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BEST PRACTICES GUIDE FOR CLEANER PRODUCTION PROGRAMMES IN CENTRAL AND EASTERN EUROPE

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Paris 1995

FOREWORD

In order to help the most pressing environmental problems of Central and Eastern Europe as rapidly and cost effectively as possible, an Environmental Action Programme (EAP) was launched. The EAP was endorsed by Environment Ministers meeting at Lucerne, Switzerland in April 1993. On that occasion, a Task Force was established to facilitate implementation of the programme and the OECD was invited to serve as its Secretariat.

Since 1993, the Task Force has undertaken a broad range of activities covering national environmental action programmes, the financing of environmental investments, the interconnection between industrial activities and the preservation of biological and landscape diversity, and education and training. The results of the Task Force's work will be reviewed at a further meeting of Environment Ministers to be held in Sofia, Bulgaria in October 1995.

This Best Practices Guide for Cleaner Production Programmes in Central and Eastern Europe was developed under the auspices of the Task Force and will be presented at the Sofia meeting for endorsement by Environment Ministers. Its origins stem from the finding that the environmental performance of the industrial sector in Central and Eastern European countries (CEECs) lags considerably behind that OECD countries. In particular, the pollution, energy and resource intensities of industries in the region are several times higher than OECD countries. Experience from Poland and elsewhere in Central and Eastern Europe demonstrates, however, that a 20-40% reduction in wastes is possible with little or no investment. Further reductions are possible through profitable investments in technically proven process or technology changes. In an environment characterised by a scarcity of resources, cleaner production is emerging as an important tool to assist industry to improve both its economic and environmental performance.

This Guide, which has been prepared on the basis of the experience gained in working on specific environmental issues in Central and Eastern Europe. Using a step-wise approach, the various elements for establishing a cleaner production programme are described -- objective setting, designing the programme, engaging different agents for its implementation, measuring performance, facilitating the multiplication of a programme, and financing investment in cleaner production. Together these elements constitute a simple, results-oriented framework which can be adapted to suit particular local circumstances and industry needs. The Guide will be of particular interest to policy-makers in industry and environment ministries, to those responsible for setting up cleaner production and training advisers, and to senior managers of enterprises. It is envisaged that the Guide will form the basis for a co-ordinated technical co-operation programme to broaden and deepen cleaner production activities in CEECs.

Mr. Olav Nedenes of the Norwegian Society of Chartered Engineers (NIF) prepared this Guide, which draws on a review of cleaner production programmes in Central and Eastern Europe undertaken by

Mr. Thomas Lindhqvist and Mr. Hakan Rodhe, Department of Industrial Environmental Economics, Lund University, Sweden in 1994. Mr. Chris Chung of the OECD Environment Directorate managed this project.

The Guide is published on the responsibility of the Secretary-General of the OECD.

Salvatore Zecchini
OECD Assistant Secretary-General
Director of the Centre for Co-operation
with the Economies in Transition

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EXECUTIVE SUMMARY AND RECOMMENDATIONS

In the transition to a market economy, governments in central and eastern European countries (CEECs), and the Newly Independent States (NIS) of the former Soviet Union, are moving at different speeds to restructure their industry sectors. Policy makers and the emerging private sector in the region are increasingly recognising that cleaner production represents a cost-effective approach to raise profitability, upgrade competitive advantage in the international marketplace and improve environmental performance. A fundamental requirement is the establishment of an environmental and industrial policy framework that emphasises pollution prevention and waste minimisation as a goal. Reinforcing the resulting economic and environmental benefits will help stimulate enterprises' demand for the introduction of cleaner production.

A number of CEECs have implemented cleaner production programmes, usually with assistance from external donors. Disseminating the lessons from successful cleaner production programmes and multiplying their positive results widely throughout the region is a major challenge. This Best Practices Guide is a response to that challenge. On the basis of practical experience in CEECs, it distils the key factors which underpin successful cleaner production programmes and provides a framework for the design and implementation of such programmes. The framework can be adapted to meet specific circumstances and industry needs in particular CEECs. The Guide is aimed at policy-makers, those responsible for setting up cleaner production programmes and training advisers, and senior managers of enterprises.

It has been estimated that 70% of all wastes and emissions from industrial processes can be prevented at source by the use of technically sound and economically profitable procedures (UNEP, 1994). The experience from 150 manufacturing companies in Poland, representing more than 20 branches of industry, is that a 20 - 40% reduction in wastes is possible with nil or minor investment (where investment is required, there is usually no need for external financing and the payback period is often within a few weeks or months). A further 30% reduction is possible through investments in technically proven and profitable equipment or process changes. Similar results have been obtained in industrial companies in other CEECs.

Four years' experience with cleaner production (CP) programmes in the region has demonstrated that it is possible to design very cost-effective programmes that combine training of trainers, in-company CP assessments (including environmental audits) and implementation of nil or low cost measures, and demonstration projects. It is estimated that programme costs are less than US$ 3,000 per company, inclusive of all training and in-company advice but excluding costs usually borne by the participant's own company, such as salary, travel and accommodation for the duration of the course. If these extra costs are included the total cost is about US$ 8,000 - 10,000.

National and local cleaner production centres have a major role to play in establishing a nationwide CP network, co-ordinating CP programmes, acting as an interface among industry, government, universities and NGOs, and disseminating information. Initially, government and/or donor support will be needed as "seed" finance for these centres but in time they should become self-financing operations on a cost-recovery, user-pays basis.

Experience in CEECs shows that much can be achieved through no-cost good "housekeeping" measures. However, once the no- and low-cost savings have been made, financing even small investments (less than US$10,000) with low payback periods can be difficult. An overriding need is to strengthen links between existing financing sources, such as environmental funds, banks and donor agencies, and those companies/state-owned enterprises capable of making "win-win" investments (i.e. investments that yield economic and environmental benefits).

Recommendations

The Recommendations are grouped according to the specific audience to which they are directed: policy-makers in Industry and Environment Ministries, senior managers of enterprises, cleaner production programme trainers, and domestic and foreign sources of assistance.

Policy-makers in Industry and Environment Ministries

1. In the process of industrial restructuring, CEEC governments should develop environmental and industrial policies which promote pollution prevention and waste minimisation through cleaner production. Emphasis should be placed on the implementation of nil and low cost measures before considering investment in higher cost and end-of-pipe technology. The Ministry of Environment and the Ministry of Industry should jointly prepare a CP Policy which sets out national goals for cleaner production, identifies responsibilities of all parties and provides criteria for measuring performance. Implementation of the policy should rely on a mix of economic, regulatory and other instruments to provide an on-going incentive for pollution reduction and to provide industry with flexibility to meet the regulatory targets. A mechanism for government-business dialogue should be established to engage the private sector in policy development.

2. Consideration should be given to issuing a CP Declaration as a voluntary agreement between government and companies/enterprises. This would commit the government to support CP training and assessment programmes, and to help participating companies identify potential funders of CP investments. Companies signatory to the CP Declaration would be required to participate in approved CP programmes, to report regularly on CP measures implemented and the results, and to agree to their trained experts assisting with dissemination of CP programmes in other companies.

Senior Managers of Enterprises

3. Cleaner production should be considered as a factor for raising profitability: minimising faulty or sub-standard products, encouraging the more efficient use of energy and other inputs, and reducing wastes. All of these measures yield significant cost savings. The interest and commitment of senior management to the concept and implementation of cleaner production is vital. This often requires, first and foremost, showing demonstrable and sustained improvement in a company's profits through good industrial housekeeping measures and cleaner production approaches. Results from in-company demonstration projects, and cleaner production assessments have a strong motivational effect through identification of areas where cost savings can be made.

4. The organisation of a CP programme within a company is the foundation for coordinated action. A Steering Committee composed of senior managers and a trade union delegate should provide the overall strategic direction to the programme; a Project Group comprised of division managers should act as the intermediary between the Steering Committee and ad hoc working groups that carry out data collection, undertake CP feasibility assessments and implement CP measures in production lines. Employees should be encouraged to generate ideas for improving productivity, minimising waste and emissions and reducing risk and hazard potential throughout the plant. An incentive system to develop employee interest and reward innovative ideas should be considered.

Cleaner Production Programme Trainers

5. CP programmes should combine the following components: training of trainers, in-company CP assessments and demonstration projects, and preparation and implementation of an action plan. Programmes should be developed appropriate to the cultural context and economic conditions of each CEEC and may need to be customised to specific industrial branches.

6. Teachers/advisers with practical experience in CP in other CEECs should be used in the initial phase of new CP programmes. They should be substituted by trained local advisers as soon as the latter have obtained the necessary training and certification. Western advisers could provide overall programme management and quality control during the period that donor support is available but their withdrawal should be phased to match the build up of local capacity.

7. All manuals used in CP training and assessment should be reviewed by local CP experts and then made available in the local language.

8. National (and in large countries, regional) CP Centres should be established as a non-governmental organisation. Their primary task should be to promote CP and to co-ordinate and run such programmes. Other tasks may include training and certification of local advisers, developing a CP data base and network of experts, liaising with international business associations, and assisting enterprises prepare applications for funding of CP investments. Competent organisations such as professional engineers' associations, technical institutes or universities or industry associations should be accredited to run CP programmes.

Domestic and Foreign Sources of Assistance

9. Domestic and donor assistance for CP should be targeted at:

   -- assisting national government ministries (environment, industry, privatisation, finance, trade) develop the necessary policy framework and institutional arrangements for CP, together with the instruments for its implementation;

   -- supporting the establishment and multiplication of CP centres and CP programmes;

   -- supporting the participation in CP programmes of senior managers and key staff in enterprises, trade union representatives and university teachers;

   -- helping finance higher cost investments in those companies capable of making "win-win" investments.

10. The potential role of domestic sources for financing CP, such as environmental funds, revolving funds, the banking sector and credit institutions, should be strengthened. Training in carrying out project appraisals should be provided to officials in such institutions as a priority activity.

Chapter 1

INTRODUCTION

A major consequence of the transition to a market economy in Central and Eastern Europe (CEE) has been a decline in industrial output and associated pollution. As the transition process turns from reform to economic growth, however, industrial production and pressures on the environment will increase. This is happening in Hungary and Poland, for example, where growth in industrial production increased by 4% and 6.2% respectively between 1992 and 1993 (OECD, 1994). In addition, a recent OECD review of environmental policy performance in Poland examined the relationship between economic restructuring and the environment (OECD, 1995). One of the major conclusions of this review was that it is insufficient to rely almost exclusively on the benefits of industrial restructuring and modernisation to reduce industrial pollution: the integration of environmental factors into industrial policies and practices is urgently needed (OECD, 1995: 161).

The foundation for renewed growth in industrial production is based upon reforms of macroeconomic and other policies and restructuring of the industry sector. In particular, (a) establishing a competitive, principally privatised industrial sector as the engine of economic growth, (b) reducing direct state involvement in the management of enterprises, (c) using prices rather than central planning as the principal guide in allocating resources, (d) reducing or eliminating subsidies for inputs, (e) enacting new tax and foreign direct investment rules, and (f) promoting greater trade liberalisation to improve market access in the EU and OECD countries. These reforms create both opportunities and challenges. Opportunities are associated with greater foreign direct investment in CEECs and improved prospects for export-led growth based on goods and services produced mainly by the private sector. A major challenge is an increase in unemployment resulting from privatisation and restructuring of the industrial sector.

Reform of the industrial sector in CEECs is focusing attention on the *quality* of production as much as the *quantity* of production. This has been stimulated by, *inter alia*, meeting product quality standards in export markets, the introduction of hard budget constraints, higher prices for energy, water and other inputs and higher and more stringent enforcement of pollution charges. Policy-makers in CEECs are beginning to use a greater range of regulatory instruments and economic incentives to encourage industry to better integrate environmental considerations into its production decisions. In a context characterised by severe resource constraints, cleaner production is emerging as an important tool in improving both economic and environmental performance.

Cleaner production (CP) is a commonly used but variously defined term. Here we adopt the definition presented in the UNEP Cleaner Production Programme (see Text Box 1).

TEXT BOX 1: Definition of Cleaner Production

Cleaner production means the continuous application of an integrated preventive environmental strategy to processes and products to reduce risks to humans and the environment.

-- For production processes cleaner production includes conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes before they leave the process.

-- For products the strategy focuses on relating impacts along the entire life cycle of the product, from raw material extraction to the ultimate disposal of the product.

Cleaner production is achieved by applying know-how, by improving technology, and/or by changing attitudes.

Source: Lindhqvist and Rodhe, 1994.

The following factors are crucial for the successful design and implementation of CP programmes:

-- Industrial and environmental policies should emphasize CP, requiring that no and lower cost CP measures are evaluated and implemented prior to investment in high cost end-of-pipe facilities. Such an assessment usually reveals opportunities for significant cost savings as well as possibilities for reducing risk and hazard potentials associated with equipment operation and raw materials storage, use and disposal.

-- The demand for the introduction of CP in industry must come from individual enterprises based on a good understanding of the economic and environmental benefits that can be obtained. Accordingly, the benefits of pollution prevention and reduction at source, the potential for savings through good "housekeeping" measures and the opportunity to use such savings to help finance higher cost investments that have a short payback period should be emphasised to senior managers in enterprises.

-- Preference should be given to supporting CP training and assessments ahead of investments in hardware. CP methodology and training should be adapted to the local cultural context and modes of learning.

-- CP programmes should aim to move from reliance on external help to self-help as soon as practicable, i.e. "go in and get out". This reduces by up to 90% the programme cost to donors and increases the pool of competent local trainers. Local CP trainers should be used to disseminate programmes to relevant industries, university departments and municipal departments.

-- "In-company" advice should be kept short: frequent short visits (1-2 days) by the CP adviser is more effective in helping enterprises than long (1-2 weeks) visits. Moreover, short visits encourage enterprises to take the initiative to evaluate and implement solutions on their own, i.e. it promotes self-help in problem solving.

-- Programmes should be built around multi-enterprise group work rather than individual company modules. Group work is a more cost-effective approach and enables participants to learn from the experiences of others.

-- Learning by doing is crucial: real life experiences are more interesting and motivating than theoretical lectures. A combination of lectures, "show and tell" experiences and exercises based on in-company projects will improve the relevancy and effectiveness of training courses. In addition, enterprise employees at all levels should be actively involved in a CP programme, e.g. objective setting, data collection, ideas generation, etc. An incentives system should be introduced to develop employee interest, reward new ideas and achievement of goals.

-- Cooperation between senior managers of an enterprise and trade unions is essential to the credibility of a programme. Both parties must be committed to the concept, to establishing an appropriate organisational structure to implement an enterprise-wide programme and to motivating employees to participate.

-- Where local municipalities are involved in joint CP programmes with industry, all relevant municipal departments should also participate, e.g. electricity, waste disposal, water and sewerage. The steering committee for a joint CP programme should be headed by the mayor as this is more likely to engage senior managers of local enterprises.

Text Box 2 summarises the main factors for achieving a successful, cost-effective CP programme.

TEXT BOX 2: Factors for a Successful, Cost-effective CP Programme

* Modification of the general CP methodology to suit local circumstances.
* Move from help to self-help as soon as practicable, i.e. "go in and get out".
* Short periods of in-company advice (1-2 days) by the CP adviser are preferable to longer visits.
* Learn from the experience of other enterprises, i.e. multi-enterprise group work should be favoured over developing individual company training modules.
* Learning by doing: real life experiences have a high motivational value and are a powerful influence in changing attitudes.
* Ideas generation groups are tailored to reflect cultural modes of interaction.
* All levels of the enterprise participate in the CP programme.
* Immediately implement good industrial "housekeeping" measures. An action plan for implementing profitable CP investments is prepared.
* Foster good co-operation between trade unions and enterprise management.
* Develop joint CP programmes between local municipalities and industries.
* Disseminate the CP programme nationwide.

Chapter 2

DESIGNING AND IMPLEMENTING CLEANER PRODUCTION PROGRAMMES

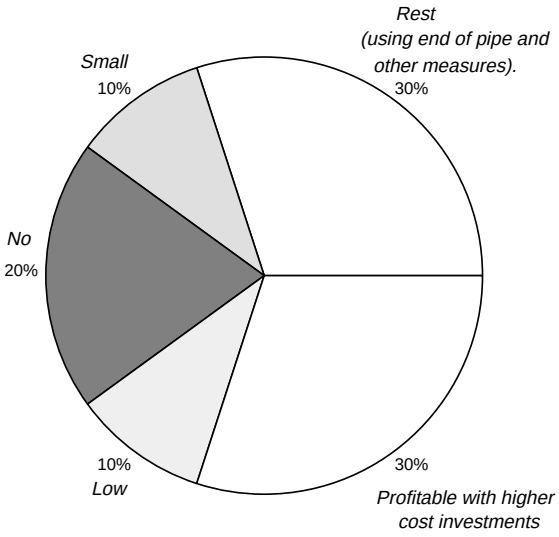
2.1 General Objective of Cleaner Production

The general objective of CP should be to restructure industry in an economically profitable manner over a period of approximately 5-7 years and at the same time to improve industry's environmental performance. Simply put, CP programmes should aim to increase the profitability of industry by reducing water and energy consumption, pollution emissions and waste volumes whilst improving product quality and workplace safety. In this way, CP measures will yield a double dividend of economic and environmental benefits.

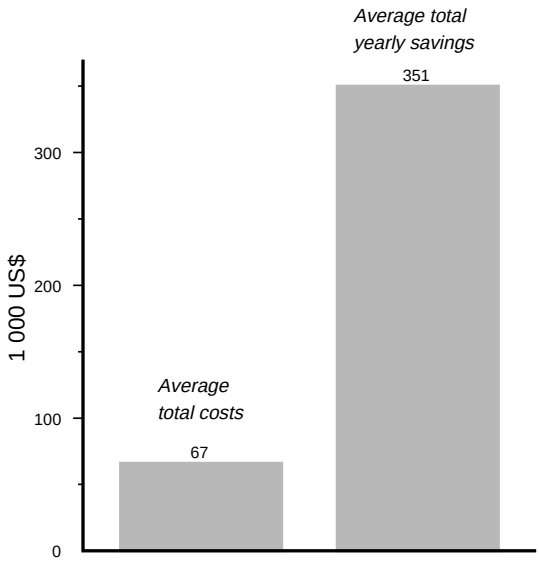
Practical results obtained from the Norwegian-Polish CP programme are shown in Figure 1. Figure 2 illustrates in schematic form investments and annual costs and savings associated with end-of-pipe technology, industrial "housekeeping" measures and CP investments.

Figure 1: Implemented and Expected Results from the Norwegian-Polish CP Programme

Additional reductions in industrial wastes and emissions with different types of investment

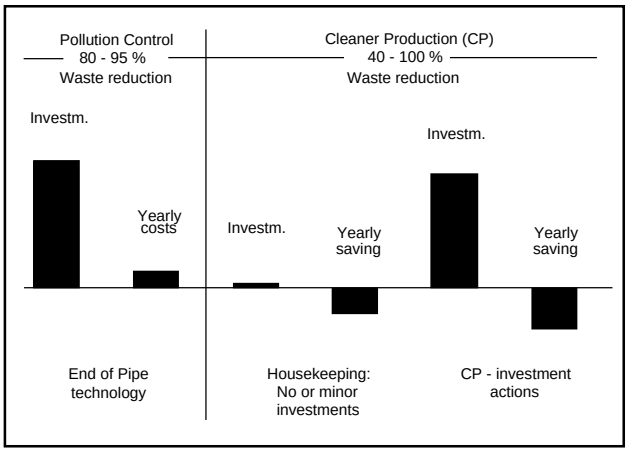


Average total costs and total yearly savings per company to date in Polish production companies
(short term investments only)



Notes:
(1) "No" means no hardware investments (only education, management training, process monitoring, etc.)
(2) "Small" and "low" profitable investments have usually been implemented without external loans (i.e. financed from enterprise's own operating budget). "Low" is less than US$ 10 000. "Small" is between US$ 10 000-40 000.
(3) "Profitable" investments require external loans and have only been implemented to a limited extent at present.

Figure 2: Investments, Annual Costs and Savings Using Different Approaches



2.2 Specific Objectives of a Cleaner Production Programme

The following specific objectives could be adapted according to the particular circumstances and needs of industry in each CEEC.

2.2.1 Training the Trainers

-- Using foreign instructors, educate a minimum of 35 highly qualified local instructors in the first CP programme. If qualified local instructors are available they should be used in the first programme. Qualified instructors from other CEECs should also be invited to contribute their experiences. Course materials and instruction should, as far as possible, be in the local language.

-- Instructors educated in the first programme would then commit themselves to be teachers/advisers in similar programmes over the next 3 years in order to develop a pool of new instructors and to act as advisers for CP assessments in participating enterprises.

-- The best qualified instructors trained in previous programmes and with practical experience as teachers/advisers in 2-3 programmes should be appointed as leaders of subsequent programmes.

-- University teachers who have participated in a training programme and obtained practical experience as members of project groups in enterprises should, after being involved as teachers/advisers in 2-3 subsequent programmes, develop undergraduate and graduate courses in CP.

2.2.2 CP Assessments

-- A minimum of 15 production enterprises should participate in the first programme and should complete within 7-8 months at least one cleaner production assessment for a production line.

-- Following the first cleaner production assessment for one production line in an enterprise, the procedure should be disseminated to all production lines over the next 1-3 years.

-- After the first programme the objective should be to double the number of programmes and the number of enterprises undertaking cleaner production assessments, as well as the number of certified advisers, every 9-12 months.

-- Enterprises that have implemented CP actions, including higher cost investments, should become demonstration plants and be invited to "show and tell" their experiences to other enterprises.

2.2.3 Setting Environmental and Economic Goals within Enterprises

-- A goal of 15-25% total reduction in waste discharges to water or air, and an equivalent reduction in solid waste generation or energy consumption, through implementation of good industrial "housekeeping" measures requiring nil investment, or minor investment with a payback period of less than 6 months, should be set. The measures should be implemented immediately and not later than one year after the initial CP assessment.

-- An average minimum reduction in wastes and emissions of 50% should be attained after 3 years of repeated CP assessments in all production lines.

-- Higher cost investments with good payback should aim at further source reductions, product and process modifications, improved materials recovery and reuse, etc.

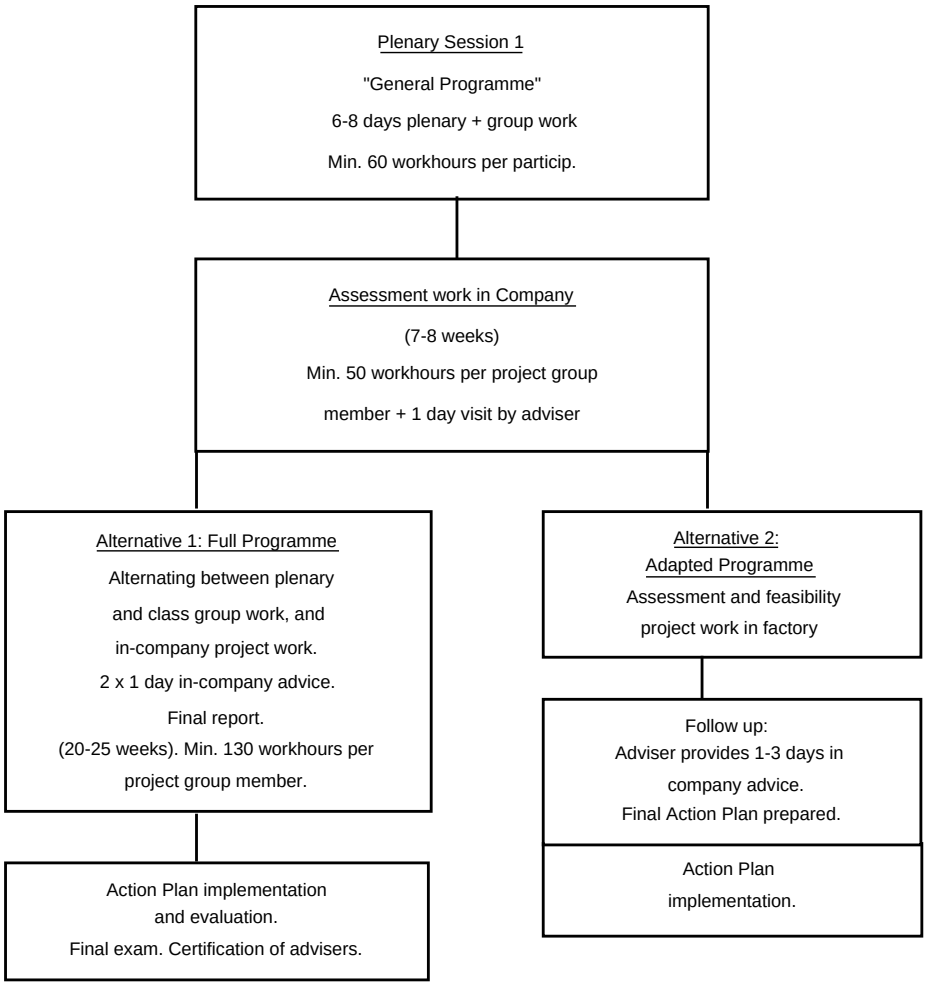
2.3 CP Programme Design

Five years' experience with CP programmes in CEECs has demonstrated that it is possible to combine in the same programme training of trainers, in-company assessments and demonstration projects, and development and implementation of a CP action plan. These outputs can be achieved with lower costs and yield similar or better economic and environmental results compared to modular programmes.

A combined programme should be designed using a mix of plenary and group sessions involving participants from different organisations (employees from enterprises and their suppliers and distributors, engineers from design offices and consulting firms, university teachers, etc.) and project work within enterprises. The preparation and implementation of an action plan and a formal examination of project work are integral parts of this programme.

It is important to build flexibility into a programme design, however, so that those participants who do not intend to become future trainers/advisers can participate in a shorter length programme. A generalised programme structure is shown in Figure 3. Common to both the full and shortened programme is 6-8 days in plenary and group work sessions followed by 7-8 weeks of project work within enterprises, during which time the trainer/adviser makes a one day visit to check progress and discuss specific problems. Further follow-up visits, especially in the initial stages of a programme, would be carried out to ensure activities are proceeding satisfactorily.

Figure 3: General Structure of a CP Training and Assessment Programme



Alternative 1 is the combined programme. After about 7-8 months this programme should conclude with a formal examination and successful candidates presented with a certificate which confirms them as "trainers". Following practical experience as teachers/advisers in 2-3 CP programmes they could then become leaders of a CP programme. Figure 4 shows the structure of this programme.

Alternative 2 is designed to provide participants from enterprises with the techniques for undertaking a pre-project CP assessment, feasibility analysis and preparation of an action plan. The adviser spends 1-3 days in the enterprise after which the participant submits a CP action plan. The course does not lead to certification as a CP trainer but will enable participants to lead a simplified CP assessment in their enterprise. (see Figure 5.)

Figure 4: Organisation of a Combined CP Programme

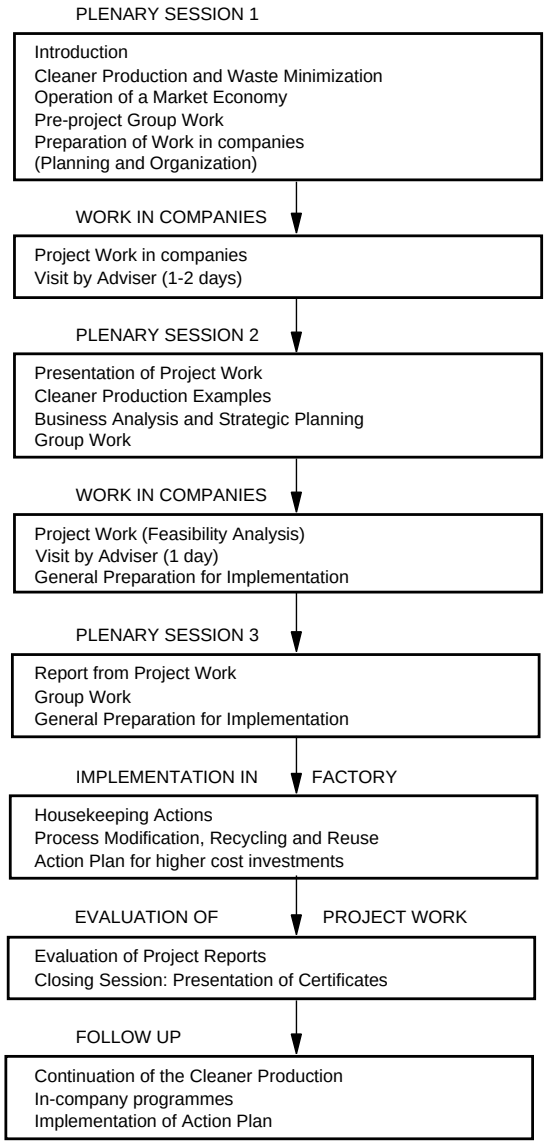
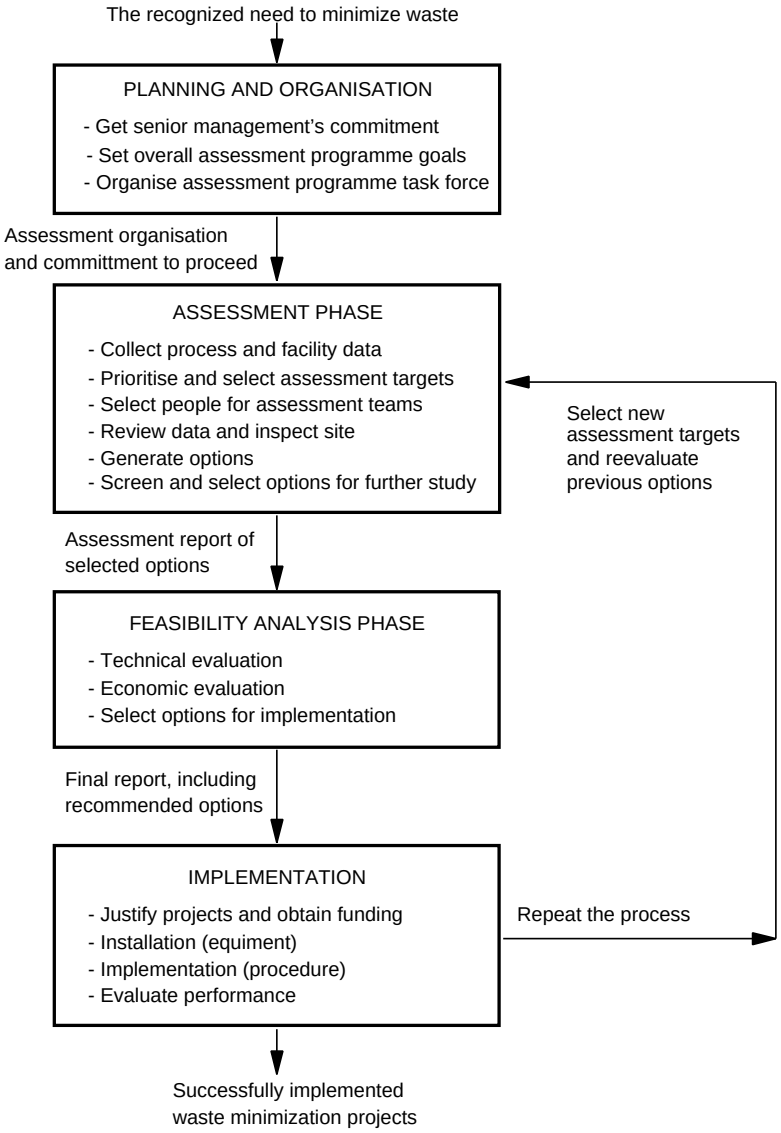


Figure 5: The CP Assessment Procedure



2.4 Barriers to Programme Success

Lack of money is often cited as the principal barrier to introducing CP programmes in CEE enterprises. Experience in the region shows, however, that in the first phase of a CP assessment the annual savings from instituting good industrial "housekeeping" measures (e.g. better process controls, more efficient use of inputs such as energy and water, improved maintenance, etc.) and with no investment are usually greater than three times the cost of carrying out the assessment. Some enterprises are even able to finance some of the medium-higher cost CP investments from their accumulated savings and without recourse to loans.

Thus, factors relating to organisational and attitudinal issues may be more important barriers than lack of money.

2.4.1 Lack of Interest In and Commitment To CP by Senior Managers

The commitment of senior management to CP is crucial. In many CEECs numerous enterprises are yet to be privatised and while they remain in state ownership the incentive (and the means) to address pollution problems is weak. Privatisation, however, does not mean that managers will be convinced automatically of the benefits of CP. Strong commitment is usually only forthcoming when the economic and environmental benefits resulting from a CP programme are well understood. This requires that results from an in-company assessment based on data on consumption of inputs, waste discharges and emissions, and potential cost-savings, as well as ideas for improving productivity, are presented early on to senior managers. Assessments carried out by external advisers do not have the same motivational effect and neither do CP results from other enterprises. Techniques for carrying out such an assessment should be included in the first plenary session of a CP programme.

2.4.2 Poor Organisation and Coordination of a CP Programme

A clear organisational structure for an in-enterprise CP programme is essential to ensure that objectives are clearly communicated and understood, responsibilities defined and efforts at different levels of the enterprise coordinated. The following organisational structure is recommended:

-- establishment of a steering committee, headed by the managing director and including all division managers and a trade union representative. The committee should establish the overall CP policy for the enterprise, set the programme objectives, review recommendations for CP investments prepared by the project group, approve project plans and resources needed for their implementation and monitor implementation of the programme;

-- creation of a project group to carry out detailed CP assessments, prepare action plans and oversee implementation of specific projects. The project group should comprise production managers, and managers of functional departments such as finance, research and development, and maintenance. A production manager should be selected as leader of the project group: not only is he/she and his/her staff closest to the problems that need to be solved but also they have direct responsibility for ensuring CP measures are implemented effectively; and

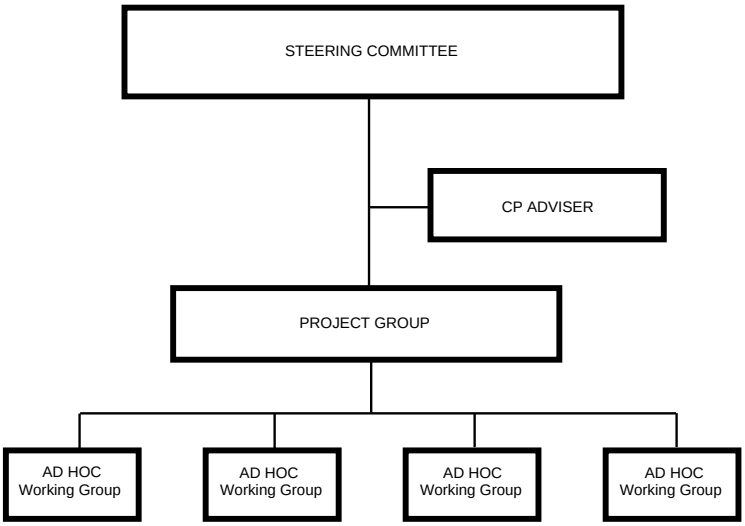
-- establishment of ad hoc working groups and ideas generation groups involving all employees. Their roles include data collection, feasibility analysis of CP options, generating new ideas and implementation of CP measures. (see Figure 6.)

It will usually take 2 staff years to fully establish this type of organisational structure and to ensure that all employees at all levels in a production line are covered.

2.4.3 Poorly Defined Goals, Responsibilities and Timetable

In the absence of clear programme objectives and allocation of responsibilities, and a realistic timetable for implementation of CP measures, frustration and demotivation among staff are likely to result. All programmes should have an action plan approved by the Steering Committee. This plan should provide a description of all CP measures to be undertaken in the next 1-2 years and a list of measures to be further evaluated for implementation beyond this period. The plan should also indicate the human, technological and financial resources needed, the time schedule for carrying out activities and the allocation of responsibilities. The latter is especially important to avoid competing demands from managers on staff seconded to another department.

Figure 6: Organisational Structure for an In-Enterprise CP Programme



2.4.4 Fear of Taking Decisions

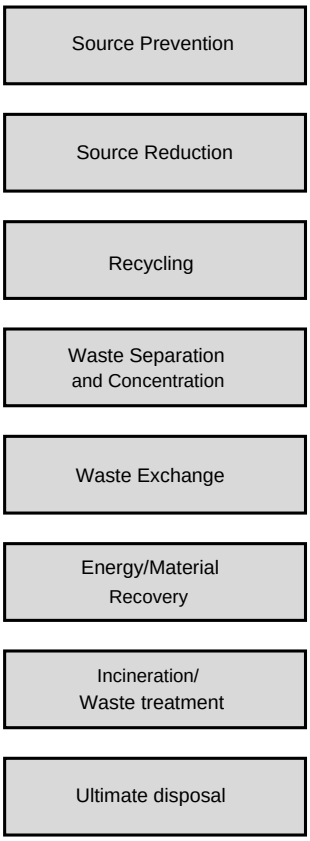
The implementation of CP measures with both a fast payback period on investment (less than 6 months) and environmental benefit is often delayed because of a fear of taking decisions. This may be a legacy of the previous economic system where decision-making was very centralised. The economic costs of delay can be high. For example, the annual savings in one of the largest galvano plants in CEE, through installation of recycling equipment for heavy metals, was estimated at more than US$ 200,000 on an investment of about US$ 20,000. More than US$ 400,000 was lost due to the 2 year delay in deciding whether to install the equipment.

2.4.5 Resistance to Change

Changing attitudes and values are fundamental barriers to be overcome in introducing CP. Reasons for resistance to change include threats to established organisational culture and power arrangements (a new way of doing things, including sharing of information among departments and wider consultation); lack of understanding about the economic benefits of CP; and concern about possible workforce reductions resulting from the introduction of CP measures.

Because CP is often a new concept for policy-makers, enterprise managers and workers, time spent in explaining the concept and correcting misconceptions is a low cost-high payoff activity. CP's emphasis on pollution prevention and reduction at source rather than end-of-pipe solutions requires that personal initiative and more participatory approaches to problem solving are encouraged. This is a new experience in CEECs. The hierarchy shown in Figure 7 is based on a decade's experience with CP in OECD countries and 5 years' experience in CEECs.

Figure 7: Priority Hierarchy



2.4.6 Blocks to Creativity

One of the most important tasks in setting up a CP programme is to create a climate of creativity among employees to stimulate the generation of ideas and innovation. Approaches to foster this "bottom-up" process will vary from enterprise to enterprise according to cultural factors, leadership style, organisational structure, etc. Creating a climate for creativity will very much depend on developing mechanisms for open communication, information exchange and rewarding innovation. Text Box 3 shows the common blocks to creativity which should be addressed.

A first step is to encourage the generation of ideas among plant operators. This can be facilitated by:

-- encouraging operators to participate in the data collection phase and agreeing on the waste streams to be examined in their production sector;

TEXT BOX 3: Ten Blocks to Creativity

1. Fear of making mistakes.
2. Fear of being considered a fool.
3. Fear of being criticised.
4. Fear of being misused.
5. Fear of being alone.
6. Fear of disturbing tradition and making changes.
7. Fear of being associated with taboos.
8. Fear of losing the security of habit.
9. Fear of losing the group's acceptance.
10. Fear of being an individual.

-- preparing materials and energy balances for each production department or each sector of a production line and explaining the results and implications to each operator; and

-- encouraging operators to take an active part in setting objectives for their area of responsibility.

Subsequently or parallel to this activity, a group ideas generation process should be started within the whole enterprise and involve all levels of staff. Usually the groups should consist of employees of the same level of seniority.

2.4.7 Financing Higher Cost Investments

Although much can be done to improve economic and environmental performance through nil and low cost good industrial "housekeeping" and simple process modification measures, further improvements are likely to require investments in the range of about US$ 50,000 - 2 million. A financing plan for these investments should be prepared as part of the CP action plan. The financing plan should state what proportion will be funded from the enterprise's own budget, the amount of external assistance required and potential sources, and payback periods of investments. Responsibility for gathering the necessary data to support applications to banks, credit institutions, etc. should also be established and indicated in the plan. Cleaner Production Centres might assist enterprises with the applications procedure on a user pays basis.

2.5 Agents for Implementation

2.5.1 Central Government

Central government has the key role in establishing the policy and regulatory framework to promote CP in industry. Moreover, the use of combinations of economic, regulatory and other instruments to support implementation of the framework provides the structure of incentives and constraints within

which enterprises operate. The underpricing of energy or raw materials and subsidies for waste disposal are particular issues which should be addressed by the policy framework.

Developing partnerships between central government, business, industry/business organisations and trade unions is important if CP is to be widely endorsed as a strategic goal in the industry sector. Public-private sector co-operation in developing national codes of conduct and establishing mechanisms for consultation are two ways of fostering such a partnership.

2.5.2 Cleaner Production Centres

Cleaner production centres in CEECs have often been associated with a specific CP project developed jointly by an NGO in a donor country and an NGO in a CEEC, with financial support from the donor government. UNEP and UNIDO have also helped establish national cleaner production centres in the region, for example in the Czech Republic and the Slovak Republic. The aim of cleaner production centres is usually to establish and multiply a combined training of trainers and CP assessment programme nation-wide. A reputable national or local NGO and experienced staff are usually selected to form the nucleus of a national cleaner production centre.

Examples include the Norwegian Society of Chartered Engineers, which is running programmes in association with NGOs in the Czech Republic, Poland, the Slovak Republic and in the north-west of the Russian Federation; and the Czech Environmental Management Centre, which is working with the World Environment Center in implementing waste minimisation programmes in Czech industry.

To increase the chances of successful programme implementation a cleaner production centre should meet fully the first three criteria noted below and also satisfy most of the other criteria listed in priority order:

-- strong, preferably daily, interaction and cooperation with manufacturing industry and senior enterprise managers;

-- practical experience in post-graduate education or training of industry leaders/experts (this experience might have been obtained in cooperation with another organisation);

-- practical experience and capability in modern accounting and project management techniques;

-- a well run decentralised organisation (central and local offices);

-- good connections with the Ministry of Industry and Ministry of Environment and other ministries with an interest in and responsibility for industrial and environmental matters;

-- good connections with local government, business associations, trade unions, goods and services suppliers and distributors;

-- act as a membership organisation, with company members or senior managers of participating companies as members.

2.5.3 Enterprise Employees

At the design stage of a CP programme understanding of the concept and its benefits is usually weak. Consequently, motivation and commitment by managers and employees to the success of the programme are low. High priority should be given to reversing this through:

-- encouraging production managers and their staff to identify no- and low-cost measures within the framework of an enterprise-wide CP assessment. Any investments should have a payback period of a few weeks or less. The results of completed initiatives should be reported to senior management in a timely manner;

-- organising introductory seminars for senior managers and production managers, using case studies from demonstration enterprises operating in the same industrial branch;

-- subsequently, organising a pre-project seminar where production managers and their staff prepare a feasibility assessment and report the costs-benefits of viable options to senior management. This could then lead into a full CP programme. Free or subsidised participation in CP training and assessment programmes seems to be required to catalyse initial industry involvement;

-- promoting information campaigns by industry associations and engineers' associations aimed at convincing their memberships that CP strategies produce "win-win" benefits. The Ministry of Industry should act as a co-sponsor of such campaigns; and

-- developing CP indicators to enable comparisons of performance pre- and post-introduction of measures among industries in the same branch. This could include data on energy and water consumption, waste generation per unit output, checklists of CP possibilities in a particular industry branch (see van Berkel, 1994).

2.5.4 Trade Unions

Endorsement of CP training and assessment programmes by national and regional trade union organisations plays an important role in motivating the involvement of their membership. Text Box 4 lists some of the benefits of CP to plant operators/workers.

TEXT BOX 4: Benefits of CP Programmes for Plant Operators/Workers

1. Improved workplace conditions, including health and safety aspects, e.g. reduction of risk and hazard potential from the transport, storage, use and disposal of toxic and hazardous substances; improved noise and dust control.

2. Upgrading the competitivity and profitability of the enterprise, improving prospects for continued employment and increased wages.

3. Empowerment of workers through participation in CP assessments, ideas generation groups and promotion of "bottom up" approaches to problem solving.

4. Stimulates investment in human resources: upgrading skills and work practices.

5. Rewards for identifying innovative ideas and practices.

Particular roles which trade unions can play include:

-- providing support and commitment from the start of a CP assessment to motivate members to participate actively in the setting of objectives and tasks, data collection and ideas generation.

Since operators/workers usually generate more than 50% of good ideas for changing current practices, such support is a low cost-high payoff factor for success;

-- nominating one of their members or elected officers to be on the steering committee (see section 2.4.2). In this way, they can influence the design and implementation of the CP programme, and contribute to developing the enterprise's environmental and business strategies. In addition, they act as intermediaries between workers/operators and senior management;

-- ensuring that the health and safety aspects are included in the CP programme; and

-- supporting incentive programmes to develop employee interest in CP and reward innovative ideas.

2.5.5 Industry/Business Associations

These types of associations could manage CP programmes by being designated as the CP Centre. In addition, they have a role in promoting network building among participating enterprises and suppliers of environmental goods and services, encouraging interest in "green" products and materials reuse/recycling/ recovery (waste from one enterprise may be the raw material of another) and contributing the business perspective in the policy development process (e.g. through a public-private sector roundtable forum).

2.5.6 Local Government

Initially, CP programmes in CEECs did not involve local government nor the participation of managers from municipal departments such as energy supply and sewerage. In 1993 a pilot combined purpose CP programme was implemented with the local authority of Tarnowsky-Gory in Poland. It was a great success. Most of the production enterprises in the town joined the programme as well as relevant municipal departments, such as energy supply, water and sewerage, hospitals, and maintenance depots. The Mayor headed the Steering Committee and was assisted by senior managers of private enterprises and municipal departments. Individual steering committees established in each participating enterprise and municipal department carried out CP assessments and made recommendations to the high-level Steering Committee. The structure of the programme is shown in Figure 8. Several joint municipality-industry CP programmes based on this model have now been successfully implemented in Poland.

The most important factors for success include:

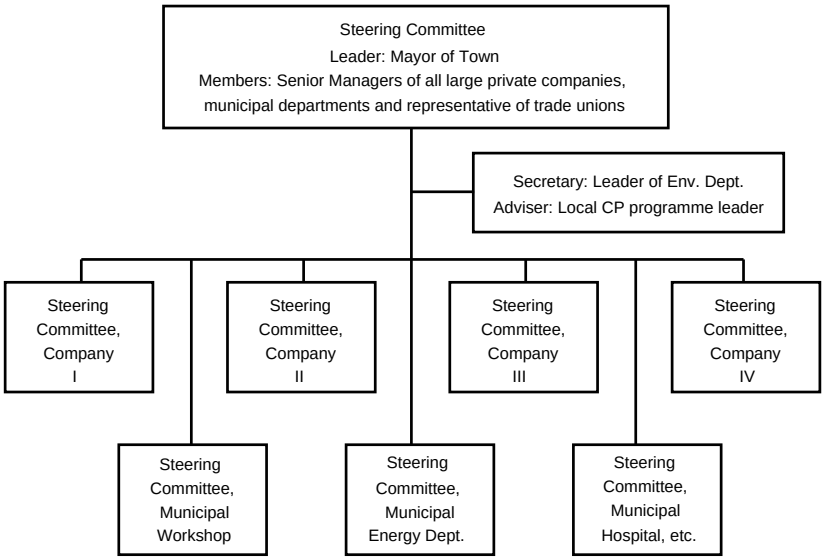
-- coordination of actions;

-- strong local political support and commitment;

-- high motivation, participation and commitment of senior industrial leaders in the community; and

-- quick identification and mobilisation of local expertise for disseminating CP programmes.

Figure 8: Organigram of a Joint Municipality-Industry CP Programme



2.6 Measuring Performance

Few CP programmes in CEECs have set measurable targets for reductions of solid wastes, emissions and energy consumption. Goals are commonly expressed in general terms, e.g. "strive to implement no- and low-cost investments" or "reveal options that combine environmental improvements with short pay-back periods". When goals are more explicitly defined, weaknesses in reporting and follow-up make it difficult to evaluate what has actually been achieved (Lindhqvist and Rodhe, 1994).

Enterprises involved in CP programmes are not always willing to report the CP measures they have implemented, especially simple "housekeeping" actions. Two important reasons are that the enterprise management is afraid that such reporting may lead to more stringent demands for pollution control from environmental authorities, and an embarrassment that such actions were not implemented earlier.

2.6.1 Quantifying Costs and Benefits

In the absence of information on the costs and benefits of a CP programme it is very difficult to objectively review changes in environmental performance, the cost-efficiency of a programme and opportunity costs of different strategies and investments. Systems for measuring costs and benefits can be designed to be both administratively simple and capture the information required.

The costs to run a CP programme, including administration, training and advisory services, can be tracked using an accounting system that corresponds item by item to the programme budget. Quantification of in-company hardware costs and other costs is more difficult to record but one method is to use the tables and/or checklists contained in CP manuals. These tables/checklists list all cost factors (direct, indirect, commitments and liabilities) and savings opportunities (reduced waste management costs, savings in raw materials, energy and water, changes in operations and maintenance procedures, changes in budgeting and billing procedures, etc.) These tables/checklists should be used to record costs and savings both during the assessment-feasibility phase and as a tool to monitor the performance of CP measures. Too often savings are forgotten when reporting so that the economic benefits of CP are underestimated.

The quantification of environmental benefits is usually the weakest part of follow-up in a CP programme. Lack of data or its unreliability is often advanced as a reason for this situation. Again, the use of checklists and worksheets from the CP manual, adapted to specific conditions in individual enterprises, is encouraged to improve recording. Often the results are better than reported simply because many good "housekeeping" measures were implemented before the enterprise began to measure its waste streams and resource consumption, i.e. the baseline reference point is not defined.

Voluntary agreements between enterprises and local government, and joint municipality-industry CP programmes, can promote better recording of costs-benefits through greater emphasis on sharing of monitoring information between partners and the dual forces of moral pressure and accountability to meet agreed goals.

A simplified report for measuring progress in implementing CP is shown in Table 1. This form could be used as the basis for nationwide summaries of activities in each industrial branch and each region involved in CP programmes. The form could also be used to inform donors supporting specific CP programmes. Enterprises could develop a more detailed reporting form; the International Cleaner Production Information Clearing House (ICPIC) format developed by UNEP could serve as a model which could be simplified to match conditions in CEECs.

Table 1: Simplified Report Format for Measuring Progress in Implementing CP

Quality and quantity of waste streams before implementation	Solid waste: ..... kg per ton of ..... ton per year (example) SO2: ..... kg per ton of ....kg per hr. ..... ton per yr. (example) (The quantity of all relevant pollutants and energy cons. could be recorded here)			
List of all options	**Costs $**	**Savings $/yr**	**Payback yr**	**% reduction after n yr** **0 1 2 3 4**
Hosekeeping options ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, Short term internal source investment ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,, Long term externally funded investments ,,,,,,,,,,,,,,, ,,,,,,,,,,,,,,,				Reduction achieved at the end of the first cycle of a CP assessment programme are listed under "0"-year column. Reductions of all relevant pollutants and of energy consumption should be recorded.

Chapter 3

MULTIPLICATION OF CP PROGRAMMES

3.1 Role of Central Government

Experience in CEECs and elsewhere has shown that cleaner production is a profitable strategy for combining the restructuring of the industrial sector and pollution prevention and reduction. Central government should support this objective by developing coherent policies covering economic development, industry, environment and privatisation. At the same time there is a need to establish the policy and regulatory framework within which industry will operate, i.e. establishing the "rules of the game".

To reinforce central government's commitment to CP, the Ministry of Industry and the Ministry of Environment should declare CP as a national industry-environment policy priority. These and other relevant ministries, such as privatisation and trade, could issue a joint national policy paper and a cleaner production declaration as a voluntary agreement with industry. Such a declaration should include a commitment by government to provide, on a subsidised or cost-free basis, combined CP training and assessment programmes to participating enterprises and to help them identify potential funding sources for higher cost CP investments. As an example, the cleaner production declaration of Poland is shown in Figure 9.

One effect of a regulatory and policy framework that stresses CP is the likely emergence of a market demand for CP trainers/advisers who can assist both state-owned and private enterprises to meet their responsibilities in a cost-efficient manner. Expanding the pool of authorised trainers with experience in industrial production and with leadership potential is an important aspect in multiplying CP programmes. This is particularly important during the first 3 years of a programme.

In addition, employment conditions need to be sufficiently attractive to motivate graduates to offer their services to new programmes. This may mean that government and participating enterprises establish a partnership, whereby the former agrees to provide free or subsidised participation in CP programmes, while the latter agrees to pay salary and other costs during the course and to let trained managers spend a defined period as advisers/teachers in subsequent CP programmes.

Scholarships and other financial support are especially important to enable university teachers and trade union leaders to participate in a programme and offset loss of salary, transport and accommodation costs.

Another important role of central government is to support the establishment of a national CP Centre. This support is critical during the start up phase, after which the Centre should become self-financing. The role of these centres is further discussed in Section 3.3.

Figure 9: Cleaner Production Declaration - Poland

Minister of
Environmental Natural Resources and Forestry

Minister of
Industry and Trade

DECLARATION OF CLEANER PRODUCTION

Considering the necessity or profound reconstruction of the Polish industry the basic principle of a:

DECLARATION OF CLEANER PRODUCTION

has been formulated.

The aim of this declaration is the development of the economy with preservation of the natural environment. Aiming at Sustainable Industrial Development, the introduction of principles of preventive environmental management into the production and development programmes of companies is proposed. In the field of environmental protection these principles aim at achieving continuous minimisation of solid, liquid and gaseous wastes in the production process, simultaneously achieving economic benefits.

FOR THE IMPLEMENTATION OF THE DECLARATION

THE ENTERPRISE

- Will prepare and implement the Cleaner Production Project according to UN methodology.
- Will introduce the Project into short term and long term production and development plans and secure periodical reporting.
- Will designate the plenipotentiary supervising the Project.

MINISTRY OF ENVIRONMENT, NATURAL RESOURCES AND FORESTRY
MINISTRY OF TRADE AND INDUSTRY

- Will organise training courses in the methodology of Cleaner Production design.
- Will facilitate access to information about overseas experience in this area.
- Will support enterprise's seeking financing for the most cost-effective proposals resulting from the Cleaner Production Projects.

3.2 Role of Local Government

The involvement of a mayor or county governor as leader of a joint municipality-industry CP programme has a strong motivational effect on industrial leaders. The mayor's commitment to introducing and following through with a programme is essential, so that convincing arguments on the benefits and savings accruing need to be marshalled, e.g. securing future local employment and economic growth, reducing environmental hazards and health risks in the community and more efficient use of taxpayer's money. The participation of the mayor or his/her closest advisers in a CP programme often catalyses commitment because possibilities for savings in municipal departments are usually revealed during project work and in preparing an action plan.

Where joint programmes have yet to start, local government could support dissemination of CP by making the necessary resources available for local public meetings, working with enterprises to prepare a local cleaner production declaration and other types of voluntary agreements, and assisting industry associations with information campaigns. More concretely, managers of municipal utility departments and the environment department, and pollution control inspectors should participate in a CP training programme. These people would then become "ambassadors" in disseminating the concept and techniques to other staff and other local authorities.

3.3 Cleaner Production Centres

These centres have a key role in disseminating and expanding CP programmes nationally and regionally. First, their staff usually have extensive practical experience and training in CP which makes them well placed to organise and lead CP programmes. This is especially important during the initial phase when a pool of local trainers is being built up. Second, they have good links to the network of CP experts and business organisations, both nationally and internationally. This extends also to sources of information and databases on "best practices" and technologies. Third, they are a credible and independent intermediary among different stakeholders: enterprises, engineering and industrial associations and their members, government ministries, universities, etc. Possible tasks of a CP Centre are shown in Text Box 5.

Decentralising the administrative, operational and some dissemination activities to programme directors may be possible. Programme directors should have responsibility for carrying out all the CP training and assessment activities within one or more areas or for managing a programme covering a specific industry branch. Appropriate budgetary resources need to be provided for this task.

In large countries consideration could be given to establishing local CP Centres which could be managed on a part-time basis. Their main tasks, apart from general promotion of CP, would include the administration and management of local combined CP programmes, monitoring demonstration projects and following up and reporting on results to the national centre.

Initially, CP Centres in CEECs might best be incorporated into a reputable and well operated NGO, preferably one with an established service tradition and good links to industry and senior business leaders. In some CEECs, an association of industrialists or a business association could take on the function of being the CP Centre provided it satisfied the criteria listed in Section 2.5.2. Other options include an association of professional engineers or a university of technology. The latter, however, often do not have strong daily links to industry and senior enterprise managers.

During this time, the CP Centre should have an independent status within its "mother" organisation. This can be done by designating a board of directors for the Centre comprised of

TEXT BOX 5: Tasks of a National CP Centre

-- Promote CP as a profitable "win-win" strategy.

-- Establish a nationwide network of CP advisers and resource persons.

-- Coordinate CP programmes.

-- Implement combined CP training of trainers and assessment programmes.

-- Run examinations and confer course graduates as CP advisers.

-- Training and examination of university teachers. Assist them in developing a course for undergraduates and graduates.

-- Undertake periodic follow-ups in enterprises and prepare regular reports of progress made in implementing the action plan.

-- Selecting and monitoring demonstration projects.

-- Establishing a national CP database and library comprising national and international materials.

-- Publication of a CP newsletter, fact sheets and case study results.

-- Facilitating dialogue among local financial institutions, donors, government ministries, business, NGOs and universities.

representatives of the funding institutions, business, and the mother organisation. The establishment of an advisory committee of industrial leaders could also be considered. A contract between the CP Centre and mother organisation should clearly indicate that decision-making authority for the Centre rests with its board and administration. Auditing should be the responsibility of the mother organisation or an external auditor approved by the government.

In time the Centre should become an independent NGO, with its activities supervised by a board of directors. This may take the form of a foundation to underline its non-profit character. This is the situation in OECD countries.

3.4 Associations of Professional Engineers and Industrialists

In many CEECs and OECD countries these associations have a long tradition in supporting tertiary education in their respective fields and providing on-going professional training to update skills. These organisations normally satisfy most of the criteria listed in Section 2.5.2 and could be given major responsibility for disseminating CP programmes. Several reasons support this suggestion. First, their members have close links to, and often are, the production managers in enterprises responsible for implementing a CP programme.

Second, they are usually in regular contact with their members through national and regional newsletters, technical bulletins, courses and seminars. These represent good opportunities to diffuse the

concept of CP, encourage participation in programmes, highlight the results of demonstration projects as well as to organise courses tailor-made to the needs of specific industrial branches, e.g. chemical industry, food industry, metallurgical industries.

Third, members of these associations have the technical expertise required to translate a cleaner production assessment manual. This manual is "the bible" in any CP training and/or assessment programme. In some OECD countries, general CP manuals have been supplemented by branch-specific manuals. Some CEECs have translated the US EPA or UNEP/UNIDO manuals but there are pitfalls. Translations should be done by engineers or graduates of a technical university with a good understanding of technical English terms and with experience in industrial production, preferably incorporating CP methods.

3.5 Trade Unions

In the implementation and dissemination of CP programmes, trade unions have much the same interests as enterprise managers, such as a profitable and productive workplace. Trade unions also have a strong interest in the health and safety conditions affecting their members in the workplace. Before participation in a CP training and assessment programme, trade union members and their national leaders usually have a weak understanding of the "win-win" benefits that are possible. Greater participation by trade unions in these programmes could be encouraged by the availability of scholarships and training grants.

Text Box 6 lists some of the specific actions that trade unions could take to promote dissemination of CP programmes. Campaigns jointly run by national trade union associations and industry associations have been very successful in Scandinavian countries but have not yet, to our knowledge, been tried in CEECs.

TEXT BOX 6: Actions by Trade Unions

-- Selecting senior union leaders to participate in CP training and assessment programmes.

-- Promoting information dissemination campaigns, designed by union leaders who have participated in CP programmes.

-- Integrating CP in general training programmes for union leaders.

Chapter 4

FINANCING INVESTMENTS IN CLEANER PRODUCTION

Experience with CP programmes in Poland and elsewhere in CEE has shown that reductions of 20% or more in wastes and emissions are possible with nil investment. A further 10-20% reduction is possible with minor investments which have a payback period of less than six months. Most enterprises should therefore be able to reduce pollution and waste by 30-40% by using CP procedures, and without requiring loans for investments. At the same time, CP measures will raise the profitability of the enterprise.

Finance is not the most important barrier to getting a CP programme started. More often, the main barrier is related to changing enterprise culture and values. This is not to deny that financing is a necessary catalyst, however. In many CEECs, enterprises are implementing good "housekeeping" measures immediately but there is a lengthy time lag before this is followed by low investment measures with good savings potential. During this time lag, and having exhausted good housekeeping measures, the enterprise is literally "throwing money down the drain". It is important therefore to close this time lag if savings are to be consolidated and profitability further raised.

Several possible sources for financing CP investments exist. First, environmental funds. National (and provincial and local) environmental funds are common in many CEECs (e.g. the Baltic States, Bulgaria, the Czech Republic, Hungary, Poland, the Slovak Republic) as well as in the Russian Federation. The revenues for most of the funds come from pollution charges and fines, with the main sources being charges on air pollution emissions and wastewater discharges (Francis, 1994). Charges for the use of natural resources, solid and hazardous waste management and a contribution from the state budget are common supplementary sources. The revenue of some of these funds is large: in 1993 in Poland it amounted to US$ 284 million and in the Czech Republic it was US$ 101 million (Francis, 1994: 8).

Loans from environmental funds are usually on low interest terms and with varying maturity periods. It is often a requirement that a loan from an environmental fund be matched from other sources. Many CEECs have adopted loan criteria or practices which direct most money to financing municipal infrastructure rather than to industry; loans to industry have mainly been used for pollution control rather than CP. In addition, the loans are not always targeted to the priority problems in industry.

Subsidies and grants from environmental funds are a further source of financing CP investments. Grants could be given for the implementation and dissemination of CP training and assessment programmes, limited to the first 3 - 5 years of programme operation by which time the economic benefits of CP should be clearly understood in industry. At least 20% reductions in industrial waste and emissions are achievable without any hardware investments and involving grants of US$ 2,000-3,000 per enterprise, provided the CP programme is designed in a cost-effective way. Enterprise costs of participation in the programme (salary, travel, accommodation) are usually repaid within 1-2 weeks from the savings obtained. Grants for demonstration and pilot projects could also be considered for funding. Grants could also help finance CP Centres during their first 2-3 years of operation. After this the individual centre’s should preferably operate as a service centre run on a cost-recovery, user-pays basis.

National revolving funds are a second possible source. These could be considered as supplements to environmental funds. They are usually directed at small or medium size investments with a short payback period (commonly less than 6 months and a maximum of 1 year). A common condition is that loans are matched by a 25-50% contribution from the enterprise. Loans from this type of fund usually have to be repaid over 1-3 instalments during the payback period: the enterprise simply sets aside the appropriate amount from the cost savings resulting from its CP measures to meet these repayments. This type of fund is being considered in Poland for financing demonstration projects, with support from donor countries.

A third possible source is the emerging private banking sector. Although these institutions do not yet have extensive experience in funding CP or environmental investments in industry, this may change as staff receive training in project appraisal and work more closely with industry experts, as the market demand for environmental goods and services increases and as opportunities to finance "win-win" investments develop. The high interest rates charged by most banks is currently an important barrier to enterprises being able to take out and repay loans.

Multilateral and bilateral donors are another possible source. International financing institutions (IFIs) such as the EBRD and the World Bank support "soft" (training and institutional capacity building, research and development, etc.) and "hard" (equipment) investments in the industry sector. The mandate of the former requires that 60% of its loans are concentrated on the private sector and privatisation efforts (Economic Commission for Europe, 1994). Sovereign guarantees are required for loans from the World Bank.

Bilateral donors are funding a variety of CP initiatives, often implemented by NGOs and business associations in east and west. Examples include CP programmes in 4 CEECs funded by Norway, the US-funded waste minimisation programme in 9 CEECs implemented by the World Environment Centre, Dutch-funded programmes in Bulgaria and Hungary and Danish programmes in Poland, Hungary and the Baltic States. Donors could assist CEECs to strengthen the capacity of local banks and credit institutions to act as financial intermediaries in breaking down and disbursing large loans from the IFIs, especially considering that many CP investments require sums that are below the minimum level lent by the IFIs. They could also work with the IFIs to support CP activities as part of sectoral and other programmes. Donors could also examine how cleaner production or other environmental requirements might best be included as part of financing arrangements aimed at accelerating environmental improvements.

4.1 Project Identification and Selection of Financing Sources

Developing a "bankable" CP project and identifying the most appropriate source of financing is often a difficult task for enterprise management. They have little information about the criteria and application requirements and possible local sources of finance, and even less of international sources. In some CEECs specific ministries or NGOs are facilitating matches between industry and financing sources, for the mutual benefit of both partners. In the Slovak Republic, for example, the Ministry of Environment acts as the focal point regardless of which source will ultimately be the most appropriate funder. This role could equally be performed by a CP Centre as one of its service functions.

On the basis of the Slovak experience, a simplified procedure for project identification and selection of funder(s) is presented here:

-- applications for financial support should follow guidelines issued by the relevant ministry, national environmental fund or other financing source and be consistent with the environmental priorities established by the ministry;

-- applications should (i) state the expected economic and environmental results, (ii) identify the measures to be implemented, and their costs, to achieve the results, (iii) include a financing plan which contains an overview of known sources of funding, loans needed, and proposed means and schedule of repayment, and (iv) provide an overview of the enterprise's business situation and prospects. Other information required may include a business plan, loan disbursement details, progress reporting schedule and accounting/payment system to be established;

-- the proposal is reviewed by the focal point, e.g. Ministry of Environment or CP Centre. If the criteria for financing established by the focal point are satisfied, they begin to identify potential local and foreign financing sources;

-- contact is established between the focal point and the selected financing institution. The financing institution may request further information from the applicant or set specific conditions for loans, e.g. equity requirements, loan security guarantees, repayment schedule. Once all criteria and contractual matters are satisfied, the loan is then given to the enterprise.

Table 2 provides an overview of some of the international and regional institutions active in financing CP investments in CEECs, their services and criteria for providing loans and grants.

Table 2: Activities of Selected International Institutions Active in Financing Environmental Investments in Industry in CEE

Financing source	Grants (1)		Large loans (2)	Small loans (2)	Guarantees (3)		Risk capital provided and limit
	Study, training	Demo. projects	Loan ceiling and maturity period		Required	Given	
World Bank	-	yes	yes	yes	yes	-	no
IFC	s, a	-	25% limit	25% limit, use f.i.	-	yes	yes, 25%
IDA	s, a	yes	yes	yes	yes	-	no
GEF	s, a	yes	-	-	-	-	-
MIGA	-	-	-	-	-	yes	-
EBRD	s	no	35% limit for private sector	35% limit for private sector, use f.i.	no	yes	yes, 35% limit for private sector
EU	s, a, t	yes	yes (5)	yes (5)	no	-	yes (6)
UNIDO/ UNEP	s, a, t	yes	no	no	no	no	no
NIB (Nordic Invest. Bank)	-	-	50% limit 7 yrs	50% limit 7 yrs	-	yes	-
NEFCO (Nordic Environ. Finan. Corp.)	-	-	-	yes	-	-	yes

Notes

(1) Grants may be for studies (s), for CP assessments (a) or for training (t). Grants are also sometimes given for investments in demonstration projects (without equity in the plant). Trust funds are usually established when grants are provided from one or more of the owner countries of the World Bank or EBRD.

(2) Large loans (larger than US$ 6 mill.) usually exceed funding required for CP investments. Small loans are often disbursed through financial intermediaries (f.i) who on-lend loans from international financing institutions to CP projects in small and medium sized enterprises.

(3) Government guarantees or guarantees from international or regional institutions are often required by the international financing institutions before loans can be given (guarantees required). Some banks also provide guarantees (guarantees given).

(4) Some financing sources provide risk capital to enterprises in return for an equity share.

(5) Loan period limit of 3-5 years.

(6) Mechanisms used include environmental funds and privatised small-medium sized enterprises (SME) programmes.

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