employment?

b) The relationship between changes noted, their qualitative impact on employment and the emergence of new skills

- What jobs are affected by the new activities?
- How are these jobs affected by the changes, (occupational mobility/new jobs/job disappearance/demand for new skills)?
- What new skills are called for?
- By what means are these skills acquired (training, experience, etc.)?
- For what skills does no appropriate training exist?
- How can the emergence of new skills generate new activities?
- What forms of cooperation between the various agents (elected representatives, responsible officials, the social partners, corporate decision-makers, training officers, etc.) contribute to the emergence of new skills?

3. Scope of research

Research was carried out in eight Member States: Austria, Belgium, Denmark, France, Greece, Italy, Spain, and the United Kingdom.

Experts questioned were asked to comment on model projects in eight fields used as case-studies and designed to serve as a source of information for developing similar activities:

- the reduction, collection, treating and recycling of waste
- environmental management
- renewable energy sources and energy saving
- air quality and changes in the field of transport
- urban ecology
- the treatment of polluted sites and soil
- home help
- organic farming
- eco-tourism
- protection of rural areas

These case-studies were essentially concerned with emerging sectors of activity and focused on innovative projects often still under way. Sectors already well structured, such as water, were disregarded.
Particular attention was paid to jobs requiring low skills and projects aimed at finding work for young people in difficulty, though without excluding other skill levels.

Each of the case-studies involved:

a) A general survey of the sector of activity throughout the territory describing:

- The principal activities and agents,
- Changes, such as developments in technology, resulting in either the creation or loss of jobs
- The impact of these changes on jobs, qualifications, skills required and training courses set up.

b) A model project to serve as the basis for assessing transferability for the purposes of other projects. Here the points studied were:

- Changes made by the project and the factors bringing about these changes - contributing factors/partnership between agents/attainment of new skills, etc.
- Existing or new jobs affected and the skill levels involved,
- Competences called for,
- Training courses set up and training needs not taken into account,
- Different methods of recognising and validating and needs not taken into account.

The case-studies were used as a basis for identifying the possibilities for action and cooperation for the various social partners.

PART ONE

Impact on employment of action to improve the environment

The research carried out involved identifying innovative, job-creating initiatives rather than analysing sectors already well structured.

As a general rule, action concerned with environmental protection impacts mainly on existing occupational profiles. We also identified a number of new occupations emerging or others radically affected.

The impact in job terms tends to be on the three categories of work specified in the following table.

Table 1: The various categories of jobs relating to the environment

Type of job	Occupation profiles and skills required	Examples	Impact of action to protect the environment
Jobs directly environment-related: • All jobs in firms whose chief activity is in an environment-related sector such as water, air, waste, noise, natural heritage, etc. • Jobs involving an activity directly environment-related	**All types of occupational profile**	◦ Secretary in a firm concerned with waste water management ◦ Domestic refuse collectors	Quantitative and qualitative
	Environment related occupational profiles Environmental skills required	• Environmental officer within a company • Ecological adviser • River maintenance operative	Quantitative and qualitative
Jobs affected by growing stringency of demands for environmental protection	**All kinds of occupational profiles** New environment-related skills may be required	◦ Local authority engineer or technician ◦ Garage mechanic	Qualitative
Jobs indirectly environment-related: Jobs in firms in all sectors due to environment-related economic activity	**All kinds of occupational profile**	Jobs in the field of public works involving the construction of environmental protection facilities	Quantitative

Research related to the first two job categories.

4. The quantitative impact on jobs directly environment-related

4.1. Job creation in the field of waste management

The expansion of waste management in all the Member States has a substantial impact on job creation

Eleven studies carried out in six countries (Austria, Belgium, Denmark, France, Italy and the United Kingdom) in the waste management sector, which includes reduction, collection, treatment and recycling, reveal firstly a steady increase in the overall volume of activity and secondly qualitative changes in the activity itself.

These developments are primarily the result of pressure exerted by legislation at European, national and regional level in all the countries concerned that has led to an increase in the percentage of domestic waste recycled.

Thanks to legal requirements all the Member States have begun to improve the management of both domestic and industrial waste. Listed in order of priority, this is reflected in:

- a reduction in the volume of waste generated
- recycling of waste
- incineration of non-recyclable waste with recovery of energy.

These activities are at various stages of development in the different Member States.

The increase in the percentage of waste recycled and the use of incineration to reduce the amount transported to disposal sites has had a net positive impact on job creation. The reduced amount transported to landfill sites has a positive effect on work intensity, particularly in urban areas. The French and Danish reports indicate that the number of jobs per unit of capacity increases when waste is incinerated rather than discharged to landfill. On the other hand, separate collection, sorting and recycling of waste creates more jobs than incineration does.

The majority of jobs created in these fields are unskilled.

The case-studies were concerned with two aspects:

- Developments and changes in existing waste management activities
- The creation of new activities:
    - introduction of separate collection, sorting and recycling of domestic waste
    - new recycling activities

The case-studies revealed the following potential for job creation in the shorter term:

- **Creation of jobs for waste disposal supervisors**

In a number of countries the introduction of a system of separate waste collection with subsequent sorting in order to increase the proportion of domestic waste recovered and recycled has led to the creation of a network of publicly accessible facilities for the disposal of recyclable waste. Experience has shown that the presence of supervisory personnel is essential for these facilities to operate really effectively.

As a result jobs for waste disposal supervisors have recently been created in the various countries and the number is increasing. In several cases the social welfare authorities have been involved with the prime objective of creating work formarginalised people.

In Denmark about 800 people are employed in waste disposal facilities of this kind and as the system develops an additional 200 to 300 jobs should be created.

In Italy the example of ecological islands established by two communes in the Reggio nell'Emilia district shows the way in which such facilities are developing. Initially they were unsupervised but today are managed by an association which employs the necessary personnel and ensures that the public are properly informed.

- **Creation of jobs in new areas of waste recycling**

The introduction of new services linked to the separate collection of waste makes possible the creation of jobs at Level I, often within specific structures for providing employment for marginalised people.

In Belgium for example an association employs 280 people mainly for:

- Collecting, sorting and recycling old appliances and textiles
- The production of heat and noise insulating panels from waste textile materials and straw.

Ninety people are involved in door to door collection and 75 work on the clothes sorting line. Many of the people concerned were previously considered unemployable.

In France a company created in 1990 to promote vocational integration manages nine waste disposal facilities and has developed other activities to meet new needs connected with the environment:

- a service that charges for taking away domestic waste where people are not able to transport it to the waste disposal facilities themselves;
- a similar weekly waste collection service is under consideration for small firms;
- undertaking waste management for large firms on a subcontracting basis including, for example, the cleaning of containers.

A consultancy has also been set up to assist local authorities and people interested in setting up similar facilities.

The creation of new activities such as workshops for the recycling and repair of domestic appliances or the crushing and composting of garden waste have similarly resulted in the creation of jobs for operators.

In France the above mentioned company has created the following activities:

- the recycling of old and defective equipment;
- the recycling of other domestic appliances;
- the crushing and composting of garden waste (a new process has been introduced to meet stringent quality requirements).

Initially this firm employed three people. Today it has a workforce of 20, 10 of whom are under a job creation scheme. The plan is to create ten new jobs. A person responsible for development has already been appointed.

It is interesting to note that in both these fields the creation of low-skill jobs is often linked to bodies concerned with job placement for people having difficulty finding employment. This brings with it certain disadvantages, such as a lack of recognition, job insecurity and a reliance on government policy for financing.

- **Creation of jobs linked to new recycling activities**

The recycling of packagings made of plastics materials is a new activity now emerging in a number of countries. The Community objective is to achieve a minimum recycling rate of 15% for such packagings by June 2001.

The setting up and expansion of facilities for recycling plastics materials means more jobs for collecting, sorting, transporting, and reprocessing and selling the end products.
In Britain a partnership between the Chester local authority and industry has resulted in a project for the recycling of plastic bottles. In Austria plans to utilise an effective means of recycling small plastic films, which up to now has not been economically viable, should also result in new jobs.

The introduction and steady development of recycling of end-of-life motor vehicles in France has led to new jobs being created in enterprises concerned with pollution reduction and dismantling. Since, however, the present firms involved in motor vehicle disposal are scheduled to disappear in the medium term, the impact on jobs will on balance be neutral.
In the United Kingdom a higher degree of recyclability of used vehicle components will have a positive impact on jobs if the market for recycled materials such as plastics and rubber continues to expand.

In short, the development of waste recycling is helping to maintain the level of employment in the recycling industry, although the jobs created could come under threat from structural changes.

4.2. New sectors with job creation potential

New sectors of activity now emerging could well create new jobs in the years to come. For the time being these are still at the level of pilot operations. In some cases they are beginning to multiply in a number of States.

◦ Treatment of contaminated sites and soil

The rehabilitation of contaminated sites is an activity previously unknown and now expanding. In every country a large number of sites are known to be contaminated.

A case-study in France and another in Denmark were concerned with this activity.
Its further development will depend on the will of the public authorities and the provision of the necessary finance by both the public and the private sectors.

In Denmark planned investment should result in the creation of 6 000 jobs at a rate of 1 260 a year. In France investment already scheduled should result in 230 jobs. A government policy of moderate decontamination should lead to 1300 new jobs.

The jobs concerned require:

- on the one hand, a low level of skills for public works employees carrying out the rehabilitation work,
- on the other, a very high level of qualifications in the case of engineers and technicians in firms specialising in soil decontamination, particularly consultancy firms.

◦ Protection of rural areas and waterway maintenance

Maintenance of waterways, rural paths and areas of natural beauty is an area of activity that has been on the increase for some years as farming has declined, but in a number of countries such activities in the main involve temporary employment for people in search of work.

The funding of such activities and the creation of stable permanent employment is only possible through the collaboration of a number of different agents - government, public bodies, local communities, local authorities, unions covering more than one commune, farmers, landscape gardening firms, etc.

In France State intervention to finance "green jobs" has resulted in the creation of some permanent jobs. In the Loire-et-Cher district, for example, action on the part of an intercommunal union in a rural district made it possible to create seven permanent jobs for river maintenance operatives. If this action were to be extended to all the rivers of France, 5000 jobs would be created.

- **Urban ecology**

The creation of urban ecology projects depends on the existence of an ecological adviser in regional government authorities. As a result, local authorities in many countries are beginning to appoint such advisers.

In Austria the region of Styria obliges all local authorities with more than 30 000 inhabitants to employ an environmental consultant. Similarly, jobs for technicians or engineers may be created at local government level in order to set up and optimise waste management services and develop recycling activities. In Italy, for example, the communes which established ecological islands have recruited a person trained as an environmental technician.

The creation of urban ecology projects also opens the way for jobs linked to new projects such as site decontamination, clearing of forest undergrowth, river maintenance, etc.

Jobs for university graduates can similarly result from the creation of departments to advise local authorities and others.
In Denmark, on the other hand, a new job with the title "green officer" is emerging in the communal dwellings field. This involves an expansion of the functions of building caretakers to cover matters relative to the environment. A green officer may be qualified to cope with different types of activity such as the sorting of waste, preparation of material for recycling, the layout of green areas, assisting inhabitants in matters connected with the environment, and so on.

In the longer run appointments of this kind could well be extended to cover building management, general administration, sanitary installations, boiler heating technology, etc. These jobs are suitable for people with low qualifications who should be given specific training.

The council of the Danish labour movement considers that there could be vacancies for 1500 green officers of this kind. This would mean an increase of 10% in the number of employees in the housing sector and indirectly in training and administration.

4.3. Quantatively limited impact in the other sectors

Besides waste management, the studies also looked at the following sectors: environmental management; renewable energies and energy saving; air quality and vehicle modification; urban ecology; treatment of polluted sites and soils; home help; organic farming; green tourism; rural conservation.

The projects referred to often only result in a few jobs being created. Three points should be borne in mind here:

- Improving environmental protection often makes it possible to preserve jobs while enhancing or altering their content. This is the case for example of farmers who switch to organic farming. Similarly, measures taken to improve forestry management in the United Kingdom show the potential for boosting the commercial returns of farmers or landowners.

- Case-studies relating to environment management show that the continuing training and advisory activities of consultants specialising in the various aspects of the environment are

on the increase. The jobs thus created call on the one hand for a high level of university qualification in the fields of organisational management and technology, but also for knowledge of legislation and training and communication skills. Such posts are to be found within management consultancy and design engineering firms, training bodies or controlling and auditing organisations.

- The number of such jobs differs from one country to another.

5. The qualitative impact on jobs directly environment-related

5.1. Creation new occupational profiles for environmental management

◦ Environment officers in large firms

Large firms are currently introducing environmental management systems. Standards at national, European (EMAS) and international (ISO14000) level have been drawn up to enable such systems to be accredited.

These changes in corporate attitude to the environment are linked on the one hand to a variety of pressures such as legislation, risk management, investments and costs, administrative sanctions and liability of corporate entities, as well as to the acceptance of the environment as a new factor of production and as a trump card in marketing. The environment is becoming an element of internal cohesion within a firm, making a contribution to improving the quality of processes and products.

For these new environmental policies to succeed they require:

- the existence of an environment manager responsible for planning and coordinating the company's environment policy;
- the creation at each production site of an interfunctional group responsible for improving plant and procedures;
- the utilisation of new tools such as ecological auditing.

The activities of environment managers thus call for new functions within the firm and permit the creation of new posts directly linked to the environment:

- an environmental officer or manager or other person responsible for waste disposal and environmental matters within the firm,
- an assistant environmental and waste disposal officer concerned with waste disposal and environmental matters within the firm or a technician within the environment management department.

The occupational profile of the environmental officer or manager, which has been developing other several years, is nowadays well established within the larger firms. The environment, indeed, has become an element of internal cohesion in firms that contributes towards improving the quality of processes and products and enhancing competitiveness.

The skills required by such a manager are constantly evolving. Today he needs particularly to increase his knowledge of environment management systems and the implications of national and European standards.

These new functions within large firms are frequently entrusted to people at executive or qualified technician level who already have considerable experience in the field.

There is little recruitment from outside the firm. This tends to be a new function carried out full

or part-time by an existing employee. Only Denmark refers to the recruitment of engineers or technicians on a permanent basis. There the job of environment officer or manager could mean 2000 more jobs.

In most countries, however, the task is entrusted to someone in mid-career at executive level who knows the firm well. However, the extra time that needs to be devoted to environmental concerns may help to safeguard jobs at a time when industry generally is running down its workforce.

At the same time young technicians with environment-related training may be recruited by large firms as assistant environment officers.

In Austria the function of "Waste and pollution control officer" has developed considerably thanks to the legal obligation imposed in 1995 on all firms with more than 100 employees to appoint someone with these responsibilities. This officer's tasks involve the planning, coordination and supervision of measures taken by the firm to protect the environment.

This legal obligation has resulted in jobs of this kind being created in 3646 Austrian firms. The trade unions have proposed that the threshold be lowered to firms with 50 or more employees, which would bring in an additional 3 934 firms. The social partners are of the opinion that the measure would not directly generate new jobs but would have positive indirect effects on employment by safeguarding existing posts because of the increased volume of work, higher sales of cleansing equipment, etc.

At the same time, the implementation of environment management systems also lends impetus to activities for new occupational profiles with a high level of qualification, namely:

- the emergence of specialised assistance functions and structures responsible for the safety and protection of the environment,
- the designing of continuing training courses for employees (which would have little impact in terms of job creation).

- **Advisers and trainers for smaller firms**

A number of case-studies have revealed the emergence of new occupations concerned with advising smaller firms in environmental matters in Denmark, the United Kingdom and France.

Small and medium-sized enterprises do indeed find it harder to study problems connected with the environment and take the necessary action because of their lack of personnel and financial resources. At the same time, environmental regulations are becoming steadily more stringent while larger firms are beginning to impose stricter environmental standards on their suppliers. Environmentally friendly measures may pay off for SMEs by cutting the cost of waste management, reducing energy consumption, giving them marketing advantages, minimising costs of decontamination and collection charges, ensuring their observance of legal requirements, etc.

This is why in several countries plans of action have been developed to promote the use of clean technologies and to assist SMEs in utilising environmentally friendly processes. With this in mind, public authorities and employers' organisations are creating networks offering competent technical and financial assistance.

These measures are based on external technical assistance and the creation of training

courses suitable for smaller firms focusing on practical measures that are easy to implement. Thus, new occupational profiles are emerging in bodies aiming to provide technical assistance and training for a large number of firms and to design means more adapted to smaller companies.

In Denmark the creation of a programme of assistance and advice for small firms, which subsidises environmentally friendly activities has resulted in the recruitment of people with this new type of occupational profile.

In France the trade association for the plastics industry has financed a training and consultancy campaign to encourage environmental measures in SMEs. This campaign involves running training courses for those responsible for a given factory and for environmental coordinators, and consultancy activities whereby a firm is followed up by an ecological trainer to help it to put into practice what has been learnt in training courses.

5.2. New skill needs for employees in the waste management sector

Developments in the waste management sector call for retraining of employees with Level I qualifications with particular emphasis on environment-related skills

The various sectors of activity concerned with waste have a number of points in common:

- the work is traditionally looked down upon;
- it is changing owing to changes in society and in the law: technical and organisational changes are threatening the firms' traditional systems of reference;
- most jobs are for people with Level I qualifications;
- most permanent employees are unskilled;
- it is difficult to recruit young people because of the poor image of the sector and the jobs involved;
- there is almost no tradition of training for this sector;
- working conditions are often poor and there are safety problems.

These sectors, like others, are in some cases confronted with new quality standards which must be complied with and taken into account in the training of their personnel.

It should be borne in mind in this connection that retraining of personnel makes for greater professionalism and a consequently higher job ranking.

- **Retraining of refuse collection personnel**

Refuse collection personnel are the most numerous in the waste management sector. They tend to have no initial qualification, have not benefited from continuing training and are poorly paid.

This type of job, which already exists but is not yet recognised, now calls for new skills, particularly following the introduction of separate waste collection:
Providing advice on waste disposal to local inhabitants;
Providing a certain standard of waste handling.

- **Personnel supervising waste disposal facilities**

This is a new type of job that has come into being over the past five years.
Since management of waste disposal facilities has become increasingly efficient, the number of supervisor jobs has been increasing everywhere. The supervisors are responsible for custody of the waste disposal facility and checking that waste is sorted according to certain criteria.
Their job is tending to develop in that they are increasingly asked to assist and advise the local community.

Thus in Denmark in some waste disposal facilities the presence of qualified personnel enables people to dispose of wastes containing oil and chemical products and asbestos.

- **Retraining of employees in recycling companies**

The recycling sector is currently facing a number of challenges. Since the recycling of waste is a matter of social concern as well as being a profitable economic activity the industry must
- adapt to the market and to the new types of waste products.
- enter into new partnerships
- take on the new function of service provider to local authorities and firms
- adapt sites to new environmental regulations
- improve the quality of their products to meet the growing demands of industries using recycled materials.

In order to adapt to the new of waste products being collected and at the same time meet the stricter requirements as regards the quality of their output, the recycling industry has to become more quality-oriented and improve its employees' skills.
Both these developments mean enhancing the competence on the part of personnel.

The recycling of plastics and of end-of-life motor vehicles are two new activities studied in Austria, France and the United Kingdom.

In Austria firms which recycle plastics use operatives with no particular qualification.

They sort the packaging, such as plastic films, bottles, etc., and operate the washing, crushing, heating and plastic flake processing plants as well as being responsible for loading and unloading. They have acquired the necessary skills through work experience.

The social partners involved, namely the Austrian Trades Union Federation and the Chamber for Manual and Office Workers recommend that training and qualification prospects for workers in this field should be improved as should industrial hygiene conditions.

In-company training lasting several weeks has already been instituted.

Europe has lent impetus to the recycling of end-of-life motor vehicles. In France the government authorities and all those involved in the sector are committed to recycling 85% of total vehicle weight by the year 2002 and 95% by 2015. In the United Kingdom an organisation has been set up to recycle and dispose of end-of-life motor vehicles and its target is a recycling rate of 95% by the year 2015. At the same time, the creation of a consortium of firms from different industries has provided all car manufacturers with access to research and development in this field.

The growth of end-of-life vehicle recycling calls for new skills in order to be able to identify materials at the sorting stage before the vehicle is crushed. The emergence of profitable markets for recycled plastics largely depends on the purity of the waste products, which depends in turn on the skills of the firms which sort the different categories of plastics materials.

6. The qualitative impact on jobs affected by new environmental regulations

In every field studied devising effective strategies and initiatives to protect the environment calls for the development of new skills for employees with a wide range of different occupational profiles:

- decision-makers: company managers, elected representatives, environmental officers in companies or local authorities, etc.;
- professional engineers, technicians and operatives involved in the technology in question;
- all employees where measures are taken within a firm.

These skills are not solely of a technical nature but also relate to organisation and communication.

Their acquisition requires that they be taken into account at the level of initial vocational training and in the designing of continuing training courses. Recommendations to public authorities and the social partners are therefore concerned with incorporating environmental skills in existing forms of training.

On the other hand, educating and raising the awareness of employees and/or users are still key factors contributing to success.

These trends may be illustrated by reference to some of the aspects studied:

6.1. New skills required for company employees

The introduction of environmental management calls for new skills for occupational profiles at every level within a company

Here the development of new skills on the part of managers, process and product designers and operatives generally is a deciding factor for the introduction of environmental management within a firm.
In other words new skills need to be added to conventional occupational profiles.

The creation of training courses to meet this requirement demands that particular attention be paid to problems specific to SMEs. The training courses will interact with projects already under way and it is this interaction that will enable employees to gain the skills needed to steer an environmental or process-improvement strategy.

- **Company managers, investors and analysts**

The UK report stresses the importance of educating and creating awareness among investors, analysts and company managers in order to ensure that the stock market takes more account of environmental concerns.

The means suggested to company managers is based on consultation of a broader sample

group inside and outside the firm in order to learn in which fields they consider the firm should provide information and how they judge its performance. These consultations set the managers on a learning curve as they seek to meet the priorities set by their interlocutors, which may be different from their own.

- **Process and product design engineers and technicians**

New skills are required to determine the composition of products produced to enhance their recycling potential.

Increased recycling of plastics, which has positive impact on both the environment and jobs, calls for new skills on the part of manufacturers of the primary products such as bottles when designing their products. They must be able to allow for the technical and economic constraints on recycling; the composition of the materials for bottles, caps and collars, the choice of adhesive, etc.

Growth in the recycling of end-of-life motor vehicles also calls for new skills on the part of vehicle designers. In the United Kingdom a number of developments - such as the labelling of parts of new vehicles according to a standardised classification system making them easier to identify at the sorting stage, and the development of parts made of single component plastics - have facilitated recycling of plastic waste from such vehicles.

- **All employees**

Both national and European standards require a factory or a firm to have a system of on-going training for employees in matters connected with environmental management, according to their position within the firm.

In the UK the adoption of these standards by a growing number of firms has led to a call for training for all employees so as to enable them to understand their role in environmental management and the importance of the firm's performance.

6.2. New skills required for energy professionals

Pilot projects being set up in the field of renewable energy sources and energy-saving require new skills on the part of energy professionals

A large number of pilot projects in the field of energy were recorded in the various countries. These included the construction of a wood-fired district heating station, the simultaneous generation of electric power and heat, the creation of "energy counters", and a growing use of solar energy for heating and electricity and of heat pumps.

These various projects call for new skills and knowledge on the part of those professionally involved in the energy field.

- **Local authority managers and managers of district heating firms**

In France a number of communes have switched from using oil to using wood as the fuel for their district heating systems.

The step involves a partnership between a number of players: the local authority, associations, private firms, central and regional government, and the EU (financial assistance), and has led to the creation of a number of jobs in the wood sector.

In Italy the creation of heating systems for blocks of flats utilising hot water and the simultaneous production of electricity and heat (thermoelectric power stations) in Bologna is the result of changes in legislation and the initiative of local politicians.

Projects permitting a more rational use of energy therefore call for new skills and knowledge on the part of elected representatives and those responsible in local government and firms supplying urban heating to enable them to predict future scenarios and assess the feasibility of possible measures.

- **Technicians in the fields of electricity and water heating**

In Austria the use of solar energy has increased in the last few years. The threshold of profitability has been crossed and the cost/benefit ratio is favourable thanks to a system of subsidies and tax breaks. Profitability is more marked in the case of new buildings where there is an optimum combination of solar energy and other technologies such as heat recuperation, insulation, etc.

The first factor ensuring the successful use of solar energy is the increased skills of technicians responsible for advising customers. These are technicians in electricity generating companies and firms producing heating systems who must be able to give the appropriate advice and carry out the installation of systems utilising solar technology.

The design, marketing and sale of such systems can also be carried out by engineers with the appropriate additional skills in this field.

The experiments referred to below in connection with the installation of urban heating systems using thermoelectric power stations also call for new skills on the part of operatives and technicians involved in the generating process.

Engineers acting as energy-saving consultants

In Belgium the opening of "energy counters" to provide individuals and SMEs with advice on energy saving has resulted in about ten jobs for those manning the counters.

This project is the product of a partnership between local, regional and central government and calls for new skills and knowledge on the part of the engineers and technicians providing the advice.

Similarly, increasing use of solar energy for heating and electricity purposes and of heat pumps calls for increased skills and knowledge on the part of engineers and technicians.

6.3. New skills linked to improving air quality

Action to improve the quality of the air has an impact on the work of administrative staff and car mechanics

Two case-studies concerned pilot projects for improving air quality.

The production and use of biodiesel, which is produced from rape-seed and does not pollute the atmosphere, calls for the training of car mechanics to be extended to include environmental skills. In fact, the lack of appropriate information about this fuel tends to make mechanics very suspicious regarding its use and to advise their customers against it.

Planning for firms using shared transport facilities and car-pooling results in the creation of jobs for "mobility managers", some 20 or 30 of whom will be needed if the system develops.

These two projects call for new skills on the part of administrative staff able to encourage, sustain and extend them.

6.4. New skills linked to urban ecology

Urban ecology calls for new skills and knowledge on the part of local politicians, institutional decision-makers and local authority personnel

Designing an overall project for the environment at local authority level calls for cooperation between the various parties involved and action focused on common objectives.
This requires new skills and knowledge, particularly on the part of politicians, officials and the administrative and technical staff of municipal authorities.

The staff of the technical departments of local authorities and the intercommunal unions need to acquire the knowledge necessary to enable them to take environmental action throughout their area by, for example, creating a network of waste-disposal facilities, etc.

New knowledge and skills are required for those in existing occupations without in most cases new jobs being created.

6.5. New skills linked to the treatment of polluted sites and soil

The rehabilitation of sites which have been used for the depositing of waste and the treatment of contaminated soil calls for new knowledge and skills:

In the case of persons responsible for soil decontamination: engineers and technicians in firms specialising in decontamination and construction firms;
In the case of engineers in public authorities who have to plan the decontamination, locate the sites, set priorities and carry out any necessary preliminary studies;

In the case of environment officers and managers in industries which need a policy to prevent contamination.

6.6. New skills linked to organic farming

In Belgium the expansion of an ecological approach to farming and the marketing of organically farmed products has led to the creation of some new jobs for academics, technicians and secretaries in the area of marketing and providing expert advice within an association called which is seeking to promote organic farming. This activity has also had an impact on the work of producers.

New knowledge and skills are required particularly by agricultural engineers and technicians

PART TWO

Acquisition of new environment-related skills

7. Including new environment-related skills in existing qualifications

Research shows that new environment-related skills need to be included in qualifications at every level from the lowest to the highest.

Thus new knowledge is required at the first qualification level. The Danish study explains particularly how development of continuing training of the workforce to include environmental skills will help to underpin growth both in productivity and jobs.

7.1. Jobs at the first skill level

New skills are required for jobs with lower qualifications. These jobs are not based on existing qualifications since most of those concerned do not have any.

New skills required by refuse collection workers

- how to communicate with users and advise local inhabitants on matters of waste disposal;
- ensuring certain quality standards in the handling of waste;
- recognising the main categories of waste.

New skills required by personnel in recycling firms:

- ability to recognise the different materials to be sorted;
- ability to identify the nature of these materials;
- ability to recognise hazardous products; knowing how to handle them and package noxious or polluting elements;
- ability to channel each type of material correctly and ensure that it is correctly processed;
- ability to use the equipment for preparing and processing materials to the dimensions required

In the United Kingdom an NVQ certificate for the recycling of metals has been proposed by the professional organisations.

7.2. Technicians and engineers

New skills needed for technician and engineering qualifications

New skills for local authority engineers and technicians

The skills and knowledge required in order to take steps to improve waste management fall under a number of headings:

- Study of the territory
- Typology of recyclable materials
- Organisation of storage and processing centres

- Organisation of separate collection points
- Relationship with traditional collection services
- Communicating environmental concerns

This knowledge and these skills are acquired by experience, an individual search for information and sometimes by means of seminars and conferences. There are, for example, seminars dealing with legislation and the typology of recyclable materials.

The initial training of technicians working for local authorities is beginning to take account of the need for such knowledge. Thus in Italy vocational training courses leading to environmental technician qualifications have been introduced.

New skills are similarly required by the administrative staff of local authorities who are responsible, for example, for monitoring compliance with standards.

In France the *Centre National de la Fonction Publique Territoriale* is designing training courses to meet these new environmental requirements. Local authority secretaries in rural areas have attended training modules lasting two days on the application of the law on waste as it affects local authorities, public information, inter-communal cooperation and regional planning.

In Belgium training courses for local and regional officials conducted by the *Institut Eco-Conseil* also helps meet the need for continuing training.

New skills for executives, engineers and technicians in manufacturing industry

For managerial staff the new knowledge required relates to:

- introducing and managing an environmental strategy;
- managing change.

Engineers responsible for designing projects, processes and new products require new skills in order to:

- determine the composition of manufactured products in terms of theirrecyclability;
- think in terms of environmental compatibility for all industrial projects.

In Italy the inclusion of ecological subjects in courses leading to a degree in engineering ensure that these needs are met.

In the case of engineers and higher level technicians, the need for environmental measures in every field of activity calls for competence in the fields of communication and sociology. Thus the setting up of energy counters in Belgium calls for greater skills in these fields by the heating engineers giving advice on energy saving. Continuing training courses have been organised with this in mind.

On the other hand, environment-related measures also cover very specific technological fields so that equally specific knowledge is required.

Thus engineers and technicians in firms specialising in soil decontamination must possess the very specialised knowledge needed in order to determine the type of pollution, carry out

the necessary studies and plan the reclamation measures, etc.

For the time being there is no training course to meet this type of need.

7.3. Industrial workers

New skills for industrial workers

New skills for all industrial operatives

- the ability to take part in studies for process improvement;
- the ability to participate in the sorting of different materials;
- ensuring observance of regulations governing their particular area of activity;
- allowing for the environmental risks inherent in measures taken in the event of accidents.

These new requirements call for environmental skills to be included in initial vocational training for skilled workers generally.

Thus in Austria the social partners have succeeded in ensuring the inclusion of environment-related skills in vocational training programmes for the mechanical and electrical engineering industries. The programme of vocational training for paper-making includes the following:

- knowledge of methods of waste-water disposal and techniques for protection of the environment;
- use of waste-water treatment plant;
- knowledge of the environmental protection measures in each firm, recycling possibilities and appropriate procedures for the disposal of raw materials and products used by the firm.

New skills for operatives responsible for waste disposal and the operation of processing installations

- ability to apply the environmental protection rules on the handling and storage of waste;
- observance of the safety regulations for the handling hazardous waste;
- ability to identify waste correctly and sort and channel it appropriately;
- ability to recognise different categories of waste;
- assuring the correct daily operation of cleansing and filtering systems for the treatment of waste water, incineration, compacting and crushing of certain waste products.

Operatives responsible for waste disposal and the operation of processing plant are semi-skilled workers without any specific training in environmental matters. They acquire their skills solely through work experience. For these operatives the updating of their knowledge to take account of technical innovations and changes in the law is important. In Austria some firms offer these operatives internal training courses on the subject.

Also in Austria, the creation of an experimental three-year training course for technicians employed in the recycling and disposal of waste could provide these operatives with the necessary basic training.

New skills for technicians installing solar-power equipment

Technicians installing solar-power systems generally are trained as electricians or heating engineers. Since the installation of solar-power systems is an additional part of their work they require new knowledge on the subject to enable them:

- to provide clients with the necessary information on the installation of solar collectors, hot water tanks and heat pumps that complete the system, and on solar systems for electricity generation;
- to advise clients on the equipment to be installed according to their type of building;
- to draw up an installation plan taking account of the client's specific wishes and the features of the building;
- to draw up a bill of costs;
- to install the system and the necessary plumbing;
- to check that the system operates correctly;
- to carry out maintenance of the system.

In Austria continuing training has been introduced for technicians and engineers. The First Vienna Solar School proposes training in the practical use of renewable energy sources for all skilled employees in heating firms.

Similarly, new skills are required by operatives and technicians in thermoelectric stations to ensure that they are able to operate these systems, which are very different from conventional ones. So far there is no training to meet this need.

New skills for car mechanics concerning techniques for reducing air pollution

- ability to provide customers with the necessary information on the use ofbiodiesel;
- knowledge of which vehicle models can be used with biodiesel;
- ability to replace hose connections and seals in engines of older cars and tractors to permit the use of biodiesel.

New skills for personnel in construction firms involved in the decontamination of polluted sites and soil

The decontamination of waste deposits and the treatment of polluted soil devolve to a large extent on construction firms. This means that the personnel of such firms need to acquire the knowledge enabling them:

- to understand the different problems linked with the cartography of pollution;
- be aware of the risks and utilise preventive measures for different types of pollution;
- to apply health regulations on the basis of a knowledge of the risks and means of contamination;
- to apply safety measures and appropriate means of personal protection.

In Denmark a training course has been created for semi-skilled personnel involved in the treatment of contaminated soils. It is a one-week "contaminated soil" course as part of a general AMU (*arbeijdsmarkeduddanelserne*) course on "Solid and liquid waste".
The course provides the skills mentioned and also deals with project planning and legislation.

8. Emerging new occupational profiles

These new occupational profiles involve more environment-related skills but are nonetheless still based on existing qualifications and also call for two areas of competence, one environment-related and the other in another subject.

8.1. Waste disposal supervisors

This job was merely that of a custodian when the first waste disposal facilities were created. Subsequently local authorities realised that the scope of the job should be extended in the interests of more effective sorting and to increase the potential volume of materials recovered. Currently waste disposal supervisors are responsible for keeping order, assisting and advising people using the facilities, checking the sorting of waste, maintaining the facility in an attractive state, replacing full containers with empty ones and keeping a record of the input and output volumes of different categories of waste.

The result has been a new occupational profile.
This comprises on the one hand traditional skills of custody and maintenance:
- maintaining and improving the area of the facility and its equipment;
- supervising the facility as a whole.

And on the other hand new environmental skills:
- recognising and correctly channelling the main categories of waste;
- assisting and advising users;
- carrying out a simple system for managing waste input and output volumes;
- knowing how to handle hazardous waste.

In Denmark an internal training scheme run by private firms and local authorities for their personnel and lasting one or two weeks deals with the handling of chemical products and asbestos, receiving clients and the work environment.

In France the CAP course on waste management and urban cleansing also trains young people and existing employees for this type of work.
In most other countries the new requirements are still little taken into account and there is no training specifically designed for the personnel involved.

8.2. River maintenance operative

The new skills required in order to perform the tasks of environmentally friendly maintenance and management of waterways have led to the emergence of a new occupational profile, that of river maintenance operative.

The skills and knowledge involved in maintaining and managing a waterway safely and with due respect for the environment are:

Maintenance and management:
- understanding the nature of a waterway;
- understanding the profile of a river;
- clearing undergrowth;
- recognising trees and deciding which should be removed and which kept;
- deciding on and using the best method for lopping, felling, and cutting back trees according to type;
- carrying out specific planting in order to maintain the banks.

Maintenance of river beds:
- planting water plants;
- cleansing by spreading suitable products;
- performing simple bed clearing operations;

Maintenance of structures:
- maintenance of wooden structures;
- maintenance of brick-built structures;
- installation of a beacon or simple signalling system.

These skills are based on the qualification for a parks and open space maintenance operative.

In France the creation of a an agricultural CAP for maintenance of rural areas provides the appropriate training.

8.3. Environmental officer

A firm's environmental officer or waste and pollution control officer requires a twofold qualification.

His basic qualification will be in the sector of activity of the firm he works for. Thus an environmental officer in a chemical factory will first of all be a chemical engineer or a chemical technician with experience of production.

The additional qualifications linked to his environmental function will be based on the following abilities:

- to plan and coordinate action related to the environment;
- to test the technical efficiency and profitability of a process or of equipment linked to clean technologies;
- to define and improve methods of waste disposal: to study the true costs of waste disposal or of energy consumption and understand the hierarchy of the various possible solutions for reducing output of waste, recycling, processing, etc.;
- to supervise the installation of cleaning systems;
- to create and extend environmental awareness at all levels within the firm,
- to apply legislation relating to the firm;
- to communicate and negotiate (public relations with local authorities and waste disposal

bodies and internal relations);
- to listen to workers' requests and translate them into innovative solutions;
- to carry out a study of solid or liquid waste management or have it carried out;
- to carry out feasibility studies on the different solutions possible or have it carried out;
- to choose the solutions most suitable for the firm;
- to set in motion and follow up a campaign for the reduction of waste, processing of waste water, reducing energy consumption, etc.

These environment-related skills are acquired by means of suitable in-company training or short outside courses such as specialised seminars.
The courses run by the Austrian Institute for the Promotion of Industry are worthy of mention.

In the United Kingdom NVQs in environmental management are now being designed (1997) in order to recognise the knowledge and skills of environment officers. A number of continuing training programmes will meet their constant need for information and for new knowledge and skills in connection, for example, with new technology.

8.4. Waste disposal and environment technician within a firm

This is an occupation that is steadily emerging in large firms. The person concerned acts as an assistant to the environmental officer or to a technician in the environmental department of larger firms.
As in the case of the environmental officer, the basic qualification of this technician will be in the fields of the firm concerned.

The additional skills relating to the environment will lie in:
- implementing measures to protect the environment;
- monitoring the operation of processes for protecting the environment within the firm, such as the avoidance and disposal of waste;
- monitoring the operation of pollution-control systems.

Since 1992 Austria has had a vocational training course for recycling and waste disposal technicians in the metal and chemical industries. In the other countries a number of basic training courses for technicians concerned with environment management have been evolved but do not always accord with the occupational profile described.

8.5. Ecological adviser within a government authority

Ecological advisers need a basic qualification in a field such as town and country planning, urban planning, law or agronomy.

The environment-related skills they require relate to:
- diagnosing environmental conditions;
- understanding the various technical fields linked to the environment.

This occupational profile also calls for a number of cross-skills to enable the ecological adviser:
- to pass information on to partners and mobilise them into action;
- to chair meetings;

- to generate agreement with partners, local inhabitants, etc.;
- to raise funds.

In Belgium a training course developed by l'Institut Eco-Conseil seeks to foster these skills and deals with such subjects as waste, water, town planning, noise pollution, etc. It aims to develop general ability, overall vision, understanding and methodical analysis of problems based on a number of disciplines, sectors, communication and knowledge of actual circumstances.

8.6. Cross-skilling

It should be pointed out that all the profiles for occupations relating to the environment require a number of general skills common to all, namely:

- methodical working;
- team spirit;
- creativity;
- the ability to work independently;
- the ability to grasp systematically and take an overall view of problems linked to the environment;
- the ability to analyse problems methodically.

As the Austrian report makes clear, the function of a company environmental officer calls particularly for a strong personality and the ability to put forward ideas, to carry conviction and to communicate.
In fact an environment officer has to be responsible for relations with the public authorities and local inhabitants while demonstrating loyalty to his employer and at the same time ensure that his decisions are adopted by the company management.

9. Innovative courses for providing environment-related skills

At present the courses referred to in the case-studies are pilot projects, often not yet completed, whose transferability is far from certain. Thus in many cases there is no training to meet the new needs, and the relevant knowledge and skills have to be acquired by work experience and self-training because of the pace of change in industry or when new processes are introduced.

The experiments in continuing training referred to are also innovative and specific and are located within the framework of training courses to interact with "learning projects". By the latter term we understand change-related activity to enable people to acquire and apply new skills.
Retraining low-skilled workers is an important aspect of training to improve the quality of environment-related services.

On the other hand, there is a large gap between initial environment-related training and needs at the place of work.

Some examples of innovative courses providing new environment-related knowledge and skills are given below.

9.1. Acquisition of skills through self-training and interaction with innovative projects

A survey of the careers of environment officers shows how the knowledge and skills necessary to enable them to carry out their tasks effectively were acquired by a complex process linking:
- prior industrial experience in various fields;
- personal ability;
- an individual pursuit of information from various sources (meetings, reading trade journals, seminars, etc.);
- utilisation of experience linked to innovative action in the field of the environment.

In Italy a case-study on a cooperative in the wholesale distribution sector shows how innovative action in the field of waste management is interacting with the building of skills of employees generally and of the eco-manager.

The eco-manager gained his experience in the cooperative's various areas of activity. He worked for more than ten years in the purchasing department and was responsible for its decentralisation, which enabled him to link financial efficiency with social objectives. At the same time, his initial training as an industrial technician and a particular taste for chemistry were important factors. At present the skills which enable the eco-manager to coordinate the packaging working party are largely self-generated and have been built up thanks to his personal commitment through a study of documents, attending specialist training, study visits to foreign markets and his cooperation with multinational packaging concerns.

On the other hand, the working party which was set up within the logistics department has enabled every member to acquire further knowledge and skills. This working party is

concerned with marketing, technological innovation, analysis of costs of transport and supply of goods, computerised data management, and the study and assessment of packaging.

For the members of the working party, involvement with the environment provides the opportunity to enhance their specific professional skills. In the course of their work they have acquired environment-related skills and the ability to work as a team, to put forward their own ideas and to listen to those of others.

9.2. Awareness-raising activity to underpin environmental management systems

Increased operative awareness is a necessity for an environmental management system. In the United Kingdom the work of the Institute of Environmental Management has shown that formal classroom approaches are rarely successful: "The commonality in the approaches lies in beginning with motivation of the individual by providing insight, and then equipping that person with the skills required to operate in a way that matched his or her aspirations".

The UK report quotes a number of large firms who have taken action to increase the environmental awareness and sense of responsibility of employees at every level from the managing director to those on the shop floor. The environmental approach is treated not so much as passing on knowledge but as a means of problem-solving and personal involvement.

Thus, in a large British company six different topic workshops held over a six-month period looked at different areas of company policy and environmental improvement. Topics included waste reduction, energy, packaging, transport, and emissions to air and water.

Each subject is dealt with in four workshops lasting one or two hours with a mixed group of 12 people of every qualification level. These workshops make it possible to study the subject in depth to consider present procedures, objectives and possible solutions. They also deal with the relevance to each person as an individual.

9.3. Transfer of skills between partners for the purposes of a common project

The development of recycling of used goods calls for a transfer of skills from the manufacturing firms to the recyclers. This is only possible when the two activities are economically integrated or as a result of government intervention.

Thus, in the United Kingdom the creation of an inter-industry consortium, which groups together car manufacturers and a number of major dismantlers and recyclers, has made it possible for the recyclers to obtain specific information on products and vehicles. As a result, it should be possible to dismantle vehicles more rapidly and to produce a larger quantity of pure reclaimed materials before the car body is crushed.

9.4. Continuing training in innovative technology

The pilot projects gradually being started in the field of renewable energy sources and energy saving call for new skills on the part of technical personnel, heating engineers, electricians and heating technicians.

The First Solar Energy School in Vienna offers training in the practical use of renewable energy to all skilled workers in the gas, water, plumbing, heating and electrical trades, including university-trained engineers and apprentices.
The training given relates to the use of solar energy to generate electricity, heat pumps and heating. The methods of training are similarly innovative, the objective being to enable the candidate to recreate actual working conditions at each stage of the profession: planning, installation, etc.

9.5. Innovative courses for retraining of low-skilled personnel

In the waste disposal sector innovative training experiments have been carried out in Denmark and France in a bid to cope with changes in the tasks of those involved in domestic refuse collection. In both countries the experiment involves the joint training of those in employment and young people with difficulty in finding work.

In Denmark government authorities and other organisations are seeking to improve the knowledge of refuse collectors so that they can perform their tasks better taking greater account of the environment. Since the early nineties an initial three-week training course in the handling and treatment of waste and a week-long specialised course in one particular field have been developed for personnel in work (AMU).
The initial course is concerned with the sanitation system, organic waste, the collection of domestic refuse, rubble, contaminated soil, and the transport and treatment of oil and chemical residues.

The specialist course on the collection of domestic refuse deals with working practices (with specific reference to lifting and transport techniques), environmental legislation, the planning and drafting of regulations, recording waste, handling loading equipment, incineration and discharge to land-fill.

The specialist course on organic waste deals with the legislation on organic waste, working practices, collection, transport, treatment with bio-gas, composting and recuperation (compost and degasified biomass).

Subsequently a training course leading to a formal qualification was created on the initiative of the refuse collectors based on a partnership between the commune, the trade union organisation and the private-sector employer. This training course was for a "Driver specialising in domestic refuse collection". This innovative training course is based on

existing training for drivers but has been adapted to the job and the likely future of refuse collection, and particularly to take greater account of the environment.
The objective is to enable refuse collectors to give local inhabitants advice on the subject of waste and the training given deals with the avoidance of conflict, general ecology and customer service.

In France the creation of a CAP in waste management and urban cleansing has provided training opportunities for existing employees and young apprentices. A pilot experiment in validation of the knowledge acquired on the job is focused on those in work.

The two training courses in Denmark and France are similarly innovative in their teaching methods, being based on skills already acquired in the course of work and on actual working activity with a dynamic alternation of on-the-job and off-the-job training.

Both courses lead to a qualification evidenced by a certificate of professional aptitude created to meet these requirements.

Both are also experiments in training people in employment together with young job seekers, with the latter replacing those employees during their training periods.

In the urban ecology sector in Denmark a vocational training course for building caretakers has existed since 1996. This training course, which was prepared by the "Joint Committee for Building Services", takes account of environmental concerns.

The course covers 45 weeks of alternating on-the-job and off-the-job training over a total period of three and a half years. It also provides for the recognition of skills already acquired.

In the environmental field it deals with the treatment of waste, maintenance of outside areas, and boiler-heating technology (maintenance of plant and correct use from the point of view of energy and the environment).

Similarly, a training course created to update the skills of domestic workers by the Danish workers' union deals with environmental aspects such as ecological cooking, cleaning without the use of chemical products, and the sorting of waste.

10. The impact of the contribution of new skills on the environment and employment

In the environmental field new skills acquired, whether through training or experience, can help to open up and develop new markets.

In the case of the innovative projects described in the case-studies, action benefiting the environment, job creation and the acquisition of new skills all interact with one another.

Thus, initiatives to improve woodland management in the United Kingdom concentrate first of all on raising the awareness of all parties concerned - farmers, landowners, local authorities, local firms processing or using timber and ecological groups, and on the exchange of information. Training for landowners and farmers with a view to achieving quality management of their forests in the form of assistance and free advice makes it possible to develop such activities as sawmills, furniture manufacturing, etc. and thus generate additional income for those concerned.

In the emerging sector of decontamination of polluted sites and soil, the acquisition of new knowledge and skills leads to the creation of new economic activities and makes it possible to develop them with qualified personnel. Thus, engineers and technicians who have acquired experience of the new technologies for decontamination of polluted sites and soils have contributed to the emergence of this new market by proposing suitable services in response to the concerns of government authorities and firms in the field.

In this way the acquisition of skills linked to a mastery of the technology of soil decontamination is enabling engineers and technicians in specialist consultancy firms to develop a new market, thereby generating new jobs in such specialist firms and in the construction sector. In Denmark the investment planned should result in the creation of some 6000 jobs at a rate of 1260 a year, while in France a government policy of moderate decontamination should result in 1300 new jobs.
In the energy field inclusion of environmental skills in the training programme for technicians has considerable advantages from the economic point of view. The Austrian report underscores the aspect of profitability: effective advising of customers as to what action to take and which technology to adopt in order to save energy is necessary since clients are becoming increasingly interested in alternative systems of energy production.

In the waste disposal sector, the acquisition of new skills by those responsible for domestic refuse collection has an impact on employers and local authorities.

Improving skills of refuse lorry drivers leads to greater environmental friendliness by:
- enhancing the level of service and the quality of refuse collection;
- permitting collection to serve the environment better through separate collection of waste;
- improved driving of vehicles which results in a saving of energy;
- eliminating the fraud practised by some small firms and individuals to avoid rubbish collection charges;
- encouraging R & D activities in the field of refuse collection with a view to exporting systems and technology.

It also has an economic and social impact at both firm and local authority level:
- it enables local authorities to include a training clause in calls for tender for domestic refuse collection;
- it helps prevent conflicts with users;
- it makes for better maintenance of equipment.

In the long term the new skills should also help to increase the number of jobs. The development of information and advisory activities increases the tasks to be carried out by refuse collecting personnel. Separate collection, whose development benefits from these new skills, needs more operatives than traditional refuse collection.

The refuse collectors' trade union has estimated, on the basis of regional experience, that the number of jobs spread over all the countries would probably have to be increased by 200.

Similarly the percentage of domestic refuse recycled is linked to management ability and the communication skills of personnel responsible for waste disposal facilities. Moreover, since recycling involves more work than does incineration, the development of these skills will tend to increase economic activity and hence the number of jobs.

In the recycling sector the acquisition of new knowledge and skills by product designers, and by managers in public authorities and recycling firms can lead to innovations that then become more widespread.
The new skills acquired by technicians and engineers mainly through on-the-job experience have led to the development of new economic activities previously unknown to the market. These include the recycling of old domestic appliances, advising local authorities on the setting up of a system of separate waste collection, the management of waste disposal facilities, etc.

Thus in the UK, a company set up to encourage the recycling of plastics, has established a pilot project in the North West with thecooperation of local authorities and industry and aims to increase the recycling rate from 22 to 25%.

PART THREE

The role of cooperation between the various agents and the social partners

Cooperation between all concerned and the will of the public authorities are key factors in the success of all the pilot projects, from both the environment and training points of view.
Those concerned are not simply both sides of industry but also elected political representatives, government officials, company decision-makers, associations representing the ordinary citizen, and all kinds of economic and social agents.
One should, therefore, stress that most of the projects we have described are the result of a political decision. The driving factor in these decisions is that the environment is no longer perceived as an obstacle by those concerned, but as an opportunity to improve the company's performance or demonstrate successful political action.

An analysis of the various factors contributing to improvement of the environment shows that the social partners can play a role in all of them. These factors are:

11. Legislative development

Legislative pressure is the first factor leading to changes benefiting the environment. The legislation may impose an obligation or provide an incentive.

In a number of countries the social partners make proposals as to which direction legislation could take in order to encourage environmental activity.
This is the case, for example, in Austria where the trade union organisations have proposed that the threshold at which a company is obliged to appoint an environment officer should be lowered from 100 employees to 50.

Legislation may also reflect impetus from government authorities for the commercial organisation of recycling chains.

12. Partnership between the various decision makers

Existence of a genuine partnership between the various decision-makers is a primary condition for success

A large number of the projects described are the product of the will of local politicians and the sensitivity and ecological commitment of government.

This political will makes it possible to set up environmentally friendly projects where there is a genuine partnership between the various decision-makers.

In the field of waste disposal, for example, this partnership may be expressed through:

- the creation of intercommunal structures;
- the creation of a partnership between the three principal actors:
  - local authorities
  - employers' organisations
  - traditional firms in the refuse collecting sector

- the involvement of firms using recycled materials, such as producers of plastics products;
- cooperation in the recycling of end-of-life motor vehicles between the various players involved in this field with State support - car makers, car designers, dismantlers and crushers, etc.

The partnership involves all concerned and may include the social partners.

13. Degree of awareness and training of all those professionally involved

Research has shown the importance of the acquisition of new skills for a wide variety of existing occupations.

This implies on the one hand the creation of innovative continuing training courses and on the other the inclusion of environmental knowledge and skills at initial vocational training level.

The social partners play an important role in both these aspects.

In Austria, for example, the trade union organisations now consider the acquisition of environment-related skills to have both a direct and indirect positive impact on employment.

In the waste disposal sector the social partners may encourage retraining courses for operatives in order to:
- stabilise jobs in temporary placement structures;
- provide qualifications for those employed in traditional enterprises and in new refuse collection and separate collection units.

Retraining aimed at the lower skilled are in the interests:
- of those employed to carry out such work:
    - a better more responsible job with an improved image;
    - an improved working environment;
    - a higher level of knowledge;
- of additional job creation.

In the environmental management sector the social partners can play an important role in:

- contributing to the development of global environmental management initiatives within firms;
- lending impetus to and maintaining the introduction of specific tools and training follow-up for small and medium-sized enterprises;
- encouraging the inclusion of the new skills identified in all training courses for technicians and engineers in every sector but limiting the number of initial training courses focusing on the environment;
- encouraging the creation of training courses to meet the needs of personnel at every qualification level by supporting environmental management initiatives;
- developing a system for the recognition of skills acquired both through training and through work experience.

Involvement of this kind can prove advantageous:

For those in industry:
- by transforming constraints into competitive advantages;
- by conserving capital and guaranteeing a firm's continuing existence;
- by effecting the necessary changes within the organisation;
- by assessing the cost of legal requirements and seeking the funding involved.

For the environment:
- by reducing harmful emissions into air, water and soil and reducing the risk of accidents.

For employees:
- by enabling employees to adapt to the new skills required;
- by bringing available training more into line with needs.

The role of the social partners is particularly important when it comes to including environment-related skills in initial and continuing training for the relevant occupations and in the longer term no doubt for all types of occupation.

Thus in Austria the social partners are negotiating for environmental knowledge and skills to be included in apprenticeship-training programmes for the metal-working and electrical engineering industries. The union initiating this action is hoping to boost the creation of new jobs and better safeguard existing ones through the emergence of new tasks and functions in the environment field.
In 1996 the social partners in Austria for the first time signed an agreement on the inclusion of environmental skills in vocational training programmes for:
- electronics fitters in communications;
- plumbing and heating technicians;

These skills relate particularly to the economic use of energy and waste recycling.
- technicians in manufacturing.

14. Solving of technical problems

Research is necessary in order to develop environmentally friendly technology that is both more efficient and less costly.

The case-studies underscored
in the field of solar installation and
in the field of end-of-life vehicle recycling:
- how car makers are facilitating recycling;
- the importance of labelling materials;
- the need to increase the use of recycled materials.

Conclusion

The various studies carried out sought to describe innovative projects in emerging fields of activity and thus only partially cover the principal sectors composed of well-structured firms with environment-related activities.

The innovative projects are based on partnerships between the various agents involved and on impetus from the authorities.

The quantitative and qualitative impact on jobs of action designed to protect the environment mainly involves existing occupational profiles, whether jobs directly concerned with the environment or those affected by new environmental requirements.
Some occupations now emerging or undergoing radical change have, however, also been identified. At the same time, a number of emerging sectors promise to create jobs in the years to come. These include the reclamation of polluted sites and soil, urban ecology, protection of rural areas, etc.

Table 2: The impact of environmental initiatives on the job categories studied

Jobs	Occupational profiles and skills required	Impact of action benefiting the environment
Jobs directly environment-related: • All jobs in firms whose main activity is in an environment-related field (water, air, waste, noise, ecological heritage) • Jobs in an industrial field directly related to the environment	All types of occupational profiles	**Quantitative impact** • Developing activities and creating jobs in the waste disposal sector • Potential jobs in emerging sectors such as treatment of contaminated sites, protection of rural areas and urban ecology **Qualitative impact** • Retraining of waste collection personnel • Retraining of personnel in recycling firms
	Profiles for occupations concerned with the environment: Environmental skills required	**Qualitative impact** • Development of the occupational profile for a company environment officer • Emergence of an occupational profile for an adviser/trainer for small firms • Qualifying training for waste disposal facility supervisors
Jobs affected by new environment protection requirements.	All types of occupational profiles New environment-related skills may be required	**Qualitative impact:** • For occupational profiles at all levels within firms introducing environmental management systems • For personnel in regional authorities • For those affected by the introduction of new technology: energy technicians, car mechanics, construction engineers

Research shows that the inclusion of new environment-related skills is needed at every level of qualification from the lowest to the highest.

In every aspect studied, the introduction of an effective strategy and action to protect the environment calls for the acquisition of new skills by people in a wide variety of occupational profiles:

- decision-makers: corporate decision-makers, elected political representatives, environment officers in firms or local authorities, etc.;
- unskilled workers in traditional occupations concerned with the collection and recycling of waste;
- workers in industries using the technology concerned, such as engineers, technicians and operatives;
- all employees when action is taken within a firm.

At the same time, new occupational profiles are beginning to emerge. These include the environmental officer, waste-disposal facility supervisor, environmental consultant, river maintenance operative, etc.

These new occupational profiles represent a larger share of environment-related skills but are still based on existing qualifications and often need two areas of competence, one relating to the environment and the other to another occupation.
In all cases the new environment-related skills required are not merely technical but also involve organisation, communication, the ability to work in a team, the ability to solve problems methodically, etc.

At present the courses referred to in the case-studies are pilot projects often not yet completed whose transferability is far from certain. Thus in most cases there is still no training to meet the new needs and the relevant knowledge and skills have to be acquired by work experience and self-training because of the pace of change in industry or when new processes are introduced.

A number of approaches have been adopted to encourage the acquisition of these new skills:

- Including environment-related skills in initial vocational training and the creation of continuing training courses.

The social partners have a particularly important role to play here.

Recommendations made to government authorities and the social partners relate particularly to including environmental skills in existing training. However, one must be careful to ensure that these environmental skills remain complementary to existing qualifications, since training focused solely on the environment does not accord with the requirements of the jobs market.

- The development and recognition of innovative training experiments in the framework of training courses interacting with "learning projects".

Within the framework of the innovative projects described in the case-studies action to protect the environment, action to create jobs and the acquisition of new skills interact with one another.

- Retraining low-skilled workers in jobs directly related to the environment, such as rubbish collection and recycling, is an important dimension of training to improve the quality of environment-related services.

- Recognising individual paths to skill acquisition through:
  - prior working experience in various fields;
  - individual ability;
  - individual pursuit of information from various sources (meetings, reading trade journals, taking part in seminars, etc.);
  - utilising experience linked to the introduction of innovative action in the environmental field.

Finally we would stress that in the environmental field the acquisition of new knowledge and skills, whether by training or through experience, can contribute to the emergence and expansion of new services and new markets and thus contribute to job creation.

ANNEX

CASE-STUDIES

REDUCTION, COLLECTION, TREATMENT AND RECYCLING OF WASTE

Activity	Country	Project
Reduction of packaging in the distributive trades	Italy	Global strategy for protecting the environment and waste reduction and recycling within a cooperative
Separate collection and recycling of solid urban waste	Italy	Creation of ecological islands in two communes
Separate collection of domestic refuse	Denmark	Communal waste disposal facilities
Domestic refuse collection	Denmark	Refuse collector, environmental custodian
Sorting, recycling and re-use of domestic waste	Belgium France	Recycling of paper and clothes: jobs for the "excluded" An *entreprise d'insertion* (a vocational integration company) creates new recycling services.
Processing of urban waste	Austria	Disposal of waste and incineration for heating purposes by the Vienna municipal authority
Recycling of waste	Austria	Disposal and recycling of plastics
Recycling of plastic bottles	UK	Introduction of a pilot recycling scheme for plastic bottles in North West England
Management and recycling of ELVs and car waste	UK France	Recycling of vehicles which have reached the end of their useful lives Pollution control/dismantling units

ENVIRONMENTAL MANAGEMENT

Activity	Country	Project
Environmental measures in the chemical industry	Italy	Ecological auditing of a large company
Environmental initiatives in small firms	Denmark UK France	Assistance and advice to small firms concerning environmental measures Changes imposed by large firms on their suppliers Measures by a chemical firm Measures taken by a printing firm Measures to develop environmental management in plastics processing factories
Protection of the environment in the metal-working and paper industries	Austria	Legal obligation for firms with more than 50 employees to appoint an environmenal and waste-disposal officer
Introduction of environmental management systems	UK	Introduction of the function of environmental manager
Environmental performances	UK	Drawing up of a standardised report on environmental performance

RENEWABLE ENERGY SOURCES AND ENERGY SAVING

Activity	Country	Project
Reducing energy consumption	Italy	Thermoelectric generation and district heating in a conurbation
Rational use of energy	Belgium	Energy counters
Use of solar energy	Austria	First Solar Energy School in Vienna Programmes aiming to increase the output of energy using solar collectors
New management of forestry resources	UK	Deciduous forest management
Introduction of district heating utilising timber waste	France	Wood-fired power station in a rural commune

AIR QUALITY AND CHANGES IN FORM OF TRANSPORT ACTIVITY

Activity	Country	Project
Monitoring air quality	Italy	Monitoring air quality and prevention of risks by regional agency in a conurbation
Encouraging alternative forms of transport	Belgium	Shared transport facilities
Production and use of biodiesel	Austria	Factory producing methyl ester from rape-seed

URBAN ECOLOGY

Activity	Country	Project
Urban ecology	Denmark	Installation of environmental technology and training for "green" employees
Involvement of local authorities in protection of the environment	France	Urban and rural ecological charter for a town

TREATMENT OF POLLUTED SITES AND SOIL

Reclamation of waste depositories and contaminated soil	Denmark	Activity throughout Denmark
	France	Reclamation of a single contaminated site

HOME HELP

Personal services	Denmark	Jobs and training for domestic employees

ORGANIC FARMING

Encouraging organic farming	Belgium	The activity of an association for promoting organic farming

ECO-TOURISM

Creation of slow tourism networks	Belgium	A green tourism network

PROTECTION OF RURAL AREAS

Maintenance, rehabilitation and protection of waterways	France	Stabilisation of jobs for maintenance of rivers in a rural environment

CEDEFOP — European Centre for the Development of Vocational Training

New qualifications and training needs in environment-related sectors
Synthesis of studies carried out in Austria, Belgium, Denmark, Spain, France, Greece, Italy and the United Kingdom

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New qualifications and training needs in environment-related sectors

Synthesis of studies carried out in Austria, Belgium, Denmark, Spain France, Greece, Italy and the United Kingdom

This synthesis report presents the results of a research project launched by CEDEFOP in 1995 in eight Member States - Austria, Belgium, Denmark, France, Greece, Italy, Spain and the United Kingdom - on changing occupations, new occupations and the development of occupational skills in the field of environmental protection.

The aim of the project was to provide governments and the social partners with information on how qualifications and occupations in the environmental field are evolving in order to encourage social dialogue on future training and job creation strategies at both national and Community level.

The research carried out in the eight countries used case-studies to analyse the relationship between measures to protect the environment, jobs and the acquisition of new knowledge and skills. It involved a scrutiny of changes that have taken place in order to safeguard the environment, their impact on employment and qualifications, the ways and means whereby new competences were being acquired and the role played by training and the social partners.

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