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United Nations Industrial Development Organization

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*Training Course*
*Ecologically Sustainable Industrial Development*

# Learning Unit 3

# Defining Ecologically Sustainable Industrial Development

Further information may be obtained from:
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## *Additional Course Material*

Video: *Greenbucks*, produced by the Television Trust for the Environment

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# Introduction

Industrial development can be sustained only if it preserves the balance of nature. Otherwise, as we saw in Learning Unit 2, the gradual eroding of the environment will eventually undermine an economy's ability to grow. Learning Unit 3 presents the basic principles of ecologically sustainable industrial development (ESID) and summarizes recent United Nations and UNIDO activities to promote sustainable development.

## Objectives

The specific learning objectives of this unit are as follows:

- To define and explain the concept of ecologically sustainable industrial development (ESID).
- To establish the criteria for ESID as a practical programme for both developed and developing countries.
- To summarize the ESID activities of UNIDO.
- To review industry's contributions to the ESID dialogue at the Second World Industry Conference on Environmental Management (WICEM II) in 1991 and the Industry Forum that preceded UNCED.
- To review the results of UNCED.
- To outline the contents of the Rio Declaration on Environment and Development and Agenda 21.

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## Key Learning Points

1 Ecologically sustainable industrial development (ESID) is an approach to industrial development that will allow us to reconcile the demands of population growth, the desire for continued industrial development and the need to preserve the environment.

2 The Conference on Ecologically Sustainable Industrial Development, held at Copenhagen in October 1991, defined ESID as "those patterns of industrialization that enhance economic and social benefits for present and future generations without impairing basic ecological processes".

3 The three criteria to achieve ESID are as follows:

- Protection of eco-capacity,
- Efficient use of human, material and energy resources,
- Equity in sharing the environmental burdens as well as the outputs of industrialization.

4 Reduction in the pollution intensity of industry through Cleaner Production is the only immediate way for industrial development to meet the ESID criteria.

5 The Conference on ESID in 1991 recommended several initiatives that industry and Governments could take to promote Cleaner Production.

6 ICC organized WICEM II in 1991. WICEM II produced the *Business Charter for Sustainable Development* and led to the organization of the Industry Forum on Environment and Development, which was held at Rio de Janeiro in 1992, just before UNCED.

7 UNCED adopted the Rio Declaration on Environment and Development and developed Agenda 21 as the world agenda for environmentally sustainable development in the twenty-first century. Chapter 30 of Agenda 21 calls for the promotion of Cleaner Production, i.e. the reduction of pollution intensity.

8 The critical problem is to convert the ESID rhetoric into operational reality by incorporating ESID into industrial development projects.

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## *Suggested Study Procedure*

1 Work through the test at the beginning of the *Review*. Think about the questions raised and what you need to learn from this Learning Unit.

2 Work through the *Study Materials*, including the *Reading Excerpts* and video. Prepare answers to the questions and check your answers against those suggested.

3 Read the *Case Studies*. If possible, work with a small group to discuss the questions raised. Compare your answers with those suggested.

4 Complete the exercises in the *Review*.

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# Study Materials

## Ecologically Sustainable Industrial Development: Principles

The challenge of reconciling the demands of population growth, the desire for continued industrial development and the need to preserve our environment can be met only by an approach that fosters development and at the same time sustains the environment.

UNIDO has taken the general United Nations call for sustainable development, contained in, for example, General Assembly resolution 42/187, and translated it into practical terms that relate to industrial development. This UNIDO calls ecologically sustainable industrial development, or ESID.

ESID is a new approach to industrial development that allows industry to contribute economic and social benefits for present generations without compromising the ability of future generations to meet their own needs and without impairing basic ecological processes.

To achieve ESID, industrial development must meet three criteria:

- Eco-capacity, the capacity of ecosystems to continue to function despite pollution.
- Efficiency, the most efficient conversion of human, material and energy resources into industrial outputs.
- Equity, the equitable distribution of environmental burdens as well as of the outputs of industrialization across nations, across segments of society and across generations.

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## *Next Steps*

*1* Read the excerpt from "The road to ecologically sustainable development", included at the end of this Learning Unit.

*2* Test your comprehension of the information by answering the questions below. Compare your answers with those suggested.

## Questions

**1** Give a definition of ecologically sustainable industrial development and name the three main criteria of ESID.

**2** Which kind of equity is meant in the ESID context?

**3** Give some examples of intractable environmental problems that cannot be corrected for future generations.

*Answers*

*1. Ecologically sustainable industrial development is defined as those patterns of industrialization that enhance economic and social benefits for present and future generations without impairing basic ecological processes. The three main criteria are eco-capacity, efficiency and equity.*

*2. Equity that refers to the equitable distribution of environmental burdens as well as the outputs of industrialization across nations, across segments of society and across generations.*

*3. There is no way to remove greenhouse gases from the atmosphere. Furthermore, there is no way to replace genetic information that is lost when species disappear forever.*

## *Next Steps*

*1* Look over the questions below so that you have some idea of what you want to learn from the video.

*2* Watch the video *Greenbucks*.

*3* Test your comprehension of the video by answering the questions below. Compare your answers with those suggested.

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## Questions

1 According to Maurice Strong, Secretary-General of UNCED, what was the purpose of the Earth Summit?

2 What was the mandate of the Business Council for Sustainable Development?

3 How does Asea Brown Boveri measure progress towards sustainable development?

4 What would be required to achieve 100 per cent recycling of cars?

**5** What steps have been taken to make a "sustainable" T-shirt?

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**6** What do developing countries need to achieve ESID?

**7** What problem is Danfoss encountering in producing CFC-free compressors?

*Answers*

*1. The purpose of the Earth Summit was to establish a fundamental change in our economic behaviour and life. An important participant in the process is industry.*

*2. The brief of the Business Council for Sustainable Development was to formulate the role of business in achieving sustainable development.*

*3. Asea Brown Boveri measures its progress towards sustainable development by developing new, cleaner technology and by selling it.*

*4. Production of a 100 per cent recyclable car would require redesign of the car.*

*5. The steps taken to manufacture a sustainable T-shirt are eliminating the use of formaldehyde in the making of the cloth, using dyes that are free of heavy metals and the organic growing of cotton.*

*6. To achieve ESID, industries in developing countries need transfer of cleaner technology, access to capital to purchase this technology, government financial assistance and, most importantly, a change in attitude.*

*7. Danfoss is finding that refrigerator manufacturers are not redesigning their products to accommodate the CFC-free compressors.*

# UNIDO Conference on Ecologically Sustainable Industrial Development

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To secure the views of member States on the issue of sustainable industrial development, UNIDO convened the Conference on Ecologically Sustainable Industrial Development at Copenhagen, from 14 to 18 October 1991.

At the Conference, the member States agreed that the reduction of pollution intensity across all media (air, water and land) within industry, through Cleaner Production (see Learning Unit 4), was the key to achieving ESID.

The member States recommended several initiatives for industry, Governments and international cooperation:

- *Industry*: adopt pollution prevention, integrate environmental awareness and responsibility at all levels of management, assume a cradle-to-grave approach to product and project design and develop and transfer environmentally sound technologies.

- *Governments*: review the environmental impact of current and planned policies, strengthen procedures for reviewing industrial projects with potentially significant environmental effects, design policies based on the "polluter pays" principle and encourage ESID through research, training and information exchanges.

- *International cooperation*: mobilize financial resources to achieve ESID, promote the transfer of Cleaner Production technologies and seek international cooperation in linkages between trade and the environment.

The member States also recommended several directions for UNIDO to take in helping developing countries achieve ESID, including the provision of technical support, assistance in identifying financial resources and the strenghtening of ESID-related databases and information centres.

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## *Next Steps*

*1* Read "Blueprint for clean industry", included in the *Reading Excerpts* at the end of this Learning Unit.

*2* Test your comprehension of the information by answering the questions below. Compare your answers with those suggested.

## Questions

1 What did the member States of UNIDO recognize to be the key to achieving ESID?

2 Explain the "polluter pays" principle.

3 What are the main tasks of international cooperation as a vehicle for achieving ESID?

*Answers*

*1. The reduction in pollution intensity through Cleaner Production.*

*2. Polluters should pay for the measures necessary to repair any environmental damage they create.*

*3. To mobilize financial resources, to promote the transfer of Cleaner Production technologies and to promote linkages between trade and the environment.*

## WICEM II and the Industry Forum

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To secure the views of the business community on sustainable industrial development and to contribute to UNCED, ICC, in cooperation with UNEP and UNCED, organized the Second World Industry Conference on Environmental Management (WICEM II) at Rotterdam from 10 to 12 April 1991.

Over 750 leaders from industry, Governments and NGOs met at Rotterdam following regional preparatory meetings at New Delhi, Budapest, Cairo and Rio de Janeiro. They reviewed the progress made in environmental management since WICEM I, in 1984 (Versailles), and discussed the challenges for world business in the context of the UNCED, which was to be held in 1992.

The delegates to WICEM II agreed to support the Business Charter for Sustainable Development, thereby committing themselves to improving their environmental performance and to working towards achieving sustainable development.

The Industry Forum on Environment and Development was organized by ICC and held at Rio de Janeiro a few days before UNCED. Over 500 corporate executives and government officials met to exchange views on the implementation of sustainable development.

The 350-page book, published by ICC, *From Ideas to Action*, was announced at UNCED. It contains over 150 examples of how industry has implemented the Business Charter.

### *Next Steps*

1 Read the *Business Charter for Sustainable Development*, included in the *Reading Excerpts* at the end of this Learning Unit.

2 Test your comprehension of the information by answering the questions below. Compare your answers with those suggested.

## Questions

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**1** Summarize industry's activities prior to UNCED.

**2** What force does the Business Charter have?

**3** What was the Industry Forum?

*Answers*

*1. Organized WCEM II to review environmental progress and prepare for UNCED, adopted the Business Charter for Sustainable Development and organized the Industry Forum on Environment and Development at Rio de Janeiro a few days before UNCED.*

*2. The Business Charter is a non-binding agreement, but it represents a commitment on the part of those businesses that have adopted it.*

*3. A meeting of business executives and government officials at Rio de Janeiro a few days before UNCED.*

# United Nations Conference on Environment and Development

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The United Nations Conference on Environment and Development (UNCED) was held at Rio de Janeiro from 3 to 14 June 1992 on the twentieth anniversary of the United Nations Conference on the Human Environment, held at Stockholm. It brought together over one hundred heads of State or Government in the most ambitious attempt to date to merge the hitherto often conflicting demands of environmental protection and economic development into a programme to achieve global sustainable development of the sort outlined in the 1987 report of the World Commission on Environment and Development, known as the Brundtland Report.

The main objective of UNCED was to propose an alternative path for global development into the next century.

An intensive two-year preparatory process preceded UNCED. It aimed to identify and incorporate the concerns of national Governments and regional groupings, the United Nations bi- and multilateral organizations, interest groups such as business and industry, NGOs and private citizens. As far as possible, specific roles for each of these interest groups were included in the proposed follow-up activities.

At UNCED, Governments agreed on several non-binding documents, including the Rio Declaration on Environment and Development (the "Rio Declaration") and Agenda 21. The Rio Declaration sets forth 27 principles for sustainable development.

Agenda 21 is a global action programme designed to implement the Rio Declaration. It is set forth in a document of more than 500 pages and includes over 100 programmes in 40 chapters. Agenda 21 is divided into four sections:

- Social and economic dimensions, including poverty alleviation, consumption patterns, demographics, health and human settlements.

- Conservation and management of resources for development, including oceans and fresh water, agriculture, atmosphere, all kinds of wastes, biotechnology and biological diversity.

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- **Strengthening the role of major groups, including women, farmers, indigenous people, children and business and industry.**

- **Means of implementation, including financial mechanisms, transfer of technology, information, capacity building, legal instruments and institutional mechanisms.**

Chapter 30 of Agenda 21 summarizes the role of business and industry in achieving sustainable development. It emphasizes Cleaner Production and cites the Conference on Ecologically Sustainable Industrial Development in this regard.

In December 1992, the General Assembly noted with satisfaction the report of UNCED (General Assembly resolution 47/190) and endorsed the recommendations on international institutional arrangements to follow up UNCED, particularly these on the establishment of a high-level Commission on Sustainable Development (General Assembly resolution 47/191). It requested that the Commission be set up as a functional commission of the Economic and Social Council. The Commission would be responsible for overseeing the implementation of Agenda 21. The United Nations system would also work closely with the Com- mission through its new Inter-Agency Committee on Sustainable Development.

## *Next Steps*

*1* Scan the following material from the report on UNCED, included in the *Reading Excerpts* at the end of this Learning Unit:

- Rio Declaration on Environment and Development
- Agenda 21: Contents
- "Strengthening the role of business and industry"

*2* Test your comprehension of the information by answering the questions below. Compare your answers with those suggested.

## Questions

**1** What was the main objective of UNCED?

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**2** What are the objectives of promoting Cleaner Production as set forth in chapter 30 of Agenda 21, "Strengthening the role of business and industry"?

**3** What will be the work of the Commission for Sustainable Development? What organization is it part of?

*Answers*

*1. The main objective of UNCED was to propose an alternative path for global development into the next century.*

*2. To increase the efficiency of resource utilization and to reduce the quantity of waste discharge per unit of output.*

*3. The Commission on Sustainable Development is to oversee the implementation of Agenda 21. It is part of the United Nations Economic and Social Council.*

# The Response of UNIDO to UNCED

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At the operational level, UNIDO will do its part to promote sustainable development through ESID in the context of Agenda 21. At the policy level, UNIDO will work through the Inter-Agency Committee on Sustainable Development to ensure that industry-related issues are properly addressed and that all the means of implementation referred to in section IV of Agenda 21 are fully utilized.

UNIDO adopted a formal response to Agenda 21 in November 1992. This response outlined UNIDO activities that correspond to the objectives of specific chapters of Agenda 21.

## *Next Steps*

*1* Read section II of "Response of UNIDO to Agenda 21", included in the *Reading Excerpts* at the end of this Learning Unit.

*2* Test your comprehension of the information by answering the questions below. Compare your answers with those suggested.

## Questions

1 Suggest two actions that UNIDO could incorporate into its technical assistance activities in support of chapter 9, "Protection of the atmosphere", of Agenda 21.

2 Suggest two actions that UNIDO could incorporate into its technical cooperation activities in support of chapters 17 and 18 of Agenda 21, which deal with the protection of water resources.

**3** Suggest two actions that UNIDO could incorporate into its technical assistance activities in support of chapters 19, 20 and 21 of Agenda 21, which deal with the environmentally sound management of toxic chemicals, hazardous wastes and solid wastes.

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**4** Suggest two actions that UNIDO could incorporate into its technical assistance activities in support of chapter 30 of Agenda 21, which deals with the strengthening the role of business and industry.

**5** Suggest two actions that UNIDO could incorporate into its technical assistance activities in support of chapter 34 of Agenda 21, which deals with the transfer of environmentally safe and sound technology, cooperation and capacity building.

*Answer*

*1. To work with alternative clean fuels (cleaner coal and oil, emission control). greater efficiency in combusting processes, energy conservation and alternative clean energy sources (solar, hydropower, hydrogen).*

*2. To improve efficiency by reducing the quantity of water used, the quantity of waste water produced and the extent of water-borne pollutants.*

*3. To work with cleaner technologies, to minimize waste at its source, to develop alternatives for reusing or recycling waste and to require safety in the production of chemicals.*

*4. To adopt pollution prevention measures through product and process improvements, to adopt a cradle-to-grave approach to product design and production and to secure the commitment of top management to environmentally sound management.*

*5. To adopt technologies that do not use chemicals that damage the ozone layer and to adopt technologies that are less dependent on fossil fuels.*

## Additional Suggested Reading

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This concludes the study section of Learning Unit 3. For additional information on ecologically sustainable industrial development, you may refer to the following sources.


Daly, Herman E., "Sustainable development: from concept and theory to operational principles" GAIA, vol. I No. 6, (November/December 1992), pp. 333-338.

Daly, Herman E., and Kenneth N. Townsend eds., *Valuing the Earth: Economics, Ecology, Ethics* (Cambridge, Massachusetts, MIT Press, 1993).

Pearce, David W., and Jeremy J. Warford, *World Without End: Economics, Environment, and Sustainable Development* (New York, Oxford University Press, 1993).

*Transforming Technology: An Agenda for Environmentally Sustainable Growth in the 21st Century*, (Washington, D.C., World Resources Institute, 1990).

UNIDO, "Barriers facing the achievement of ecologically sustainable industrial development", *Proceedings of the Conference on Ecologically Sustainable Industrial Development* (PI/112), Working Paper No. II.

United Nations, *Agenda 21: Programme of Action for Sustainable Development; Rio Declaration on Environment and Development; Statement of Forest Principles* (United Nations publication, Sales No. E.93.I.11).

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# Case Studies

## Case Study 1: ESID Approaches in Pakistan

### *Next Steps*

1 Review Case Study 2 from Learning Unit 2 as well as the table that you prepared for that case study. Read *The Pakistan National Conservation Strategy*, included in the *Reading Excerpts* at the end of this Learning Unit.

2 Prepare a table like that outlined below suggesting approaches that Pakistan might take to bring its industry more into harmony with the environment. Or, if you have enough information, prepare one for your own country.

3 Of the solutions that you have suggested for each problem, which do you think will be most effective? Most economical? Most in harmony with the principles of ESID?

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| Pollution problem | Industries involved | Possible solutions |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

## *Next Steps*

*1* Study the case below, provided by R. G. A. Boland, AGL International, Previssins-Moens, France. Then answer the questions that follow, if possible in a small group.

*2* Compare your answers with those suggested.

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## Case Study 2: Financial Organizations and the Environment

A senior French banker was asked how his bank deals with environmental issues and audits. He responded with the following practical advice:

"Environment is a very serious problem, but it is not a problem for the bank! It is a problem for Government and for industry. You see in France, we have very strict laws about environmental impacts, but there is no legal requirement for environmental audit. Thus when we help our clients to finance major industrial developments, they have to get environmental approval from the Government. So you see, for the bank, there is no financial risk! And in any case we just don't have the time or the staff to deal with such technical/scientific matters".

## Questions

**1** What are the assumptions and values underlying this advice?

**2** Do you agree with the banker? Why?

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**3** How could environmental issues be relevant to banking and financial organizations?

*Answers*

*1. False assumptions, such as that the environment is a scientific rather than a management problem, that the Government is mainly responsible, that there is no public relations benefit for the bank, that the European Community will not act, that public/political/business attitudes towards the environment will not change soon and that there is no financial risk for the bank if environmental standards are not met.*

*2. You should disagree. Banks have changed radically since 1989. Environmental compliance audits are becoming a normal business activity. The Business Charter was accepted by major companies in 60 countries at WICEM II (April 1991), including the major banks.*

*3. Banks have secondary responsibility if they finance disastrous projects, and the public relations effects could be important. In 1992 at UNCED, the new responsibility of financial institutions to refuse to finance environmentally damaging projects was clearly established as a critical factor for achieving Agenda 21.*

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# Review

## Test

The following test will help you review the material in Learning Unit 3.

**1** Sustainable development means meeting the needs of the present without

a. Compromising the needs of the future
b. Creating pollution problems for those over 60 years of age
c. Increasing population
d. Creating greenhouse effects

**2** To achieve ESID, we need all of the following except

a. Eco-capacity
b. High GNP per capita
c. Efficiency
d. Equity

**3** The critical load of industrial pollutants beyond which the quality of life and the proper management of natural assets are affected is called

a. Clean production limit
b. Effluent standard
c. Eco-capacity
d. Ambient environmental standard

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4 A strategy for protecting the biosphere should

a. Set standards for annual emissions and wastes
b. Try to stabilize and reduce total loadings of pollutants
c. Focus on economic growth
d. Focus on reducing the number of industrial areas

5 Waste minimization is an objective of environmental

a. Eco-capacity
b. Equity
c. Economic analysis
d. Efficiency

6 The concept of a fair opportunity to share in the benefits of industrialization refers to

a. Efficiency
b. Eco-capacity
c. Dreams
d. Equity

7 Which option for achieving ESID has a more immediate chance of success in both developed and developing countries?

a. More rigorous enforcement of environmental standards
b. Cleaner Production
c. Conservation of renewable resources
d. Conservation of non-renewable resources

8 What is the key to achieving ESID?

a. Transfer of clean technology
b. Government financial subsidies
c. Reduction of pollution intensity
d. Commitment to the Business Charter of ICC

9 ESID is justified mainly by

a. Limited capacity for absorbing wastes from human activities
b. Shortage of natural resources
c. The need for new business ethics
d. UNCED

**10** The Conference on ESID at Copenhagen worked out initiatives for all of the following except

a. Industry
b. Environmental organizations
c. Governments
d. International cooperation

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**11** Agenda 21, chapter 30, "Strengthening the role of business and industry", calls for

a. Support of the Valdez Principles
b. Shipment of hazardous wastes to developing countries
c. Annual environmental reporting
d. Preparation of emergency response plans

**12** Agenda 21, chapter 8, "Integrating environment and development in decision-making", calls for

a. Increased government subsidies for pollution control
b. Economic impact analyses of environmental regulations
c. Use of market incentives
d. Integrated multimedia pollutant discharge permits

**13** The Rio Declaration is

a. A call for reform of the United Nations system
b. Principles of sustainable development
c. A commitment to address climate change issues
d. Industry's response to sustainable development issues

**14** Agenda 21 is

a. A global action plan to implement the Rio Declaration
b. A call for a new international order
c. A tropical forest action plan
d. A UNDP initiative for capacity building

**15** The Business Charter for Sustainable Development is

a. An environmental agreement among transnational corporations
b. A business agreement to conduct environmental audits
c. A call for fair terms in international trade
d. A business commitment to improve their environmental performance

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Answers

1-5 a b c b d

6-10 d b c a b

11-15 c c b a d

## Some Ideas to Think About

The following are some problems that you might face as a UNIDO representative. Take some time to think about them. If possible, work in a small group and try to achieve consensus.

**1** In a UNIDO project a large commercial laboratory has been carrying out safety tests on new chemical products for various companies for over 10 years. Many of the products, including pesticides and potentially toxic drugs, have been registered and authorized for widespread use on the basis of these tests. A series of adverse reports of environmental damage finally led to the admission by the laboratory that it had falsified many of the results because it believed many of the tests were unnecessary and that some products were absolutely safe. The records have been destroyed. Does this problem have anything to do with the potential for ESID in some developing countries?

**2** Can an underpopulated country tolerate higher levels of air pollution than a densely populated country?

**3** In developing countries, do environmental concerns entail a cost for business without much benefit?

**4** In 1991, some years after the Bhopal incident, the Government of India issued a warrant for the arrest of the Chief Executive Officer of Union Carbide on the charge of "absconding" from the judicial process after the case for damages. His extradition from the United States to face criminal charges in India is being requested. Does this have anything to do with ESID?

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# Reading Excerpts

## The Road to Ecologically Sustainable Industrial Development

Excerpted from UNIDO. *Proceedings of the Conference on Ecologically Sustainable Industrial Development, Copenhagen, Denmark, 14-18 October 1991*, (PI/112). Working paper No. 1, chaps. II and III.

### Chapter II: Definition of Ecologically Sustainable Industrial Development

There has been a good deal of debate on the meaning of the term "sustainable development". The World Commission on Environment and Development of the United Nations offered several definitions of sustainable development. The one that is most often repeated is that sustainable development "meets the needs of the present without compromising the ability of future generations to meet their own needs".

Any definition ought to address three issues:

- The explicit contribution of ecological processes to living standards;
- The access by future generations to as effective a resource base as that enjoyed by the present generation, if living standards are not to decline over time;
- The resource base, which must include a mix of man-made and natural capital.

The last issue, the appropriate mix of man-made and natural capital that needs to be preserved for future generations, is at the centre of the sustainability debate. The components of this capital are four: man-made

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capital; non-renewable resources; renewable resources; and common property resources (air, water and soil). Often thought of as cost-free, common property resources, in particular those of the biosphere, are at greatest risk from industrial activities, because both the production processes and the products themselves generate residuals that enter the water, air, and soil.

There is considerable disagreement about the extent to which industrialization can sacrifice environmental assets—particularly common property resources—and still result in sustainable development.[1] There are those, primarily traditional economists, who see sustainable development only in terms of growing wealth which allows for substitution between man-made and natural capital (the weak definition). Their concern is that the overall aggregate of man-made and natural capital should not decline from one generation to the next. On the other hand, there are those who see sustainable development under the constraint of non-declining natural wealth, which does not allow for substitution between man-made and natural capital (the strong definition). Their concern is that a similar natural endowment should be available from one generation to the next. Those advocating the strong definition challenge the substitutability argument, as applied to natural environmental capital. They point out that there is no plausible way to recreate the ozone layer of the stratosphere or to remove greenhouse gases from the atmosphere. Nor is there any plausible technological solution to the problems of increasing environmental acidification and/or toxification. Finally, there is no way to replace genetic information that is lost when species disappear forever.

On the basis of the growing scientific evidence in support of the strong definition of sustainable development, UNIDO proposes a definition of ecologically sustainable industrial development (ESID) that tends to preserve natural capital and allows a low degree of substitutability by man-made capital. ESID is defined as those patterns of industrialization that enhance economic and social benefits for present and future generations without impairing basic ecological processes.

This definition of sustainability does not admit major man-made changes to climate, human interference with the carbon cycle, anthropogenically induced deforestation of the tropics, accumulation of toxic heavy metals and non-biodegradable halogenated organics in soils and sediments or sharp reductions in biodiversity. It follows, therefore, that any significant degradation of ecological processes by industrialization, as well as by other human activities, is *ipso facto* unsustainable over long periods.

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[1] For an elaboration of this argument, see Pearce, D., N. Markandya and E. Barbier, *Blueprint for a Green Economy* (London, Earthscan Publications, 1990), Chap. 2.

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# Chapter III: Criteria for Ecologically Sustainable Industrial Development

UNIDO proposes three criteria that a particular pattern of industrialization must satisfy if it is to be deemed ecologically sustainable:

- It must protect the biosphere;
- It must make the most efficient use of man-made and natural capital;
- It must promote equity.

## Protection of the Biosphere

### The Concept of Eco-Capacity

The concept of eco-capacity has two aspects. On the one hand, it refers to the capacity of an ecosystem to be resilient, that is to maintain its patterns of behaviour in the face of external disturbance. On the other, it refers to the capacity of the system to remain stable, that is to maintain its equilibrium in response to normal fluctuations in the environment. It is the first aspect of the concept that is of interest here.

Protecting the biosphere from industry-related activities is a fundamental criterion for sustainable development. It is also a very difficult one to measure because it is multidimensional. It includes stabilizing the biosphere in the face of the threats from greenhouse gases and ozone-depleting substances, maintaining the carrying capacity of natural resource systems (forest, fisheries and agricultural land) and protecting the absorptive (assimilative) capacity of air, water, and soil from emissions and waste discharges.

Complicating the analysis is the continuing expansion of our scientific knowledge and the uncertainty surrounding that knowledge at a time when decisions must be made. One has only to look at the environmental concerns cited at the beginning of this paper. For example, CFCs came into commercial use in the 1930's. They were heralded as a significant environmental improvement because the common refrigerants at the time—ammonia, methyl chloride and $SO_2$—were not suitable as home refrigerants owing to their noxious and toxic properties. In the 1940's, CFCs were used as aerosols for insecticides such as dichlorodiphenyltrichloroethane (DDT) and later they were used widely as solvents by the microelectronics industry. Only in the early 1970's did scientific studies, which were confirmed by direct observations in the 1980's, demonstrate that these long-lived substances damaged the stratospheric ozone layer.

Another example of expanding knowledge turns up in connection with the regulation of $SO_2$ in the United States. In 1971, the United States Environmental Protection Agency set the ambient standards for this

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pollutant on the basis of considerable scientific data that had been assembled in the 1960's; these standards have since been adopted by many nations. At the time, the Environmental Protection Agency considered the standards adequate to protect not only human health but also natural ecosystems. Now, in the 1990's, it is calling for a total loading standard, that is, a further 50 per cent reduction in $SO_2$ emissions, over and above that required by the annual ambient standard, because of concern about the effects of acid deposition on natural ecosystems.

## Strategies for Protection

There are two main strategies for protecting the biosphere. The first, which is less restrictive, is to keep annual emissions and wastes from industrial activity within the limits of ambient environmental standards. Ambient standards set acceptable concentrations of the various pollutants in the environment. They are based on the effects of pollutants on human health and on flora and fauna and often vary, particularly for water quality, where they depend on the use of the receiving body of water (e.g. more stringent standards are required for rivers that are sources of drinking water). Standards are difficult to establish because of inadequate scientific information, particularly about the effects of minuscule concentrations of toxic chemicals. In addition, they are difficult to implement because complex modelling is required to relate industrial discharges to overall ambient concentrations. At the national and international levels, ambient standards exist for common pollutants such as particulate matter and $SO_2$ and for several toxic pollutants, such as heavy metals and selected organic compounds.

Environmental managers have adopted an alternative in response to the shortcomings of ambient standards. This alternative, discharge standards, emerged in the 1970's in response to the difficulties of relating emissions to ambient concentrations. Discharge standards are expressed in terms of the concentration of a pollutant in the effluent stream or in terms of the allowable quantity of pollutant discharge per unit of raw material or product output. These standards, which have evolved over the past 20 years, are usually determined on the basis of available technology and economic considerations. While they eliminate the problem of relating emissions to ambient concentrations, they can reduce pollutant discharges to a greater or lesser extent than is needed for environmental protection.

The second major strategy for protecting the biosphere, now emerging in light of global and regional environment problems, is to stabilize and eventually reduce total loadings of pollutants of global and regional concern. This more restrictive strategy recognizes the limitations of science in determining acceptable concentrations for pollutants that have irreversible effects.[2] The pollutants at issue are those associated with global and

[2] For example, the United States invested more than $500 million over a 10-year period in research to determine the amount of $SO_2$ reduction that would be necessary to protect aquatic and terrestrial ecosystems. In the end, the report could not

regional air pollution problems, primarily global warming, ozone depletion and acid deposition, and those causing the deterioration of aquatic ecosystems, primarily toxic heavy metals and chlorinated hydrocarbons. The aim of the total loading standards is to reduce pollutant loadings to the environment to a level below that required by ambient standards. A clear expression of support for total loading standards at the regional level is the Bergen Ministerial Declaration on Sustainable Development in the ECE Region, which calls for significant reductions in $CO_2$, $SO_2$ and $NO_x$ emissions and for the replacement of hazardous chemicals and their safe disposal. At the national level, one endorsement of the loading standard for the pollutants of concern is the national environmental policy adopted by the Government of the Netherlands.

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The meeting of total loading standards is a more costly and long-term strategy but also a more important one because it would impose more stringent discharge limitations than ambient standards. Total loading standards call for very low levels of pollutant discharge so as to protect the ozone layer, the climate-stabilizing system and key cycles—carbon/oxygen, nitrogen, phosphorous and sulfur. It is essential to recognize that continuous reduction of emissions, per unit of output is not sufficient to achieve ESID. Emissions must be reduced in absolute terms, for the industrial system as a whole. In the long run this implies (a) the massive substitution of renewable (e.g. solar or biomass) energy for fossil fuels, especially coal and (b) the closing of the materials and product cycles through optimal processes and optimal products, as discussed in Working Paper III, which discusses the role of industry in achieving ESID.

## Efficiency

Even if the overriding concern of sustainable development is the preservation of the natural environment, this should be done in an efficient manner. Thus, if there are alternatives for maintaining eco-capacity, the idea would obviously be to choose those that minimize input (of energy, for example) per output produced or that maximize output per input needed. This follows from the fact that the notion of development is central to ESID, and development, in turn, implies rising living standards, at least in the broad sense. As attested by economic history, economic development by means of industrialization (the transformation of raw materials into products) has long been the path to higher standards of living. Hence industrialization policies have to be consistent with achieving the most efficient conversion of raw materials into outputs.

## Equity

There is one further criterion that needs to be applied, namely the promotion of equity. The issue of equity takes a number of forms. The first

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refute the political decision to reduce $SO_2$ emissions by 50 percent nor could it suggest another target

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is the equitable distribution of environmental burdens as well as outputs. The solution of this issue may have important repercussions for their preservation of the environment. If the costs of meeting environmental standards are considered to be too high, sizable segments of the population, many of the already poor, will suffer the consequences of this decision, i.e., a degraded environment, and this will make them poorer. The cycle spirals downwards because poverty per se breeds some of the worst forms of environmental degradation, i.e. deforestation, over-exploitation of marine resources, unsanitary living conditions etc., as discussed later.

On a global scale, the issue of equity arises in another way. One argument is that industrialized countries, which have benefited the most from the exploitation of natural resources and the waste assimilative capacity in the biosphere, now have a moral obligation to permit the developing countries to follow similar growth patterns. This argument implies that industrialized countries should pay the excess costs incurred by the developing countries to protect the environment. However, this moral argument is not necessarily accepted by those who would have to pay the excess costs. A more effective argument might well be based on interlocking mutual security and economic interests. This was the argument that justified the Marshall Plan after the Second World War. At present, a number of West European countries have found it cost-effective, i.e. in their own interests, to assist Poland and the other Eastern European countries to reduce air pollution. Such arguments can be applied on a global, as well as regional scale.

A third aspect of the equity issue is intergenerational equity. The present generation is clearly paying for the degradation of natural resources, such as deforestation, overgrazing and erosion, caused by earlier generations. Future generations will, however, have to pay not only the costs of current environmental degradation of the same kind (only accelerated) but also the costs of accumulations of atmospheric gases and toxic heavy metals and the loss of tropical rain forests and biological diversity. One implication of this understanding is that the needs of future generations should be taken into account even if this places an additional strain on political institutions, which are normally geared to achieving short-term targets and not to satisfying future generations.[3]

Two further aspects of the equity issue are especially relevant to industry. First, all countries need to participate in the shift to cleaner

[3] Indeed, there is a deep underlying ethical divide on the issue of intergenerational equity. On one side are those who argue that discounting, which is how society currently evaluates the future costs and benefits of present actions, is ethically justified because future generations will be the gainers. While current generations may use up the earth's natural resources, they endow their descendants with greater scientific knowledge and more powerful technologies, not to mention invested capital, than their ancestors left them. On the other side are those who see man as part of nature with no special rights over other species. Somewhere in between is Thomas Jefferson's view that the environment is a common property of all generations, held by the living in usufruct for the unborn. These two positions correspond to very different choices of a discount rate: very high in the first case and very low (or zero) in the second.

production processes, which are at the core of ESID. Industrialization in developing countries has the potential to go forward with much smaller energy and raw material inputs than developed countries needed at similar stages of industrialization. Cleaner production processes could maximize this potential. Secondly, unless employment opportunities are created for marginalized populations, they will continue to resort to environmentally unsound farming, grazing and fishing, giving rise to environmental disasters such as desertification, deforestation and the depletion of top-soils. One study estimates that deforestation in developing countries accounts for 23 per cent of global $CO_2$ emissions and says that it shows little sign of diminishing

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It is difficult to lay out a path that would consistently satisfy all three criteria. There will have to be trade-offs between them, and these will be based on value judgments. For instance, a certain investment strategy might create more jobs, but it would not necessarily lead to the most economically efficient production, which is often based on capital-intensive, clean technologies. Similarly, there might be trade-offs between economic efficiency and protection of eco-capacity. Pollution reduction measures, particularly those that reduce conventional pollutants, might not be the most economically efficient investments because they would divert capital from more productive investments. Trade-offs between efficiency and eco-capacity for pollutants that threaten basic life support systems are a lesser problem. At any rate, the criteria will have to be weighted, and this can only be done through the political process. Whatever the outcome of such a process, it is essential that the importance of the criteria is understood by the affected public.

# Blueprint for Clean Industry

UNIDO, *Blueprint for Clean Industry: Conclusions and Recommendations of the ESID Conference* (PI/111).

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## General Considerations

The Ministers noted with concern that, although successes had occurred in the 1970's, the gap between developed and developing countries in terms of per capita income and per capita industrial output narrowed slightly between 1970 and 1990. Industrialization, the well-trodden path to the achievement of higher standards of living and expanded economic development, remained a distant goal for many developing countries.

The Ministers noted that threats to the environment were a common concern. They stated that all countries should take effective action to protect and enhance the environment in accordance with their responsibilities and respective capacities. In this regard, the Ministers confirmed that in developing strategies to secure agreement on, and commitments by, Governments on major environmental issues, it has been recognized that:

- Because the greater part of current emission of pollution into the environment originates in developed countries, these countries bear the main responsibility for combating such pollution;
- International cooperation between all countries, and in particular between developed and developing countries, is essential to acquiring and using relevant scientific information and environmentally sound technologies. Industrialized countries with significant experience in pollution prevention, Cleaner Production methods and pollution control technologies are encouraged to promote industrial pollution prevention and management worldwide. Economic well-being is essential for achieving sustainable development and minimizing the degradation of the environment concomitant with such growth. Ministers called on Governments and industry to cooperate at the local, national and regional levels in using existing and, where necessary, establishing new mechanisms that promote pollution prevention, waste minimization, Cleaner Production, energy efficiency and rational use of natural resources and in making these techniques and technologies available, particularly to developing countries. This would entail the mobilization of financial resources and enhanced technical cooperation in particular with developing countries, at the bilateral and multilateral levels. However, it was also recognized that new and additional financial resources will have to be channelled to

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developing countries in order to ensure their full participation in global efforts for environmental protection.

Ministers recognized that economic, social and environmental elements of the decision-making process should be fully integrated, and that there was a fundamental mutual dependence between economic growth and environmental protection. Ministers noted that sustained economic growth and effective environmental protection are closely interlinked and should not be looked upon as competitive policy objectives.

The continuing deterioration of the global environment is closely related to the unsustainable pattern of production and consumption in particular in industrialized countries. In developing countries, environmental degradation is closely related to poverty and underdevelopment, as well as demographic patterns and pressures. Promotion of economic and social development is therefore essential for the protection of the environment.

The Ministers noted with concern the financial and technological constraints facing the developing countries in realizing the desired ecologically sustainable industrial development.

The Conference was held at the time when economic reforms to strengthen the private sector and harness market forces in support of economic development were being carried out in a number of countries. The need was recognized for economic instruments to supplement public regulations. Ministers stressed that market-oriented instruments could play an increasing role in achieving ESID, in particular by internalizing environment considerations. Assistance should be provided upon request, by donors and international organizations, to countries that needed to develop such instruments and to administer them.

The Ministers called for new approaches to industrialization that would allow industry to contribute to economic and social benefits for present generations without compromising the ability of future generations to meet their own needs, and without impairing basic ecological processes. These new approaches do not imply in any way encroachment upon national sovereignty. States have, in accordance with the Charter of the United Nations and the applicable principles of international law, the sovereign right to exploit their own resources pursuant to their environmental policies. This also reaffirms their responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States. Those new approaches would enhance economic development over time through the efficient and rational management of both renewable and non-renewable resources while aiming at minimizing waste. They would differ from country to country, depending on the resource endowments, the stage of development and other economic and social characteristics as well as the assimilative capacity of the ecosystem.

The Ministers agreed that the reduction of pollution intensity across all media within industry, through Cleaner Production, was the key to achieving ESID. Thus, the development of technology to promote Cleaner Production should be enhanced. The objective of Cleaner Production, with its focus on source reduction, waste minimization, energy efficiency and low-waste and non-waste technology, is to prevent or minimize, in the most cost-efficient manner, the short- and long-term risks to humans and the environment. Cleaner Production would require a management approach that, *inter alia*:

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- Assigned priority to the efficient use of resources, materials substitution and product reformulation, process modification and equipment redesign to lower waste technologies, and recycling and reuse as the primary options for pollution prevention and increased profitability;
- Utilized safe and environmentally sound processes, technologies and substances combined with efficient operating procedures;
- Assigned clear responsibility and incentives for pollution prevention and control, in the context of a regulatory framework that establishes achievable environmental goals and that provides industry with flexibility in the choice of response actions.

Ministers recognized the importance of providing women with knowledge on ESID, as well as access to the necessary measures to promote it.

The Ministers agreed to support action to overcome barriers to the achievement of ESID. Among those barriers are the difficulties of implementing policies both in the North and the South that would bring about a transition to ESID. Industry everywhere needed to re-examine its attitudes on pollution prevention, Cleaner Production and environmentally friendly products.

## Industry Initiatives in Achieving ESID

The Ministers recognized that industry and industrial institutions had to play a central role in the transition to ESID. While Governments can assist, regulate and control that transition, it is essential that industry acts in accordance with the principles implied by ESID. The relevant organizations and institutions should promote managerial practices and technologies based on the principles of sustainability.

The Ministers agreed that, in order to achieve ESID, industry initiatives should include the following objectives:

- Adoption of pollution prevention, the approach that prevents pollution at the source in products and manufacturing processes rather than removing it after it has been created;

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- Integration of environmental awareness and responsibility at all management levels, taking into account careful analysis of relative risks, introduction of waste minimization and environmental compliance auditing, establishment of emergency, risk and safety management systems, as well as training programmes;
- Adherence to environmental codes of conduct, including voluntary ones, for industrial investment and production;
- Increase of R and D activities with emphasis on Cleaner Production technologies, giving priority to technologies that offer potential for improved efficiency and reduced pollution; and provide training facilities to developing countries for this purpose;
- Consideration, where feasible, of the use of substitute materials and product reformulations, process modifications and equipment redesigns, renewable sources of energy and raw materials, recycling and reuse of waste and scrap materials;
- Assumption of a "cradle-to-grave" assessment approach to industrial products and projects;
- Application of cleaner industrial production processes and more rational use of natural resources;
- Development, transfer and adaptation of environmentally sound technologies, know-how and skills to meet the needs of other countries, in particular developing countries, and mobilization of financial resources and provision of human resources for this purpose;
- Encouragement of industry to provide information on environmentally sound management and energy conservation.

The foregoing objectives could be facilitated by regular exchanges of experiences in the context of long-term programmes developed by industry.

The Ministers recognized that the Economic and Social Council, at its second regular session of 1991, had addressed ways to encourage and mobilize industrial enterprises, including transnational corporations, to cooperate in efforts to protect and enhance the environment in all countries. In that regard, the Council adopted resolution E/1991/55, requesting, *inter alia*, the preparation of action-oriented and practicable recommendations for consideration by the Commission on Transnational Corporations and by the Preparatory Committee of the United Nations Conference on Environment and Development.

The Ministers recognized that many transnational companies and investors involved in international joint ventures or in the export of manufacturing processes implement ESID and apply general standards of environmental responsibility to their foreign operations which are fully consistent with those used in their home countries and in compliance with

the laws and regulations of host countries. These standards should not be applied on a discriminatory basis. Ministers encouraged all companies to adopt this policy and subscribe to a rational and precautionary approach to anticipating and preventing the causes of serious or irreversible environmental degradation consistent with scientific and technical understanding and the economical use of resources.

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The Ministers encouraged non-governmental organizations representing all the parties involved in the industrial process, including industrial federations, trade unions, and consumers and environmental groups, to carry out and participate in activities relevant to ESID.

UNIDO undertook five case studies for the preparation of the Conference to illustrate the scope for ESID. These case studies covered pulp and paper, leather industry, alumina industry, plastics and plastics waste recycling, and phosphate fertilizers. The studies presented a number of problems related to unsustainable production processes and suggested measures to solve them. Ministers emphasized the importance of ensuring close cooperation between industry, Governments and international organizations in solving those problems.

## Government Initiatives in Achieving ESID

The Ministers agreed that Governments could:

- Review the environmental impact of current and planned policies, regulations and institutional infrastructure that affect industry and environment with a view to contributing to the transition to ESID through appropriate policies and measures;
- Review the environmental impact of current and planned policies and build in the environmental concerns as an integrated part in such policies and strategies;
- Design suitable methods and tools for quantification and valuation of natural and environmental resources used by industry;
- Establish new or strengthen existing procedures for reviewing industrial projects with potentially significant environmental effects. Similar procedures should be applied for reviewing risks associated with products. The evaluation and assessment procedures should be based on a cradle-to-grave approach and continue during and after completion of projects. The evaluation and assessment procedures should be supported by internationally recognized ecological guidelines and indicators where these exist;
- Apply, with due consideration for the economic and social conditions in specific countries, a balanced mix of regulatory and economic instruments, including the internalization of externalities in price calculations, to reach the objectives of industrial development and environmental protection;

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- Design policies based on the "polluter pays" principle, bearing in mind the need to internalize the cost of environment protection in price calculations, and to apply a precautionary approach and the principle of economic efficiency when undertaking or promoting investments. Inclusion of the cost for pollution abatement in entrepreneurial calculations would thus be a useful approach governing the use of economic instruments and help to achieve a better allocation of resources in the pursuit of environmentally sustainable industrial development;
- Implement schemes for increasing public awareness, particularly in the younger generation, of the necessity for ESID and the responsibility of individual enterprises, managers, engineers, workers and other members of staff in that respect;
- Give active encouragement to ESID through research, development, acquisition and transfer of techniques and technologies, as well as efficient utilization of existing relevant technologies in the public and private sectors, and through public and private partnerships while ensuring occupational health and safety;
- Promote technical and managerial training and education that incorporate ESID in both informal and formal sectors;
- Create an adequate institutional framework to stimulate environmental policies such as regulations, standardization, monitoring and control of the industrial environment;
- Promote ESID through environmental education and the participation by the general public and non-governmental organizations, such as industrial federations, employees associations, community-based groups, consumers, women's, environmental and developmental organizations;
- Support exchanges of information and experience on ESID among all countries in particular between industrialized and developing countries;
- Provide access, on preferential conditions, to financing sources to small and medium-scale enterprises in support of ESID oriented restructuring and modernization;
- Incorporate the principal elements of their policy in programmes that extend over several years. These programmes should be made public.

## International Cooperation in Achieving ESID

The Ministers called upon Governments to enhance international cooperation in mobilizing financial resources for achieving ESID. The mobilization of financial resources is of vital importance to ESID, as well as to alleviating environmental problems in general. International sources

of financing, particularly the development assistance programmes of developed countries, play a key role in this respect.

Noting that the transfer of techniques and technologies is one of the keys to the adaptation and absorption of pollution prevention techniques and the Cleaner Production processes by industrial firms, the Ministers agreed to encourage international cooperation in the transfer of those techniques, technologies and processes, and the requisite information, skills and know-how from industrialized to other countries, in particular developing countries, as well as the means necessary to develop infrastructure and policies to support them. The Ministers recalled United Nations General Assembly resolution 44/228, section I, paragraph 15 (m), which decided that UNCED should have as an objective the examining of effective modalities for favourable access to, and transfer of, environ- mentally sound technologies, in particular to the developing countries, including on concessional and preferential terms. The Ministers look forward to the results of that examination.

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The Ministers invited Governments to seek international cooperation in addressing concerns about linkages between the environment and trade in manufactured goods. While the pursuit of the objectives of trade liberalization and environmental protection are in principle compatible, some trade practices may give rise to certain environmental concerns, and some environmental actions may adversely affect international trade flows. The Ministers also noted that improved access to markets in general— through reduction and possible elimination of tariffs and elimination of non-tariff barriers to trade—would improve the possibilities of all coun- tries, particularly of developing countries, to finance the introduction of ESID-related technologies, and could have important foreign exchange implications.

Noting that financial and technological constraints are among the key obstacles facing many countries, in particular developing countries, in achieving ESID, the Ministers acknowledged that the industrialized countries should create a climate conducive to enabling those countries to have access to appropriate ESID techniques and technologies and to financial resources on concessional and non-concessional terms, as appropriate.

Ministers called for the need to coordinate efforts between UNIDO and all other United Nations institutions and organizations that deal with environmental issues, in order to be more efficient and effective, and avoid duplication in the pursuit of ESID.

Ministers recognized the critical situation prevailing in least developed countries and called for special measures in favour of those countries in support of their ESID policies and programmes.

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## Future Activities of UNIDO

Ministers recognized that ESID can both reduce environmental problems and enhance industrial efficiency, and invited the fourth session of the General Conference of UNIDO to express its support for UNIDO to continue working on the best options to achieve ESID, in order to present them as a valuable contribution to be taken into account at the Fourth Preparatory Committee of the United Nations Conference on Environment and Development, which took place in March 1992, and for submission at the UNCED conference held in June 1992.

Ministers invited UNIDO to submit proposals incorporating the views expressed at the meeting in Copenhagen, and to make concrete sugges- tions to harmonize its activities, in the short, medium and long term, with the concept of ESID. These suggestions should be submitted for con- sideration to the policy-making bodies of the Organization, taking into account the mandates, recommendations and guidelines of UNCED. In order to improve UNIDO's capabilities to implement the conclusions and recommendations of the ESID Conference, the Ministers further call upon Member countries to continue to make resources available for sustainable industrial development through the UNIDO Environment Programme.

Action by UNIDO, within available regular budget resources and additional voluntary contributions, if any, could make a significant contribution to the implementation of ESID. Because environmental management often involves complex issues and requires specialized skills, UNIDO would need to work in cooperation with other organs, organizations and programmes of the United Nations system to ensure the broadest possible effort. In particular, UNIDO should work closely with the United Nations Environment Programme, especially with its Industry and Environment Office, in such activities as information exchange and training.

UNIDO should lend its support, on a coordinated basis, to the activities of other organizations active in this field, in particular United Nations regional commissions, in implementing ESID at the regional level. Further, UNIDO should promote the establishment and support of the necessary institutional framework and should work in close cooperation with national institutions in implementing ESID.

The following were some major directions for possible UNIDO action in achieving ESID:

- Assisting developing countries, upon request, in building the technical and scientific institutional capacity to develop, absorb and diffuse pollution prevention techniques and cleaner production processes essential to making the transition to ESID. This could be done by:

- Demonstrating the financial and economic advantages and environmental benefits of ESID by working cooperatively with industry and other technical experts, and with Governments, to undertake a programme of site-specific, country case studies;

- Providing technical support for the design, establishment, operation, evaluation and monitoring of pollution prevention techniques and cleaner production processes and technologies;

- Assisting demonstration and training centres at new or existing industrial facilities, and providing support to centres of excellence;

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- Assisting developing countries in the implementation of international environmental conventions and protocols related to industrial activities by:

  - Providing technical assistance to those countries to identify and implement the actions needed;

  - Helping those countries to locate expertise and funding for projects that contribute to the implementation of those conventions and protocols;

- Assisting developing countries in determining the environmental soundness of industrial technologies by:

  - Preparing guidelines on environmentally sound industrial practice for selected sectors;

  - Promoting, in selected sectors, technical procedures to evaluate and to test processes. products and services;

  - Providing assistance for the development of assessment techniques for the identification and measurement of environmental impact;

- Assisting developing countries in integrating environmental considerations into their industrial strategies and policies by:

  - Identifying sectoral and subsectoral priorities for environmentally sound industrial activities;

  - Specifying the techniques available to rehabilitate existing industries so that they could operate in an ecologically sustainable manner, assessing the costs of such a transition and estimating a time frame for achieving it;

- Assisting developing countries in identifying appropriate, including new, financial resources, where possible on concessional terms, that would enable them to take necessary steps to achieve ESID;

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- Assisting other countries, upon request, in achieving ESID in accordance with the provisions of the UNIDO Constitution and relevant decisions of the General Conference and Industrial Development Board;
- Strengthening its existing database and its capacity to coordinate the dissemination of technical and policy information on ESID, *inter alia*, by cooperating with the United Nations Environment Programme in its work on the International Cleaner Production Clearinghouse (ICPIC).

In implementing its programmes and projects UNIDO should establish and or strengthen internal procedures for appraisal and approval of activities that ensure compatibility with the concept of ESID.

# The Business Charter for Sustainable Development: Principles for Environmental Management

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Excerpted, with permission, from International Chamber of Commerce, *The Business Charter for Sustainable Development*, Publication 210/356 A (Paris, 1990).

## Introduction

Sustainable development involves meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Economic growth provides the conditions in which protection of the environment can best be achieved, and environmental protection, in balance with other human goals, is necessary to achieve growth that is sustainable.

In turn, versatile, dynamic, responsive and profitable businesses are required as the driving force for sustainable economic development and for providing managerial, technical and financial resources to contribute to the resolution of environmental challenges. Market economies, characterised by entrepreneurial initiatives, are essential to achieving this.

Business thus shares the view that there should be a common goal, not a conflict, between economic development and environmental protection, both now and for future generations.

Making market forces work in this way to protect and improve the quality of the environment—with the help of performance-based standards and judicious use of economic instruments in a harmonious regulatory framework—is one of the greatest challenges that the world faces in the next decade.

The 1987 report of the World Commission on Environment and Development, "Our Common Future", expresses the same challenge and calls on the cooperation of business in tackling it. To this end, business leaders have launched actions in their individual enterprises as well as through sectoral and cross-sectoral associations.

In order that more businesses join this effort and that their environmental performance continues to improve, the International Chamber of Commerce hereby calls upon enterprises and their associations to use the following Principles as a basis for pursuing, such improvement and to express publicly their support for them.

Individual programmes developed to implement these Principles will reflect the wide diversity among enterprises in size and function. The objective is that the widest range of enterprises commit themselves to improving their environmental performance in accordance with these Principles, to having in place management practices to effect such improvement, to measuring their progress, and to reporting this progress as appropriate internally and externally.

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## Principles

### Corporate Priority

To recognise environmental management as among the highest corporate priorities and as a key determinant to sustainable development; to establish policies, programmes and practices for conducting operations in an environmentally sound manner.

### Integrated Management

To integrate these policies, programmes and practices fully into each business as an essential element of management in all its functions.

### Process of Improvement

To continue to improve corporate policies: programmes and environmental performance, taking into account: technical developments, scientific understanding, consumer needs and community expectations, with legal regulations as a starting point; and to apply the same environmental criteria internationally.

### Employee Education

To educate, train and motivate employees to conduct their activities in an environmentally responsible manner.

### Prior Assessment

To assess environmental impacts before starting a new activity or project and before decommissioning a facility or leaving a site.

### Products and Services

To develop and provide products or services that have no undue environmental impact and are safe in their intended use, that are efficient

Note The term environment as used in this document also refers to environmentally related aspects of health, safety and product stewardship.

in their consumption of energy and natural resources, and that can be recycled, reused, or disposed of safely.

**Customer Advice**

To advise, and where relevant educate customers, distributors and the public in the safe use, transportation, storage and disposal of products provided; and to apply similar considerations to the provision of services.

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**Facilities and Operations**

To develop, design and operate facilities and conduct activities taking into consideration the efficient use of energy and materials, the sustainable use of renewable resources, the minimisation of adverse environmental impact and waste generation, and the safe and responsible disposal of residual wastes.

**Research**

To conduct or support research on the environmental impacts of raw materials, products, processes, emissions and wastes associated with the enterprise and on the means of minimizing such adverse impacts.

**Precautionary Approach**

To modify the manufacture, marketing or use of products or services or the conduct of activities, consistent with scientific and technical understanding, to prevent serious or irreversible environmental degradation.

**Contractors and Suppliers**

To promote the adoption of these principles by contractors acting on behalf of the enterprise, encouraging and, where appropriate, requiring improvements in their practices to make them consistent with those of the enterprise; and to encourage the wider adoption of these principles by suppliers.

**Emergency Preparedness**

To develop and maintain, where significant hazards exist, emergency preparedness plans in conjunction with the emergency services, relevant authorities and the local community, recognizing potential transboundary impacts.

**Transfer of Technology**

To contribute to the transfer of environmentally sound technology and management methods throughout the industrial and public sectors.

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### Contributing to the Common Effort

To contribute to the development of public policy and to business, governmental and intergovernmental programmes and educational initiatives that will enhance environmental awareness and protection.

### Openness to Concerns

To foster openness and dialogue with employees and the public, anticipating and responding to their concerns about the potential hazards and impacts of operations, products, wastes or services, including those of transboundary or global significance.

### Compliance and Reporting

To measure environmental performance; to conduct regular environmental audits and assessments of compliance with company requirements, legal requirements and these principles; and periodically to provide appropriate information to the Board of Directors, shareholders, employees, the authorities and the public.

### Support for the Charter

The ICC is undertaking an extensive campaign to encourage member companies and others to express their support for the Charter. It has also invited certain international organizations to provide supportive messages.

A list of these companies, and the messages received from international organizations are given in separate leaflets which are normally circulated together with the Charter. They may also be obtained from ICC Headquarters or ICC National Committees in nearly 60 countries.

*Business Charter for Sustainable Development*, ICC Document n° 210/356/A, published in its official English version by the International Chamber of Commerce, Paris.  available from ICC Publishing S.A., 38 Cours Albert 1$^{er}$, 75008 Paris, France.

# Rio Declaration on Environment and Development

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Excerpted, with permission, from *Report of the United Nations Conference on Environment and Development*, vol. I (United Nations publication. Sales No. E. 93. I. 8), resolution 1, annex I.

*The United Nations Conference on Environment and Development,*

*Having* met at Rio de Janeiro from 3 to 14 June 1992,

*Reaffirming* the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June 19[illegible]2[1], and seeking to build upon it,

*With the goal* of establishing a new and equitable global partnership through the creation of new levels of cooperation among States, key sectors of societies and people,

*Working towards* international agreements which respect the interests of all and protect the integrity of the global environmental and developmental system,

*Recognizing* the integral and interdependent nature of the Earth, our home,

*Proclaims that:*

## Principle 1

Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

## Principle 2

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or

[1] *Report of the United Nations Conference on the Human Environment*, Stockholm, 5-16 June 19[illegible]2 (United Nations publication, Sales No. E.[illegible]3.II.A.14 and corrigendum), chap. I.

control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

**Principle 3**

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The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

**Principle 4**

In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

**Principle 5**

All States and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world.

**Principle 6**

The special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interests and needs of all countries.

**Principle 7**

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

When the term "Governments" is used, it will be deemed to include the European Economic Community within its areas of competence. Throughout Agenda 21 the term "environmentally sound" means "environmentally safe and sound", in particular when applied to the terms "energy sources", "energy supplies", "energy systems" and "tech- nology" or "technologies".

**Principle 8**

To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.

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**Principle 9**

States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.

**Principle 10**

Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

**Principle 11**

States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries.

**Principle 12**

States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable development in all countries, to better address the problems of environmental degradation. Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided. Environmental measures addressing transboundary or global environmental problems should, as far as possible, be based on an international consensus.

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**Principle 13**

States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.

**Principle 14**

States should effectively cooperate to discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health.

**Principle 15**

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

**Principle 16**

National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.

**Principle 17**

Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.

**Principle 18**

States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those States. Every effort shall be made by the international community to help States so afflicted.

**Principle 19**

States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant

adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith.

**Principle 20**

Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development.

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**Principle 21**

The creativity, ideals and courage of the youth of the world should be mobilized to forge a global partnership in order to achieve sustainable development and ensure a better future for all.

**Principle 22**

Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.

**Principle 23**

The environment and natural resources of people under oppression, domination and occupation shall be protected.

**Principle 24**

Warfare is inherently destructive of sustainable development. States shall therefore respect international law providing protection for the environment in times of armed conflict and cooperate in its further development, as necessary.

**Principle 25**

Peace, development and environmental protection are interdependent and indivisible.

**Principle 26**

States shall resolve all their environmental disputes peacefully and by appropriate means in accordance with the Charter of the United Nations.

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**Principle 27**

States and people shall cooperate in good faith and in a spirit of partnership in the fulfilment of the principles embodied in this Declaration and in the further development of international law in the field of sustainable development.

# Agenda 21: Contents

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Based on *Report of the United Nations Conference on Environment and Development*, vol. I (United Nations publication, Sales No. E. 93. I. 8), resolution 1, annex II.

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- Protecting vulnerable groups
- Meeting the urban health challenge
- Reducing health risks from environmental pollution and hazards

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- Improving human settlement management
- Promoting sustainable land-use planning and management
- Promoting the integrated provision of environmental infrastructure: water, sanitation, drainage and solid waste management
- Promoting sustainable energy and transport systems in human settlements
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- Promoting sustainable construction industry activities
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- Making effective use of economic instruments and market and other incentives
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**9. Protection of the Atmosphere**

- Addressing the uncertainties: improving the scientific basis for decision-making
  - Promoting sustainable development
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## 10. Integrated Approach to the Planning and Management of Land Resources

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- Developing and strengthening integrated development programmes for the eradication of poverty and promotion of alternative livelihood systems in areas prone to desertification
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- Developing comprehensive drought preparedness and drought-relief schemes, including self-help arrangements, for drought-prone areas and designing programmes to cope with environmental refugees

- Encouraging and promoting popular participant and environmental education, focusing on desertification control and management of the effects of drought

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# Strengthening the Role of Business and Industry

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Excerpted, with permission, from *Report of the United Nations Conference on Environment and Development*, vol. I (United Nations publication, Sales No. E. 93. I. 8), resolution 1, annex II, chap. 30 of Agenda 21.

## Introduction

Business and industry, including transnational corporations, play a crucial role in the social and economic development of a country. A stable policy regime enables and encourages business and industry to operate responsibly and efficiently and to implement longer-term policies. Increasing prosperity, a major goal of the development process, is contributed primarily by the activities of business and industry. Business enterprises, large and small, formal and informal, provide major trading, employment and livelihood opportunities. Business opportunities available to women are contributing towards their professional development, strengthening their economic role and transforming social systems. Business and industry, including transnational corporations, and their representative organizations should be full participants in the implementation and evaluation of activities related to Agenda 21.

Through more efficient production processes, preventive strategies, Cleaner Production technologies and procedures throughout the product life cycle, hence minimizing or avoiding wastes, the policies and operations of business and industry, including transnational corporations, can play a major role in reducing impacts on resource use and the environment. Technological innovations, development, applications, transfer and the more comprehensive aspects of partnership and cooperation are to a very large extent within the province of business and industry.

Business and industry, including transnational corporations, should recognize environmental management as among the highest corporate priorities and as a key determinant to sustainable development. Some enlightened leaders of enterprises are already implementing "responsible care" and product stewardship policies and programmes, fostering openness and dialogue with employees and the public and carrying out environmental audits and assessments of compliance. These leaders in business and industry, including transnational corporations, are increasingly taking voluntary initiatives, promoting and implementing self-regulations and greater responsibilities in ensuring their activities have minimal impacts on human health and the environment. The regulatory

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regimes introduced in many countries and the growing consciousness of consumers and the general public and enlightened leaders of business and industry, including transnational corporations, have all contributed to this. A positive contribution of business and industry, including transnational corporations, to sustainable development can increasingly be achieved by using economic instruments such as free market mechanisms in which the prices of goods and services should increasingly reflect the environmental costs of their input, production, use, recycling and disposal subject to country-specific conditions.

The improvement of production systems through technologies and processes that utilize resources more efficiently and at the same time produce less wastes—achieving more with less—is an important pathway towards sustainability for business and industry. Similarly, facilitating and encouraging inventiveness, competitiveness and voluntary initiatives are necessary for stimulating more varied, efficient and effective options. To address these major requirements and strengthen further the role of business and industry, including transnational corporations, the following two programmes are proposed.

## Programme Areas

### Promoting Cleaner Production

#### Basis for Action

There is increasing recognition that production, technology and management that use resources inefficiently form residues that are not reused, discharge wastes that have adverse impacts on human health and the environment and manufacture products that when used have further impacts and are difficult to recycle, need to be replaced with technologies, good engineering and management practices and know-how that would minimize waste throughout the product life cycle. The concept of Cleaner Production implies striving for optimal efficiencies at every stage of the product life cycle. A result would be the improvement of the overall competitiveness of the enterprise. The need for a transition towards Cleaner Production policies was recognized at the UNIDO-organized ministerial-level Conference on Ecologically Sustainable Industrial Development, held at Copenhagen in October 1991.

#### Objectives

Governments, business and industry, including transnational corporations, should aim to increase the efficiency of resource utilization, including increasing the reuse and recycling of residues, and to reduce the quantity of waste discharge per unit of economic output.

**Activities**

Governments, business and industry, including transnational corporations, should strengthen partnerships to implement the principles and criteria for sustainable development.

Governments should identify and implement an appropriate mix of economic instruments and normative measures such as laws, legislations and standards, in consultation with business and industry, including transnational corporations, that will promote the use of cleaner production, with special consideration for small and medium-size enterprises. Voluntary private initiatives should also be encouraged.

Governments, business and industry, including transnational corporations, academia and international organizations, should work towards the development and implementation of concepts and methodologies for the internalization of environmental costs into accounting and pricing mechanisms.

Business and industry, including transnational corporations, should be encouraged:

- To report annually on their environmental records, as well as on their use of energy and natural resources;
- To adopt and report on the implementation of codes of conduct promoting the best environmental practice, such as the Business Charter on Sustainable Development of the International Chamber of Commerce (ICC) and the chemical industry's responsible care initiative.

Governments should promote technological and know-how cooperation between enterprises, encompassing identification, assessment, research and development, management marketing and application of Cleaner Production.

Industry should incorporate Cleaner Production policies in its operations and investments, taking also into account its influence on suppliers and consumers.

Industry and business associations should cooperate with workers and trade unions to continuously improve the knowledge and skills for implementing sustainable development operations.

Industry and business associations should encourage individual companies to undertake programmes for improved environmental awareness and responsibility at all levels to make these enterprises dedicated to the task of improving environmental performance based on internationally accepted management practices.

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International organizations should increase education, training and awareness activities relating to Cleaner Production, in collaboration with industry, academia and relevant national and local authorities.

International and non-governmental organizations, including trade and scientific associations, should strengthen cleaner production information dissemination by expanding existing databases, such as the UNEP International Cleaner Production Clearing House (ICPIC), the UNIDO Industrial and Technological Information Bank (INTIB) and the ICC International Environment Bureau (IEB), and should forge networking of national and international information systems.

## Promoting Responsible Entrepreneurship

### Basis for Action

Entrepreneurship is one of the most important driving forces for innovations, increasing market efficiencies and responding to challenges and opportunities. Small and medium-size entrepreneurs, in particular, play a very important role in the social and economic development of a country. Often, they are the major means for rural development, increasing off-farm employment and providing the transitional means for improving the livelihoods of women. Responsible entrepreneurship can play a major role in improving the efficiency of resource use, reducing risks and hazards, minimizing wastes and safeguarding environmental qualities.

### Objectives

The following objectives are proposed:

- To encourage the concept of stewardship in the management and utilization of natural resources by entrepreneurs;
- To increase the number of entrepreneurs engaged in enterprises that subscribe to and implement sustainable development policies.

### Activities

Governments should encourage the establishment and operations of sustainably managed enterprises. The mix would include regulatory measures, economic incentives and streamlining of administrative procedures to assure maximum efficiency in dealing with applications for approval in order to facilitate investment decisions, advice and assistance with information, infrastructural support and stewardship responsibilities.

Governments should encourage, in cooperation with the private sector, the establishment of venture capital funds for sustainable development projects and programmes.

In collaboration with business, industry, academia and international organizations, Governments should support training in the environmental aspects of enterprise management. Attention should also be directed towards apprenticeship schemes for youth.

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Business and industry, including transnational corporations, should be encouraged to establish worldwide corporate policies on sustainable development, arrange for environmentally sound technologies to be available to affiliates owned substantially by their parent company in developing countries without extra external charges, encourage overseas affiliates to modify procedures in order to reflect local ecological conditions and share experiences with local authorities, national Governments and international organizations.

Large business and industry, including transnational corporations, should consider establishing partnership schemes with small and medium-sized enterprises to help facilitate the exchange of experience in managerial skills, market development and technological know-how, where appropriate, with the assistance of international organizations.

Business and industry should establish national councils for sustainable development and help promote entrepreneurship in the formal and informal sectors. The inclusion of women entrepreneurs should be facilitated.

Business and industry, including transnational corporations, should increase research and development of environmentally sound technologies and environmental management systems, in collaboration with academia and the scientific/engineering establishments, drawing upon indigenous knowledge, where appropriate.

Business and industry, including transnational corporations, should ensure responsible and ethical management of products and processes from the point of view of health, safety and environmental aspects. Towards this end, business and industry should increase self-regulation, guided by appropriate codes, charters and initiatives integrated into all elements of business planning and decision-making, and fostering openness and dialogue with employees and the public.

Multilateral and bilateral financial aid institutions should continue to encourage and support small and medium-scale entrepreneurs engaged in sustainable development activities.

United Nations organizations and agencies should improve mechanisms for business and industry inputs, policy and strategy formulation processes, to ensure that environmental aspects are strengthened in foreign investment.

International organizations should increase support for research and development on improving the technological and managerial re-

quirements for sustainable development, in particular for small and medium-sized enterprises in developing countries.

## Means of Implementation

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### *Financing and Cost Evaluation*

The activities included under this programme area are mostly changes in the orientation of existing activities and additional costs are not expected to be significant. The cost of activities by Governments and international organizations are already included in other programme areas.

# UNIDO Environment Programme: Response of UNIDO to Agenda 21

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Excerpted from "UNIDO environment programme: Response of UNIDO to Agenda 21: Report by the Director-General" (IDB.10/32).

## Agenda 21 and the Activities of UNIDO

The scope of Agenda 21 calls for a careful re-examination of the roles and responsibilities of the agencies in the United Nations system. Steps are already being taken to establish principles for defining those roles. Pending the outcome of the system-wide deliberations, UNIDO considers that it can play a key role in the implementation of certain programme areas and chapters of Agenda 21. The relevant chapters elaborated below are divided into two categories.

The first category shows those programme areas that are accorded high priority within UNIDO, based on the Organization's specific strengths as developed over the past 25 years. UNIDO regards these programme areas as the Organization's primary concerns, as they are based on a clear delineation of its role and on an efficient division of labour within the United Nations system.

The second category includes those programme areas where UNIDO can play a key complementary role contributing to the implementation of system-wide efforts relating to Agenda 21 by making optimum use of the expertise and experience available throughout the specialized agencies. Future directions for UNIDO activities are further elaborated in the updated UNIDO environment programme, taking full account of Agenda 21.

### Category 1

#### Integrating Environment and Development in Decision-Making (chap. 8)

The UNIDO strategic management approach is based on a process of consultations and cooperation between the Government and the private sector for the development of flexible and demand-driven technical and financial support programmes that enhance productivity and secure sustainable growth. Furthermore, the policy studies, System of Consultations and technology acquisition and negotiation programmes are all instruments geared to effecting a proper integration of environment into the decision- and policy-making process.

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### Protection of the Atmosphere (chap. 9)

UNIDO addresses this issue in three ways: by developing alternative clean fuel programmes (cleaner coal and oil, mission control); by stimulating greater efficiency in combustion processes and energy conservation; by supporting alternative clean energy sources (solar, hydropower, hydrogen). Both environmental and energy considerations are being increasingly integrated into UNIDO activities, stressing the development of sustainable energy systems.

### Protection of Water Resources: The Oceans (chap. 17): Fresh Water Resources (chap. 18)

An integrated approach to water management can ill afford to ignore industry, and the efficient use of water was thus emphasized at the ESID Conference. Over the years, UNIDO has been endeavouring to minimize the impact of industrial activities on the aquatic environment. Its objective is to improve industrial efficiency by reducing the quantity of water used, the waste water produced, and the extent of water-borne pollutants. Complementing such efforts, manuals, guidelines and technological information on the management of waste water will be prepared and disseminated.

### Environmentally Sound Management of Biotechnology (chap. 16)

UNIDO has recognized the enormous potential that biotechnology offers both industrial development and environmental protection and is currently enhancing the biotechnological capacity of some developing countries so as to enable them to take advantage of that potential. Appropriate mechanisms and centres, such as the International Centre for Genetic Engineering and Biotechnology (ICGEB), have been set up.

Efforts have and will continue to concentrate on studies and capacity building, enabling countries to identify and capitalize on opportunities in biotechnology, based on their own comparative advantages, as well as on direct technical assistance in applying biotechnology to industrial activities in health care, chemical production and environmental protection; and to promote biosafety through inter-agency collaboration aimed at developing a biosafety information network and advisory service.

### Environmentally Sound Management of Toxic Chemicals; Hazardous Wastes and Solid Wastes (chaps. 19, 20, 21)

Solid and hazardous industrial waste can be reduced through improved process efficiency. This involves promoting cleaner technologies, minimizing waste at source, developing alternatives for erstwhile waste and promoting recycling.

In UNIDO priority is given to safety in chemical production, especially with regard to hazardous operations and toxic chemicals. This

approach covers operational, occupational and environmental safety in chemical production, and contributes to the sound management of toxic chemicals, thus complementing the work initiated by the World Health Organization (WHO) in collaboration with UNEP and the International Labour Organisation (ILO) of the International Programme on Chemical Safety (IPCS). UNIDO is currently negotiating to join IPCS.

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### Global Action for Women Towards Sustainable and Equitable Development (chap. 24)

The integration of women in industrial development is a cross-sectoral issue. The approaches employed by UNIDO include: promotion of gender-sensitive programme project design; studies and research programmes to monitor the impact on women of new technologies and industrial restructuring; examination of issues related to health, safety and working conditions of women workers; development and dissemination of appropriate energy-saving and environmentally sound technologies for rural women; maintenance of quantitative and qualitative databases on women in industry; and provision of policy support to governments and industry in creating a sustainable and enabling environment for the participation of women in industry; organization of training workshops to promote women entrepreneurs in selected industrial branches with specific emphasis on environmentally sound and energy-saving technologies.

### Strengthening the Role of Business and Industry (chap. 30)

UNIDO will analyse increasingly the role of business and industry with a view to advocating either the short- or long-term profitability of environmental protection through the use of clean or energy-efficient technology and energy conservation in industry. UNIDO will build on its prior experience of pollution prevention through product and process improvement, including plant modernization and rehabilitation. Business and industry in developing countries will be assisted in the adoption of processes and procedures that reduce demand on resources by industry and generate less industrial waste, *inter alia* by devoting particular attention to environmental considerations in the operation and development of small and medium-scale industries. Through demonstration activities such as Cleaner Production centres, UNIDO will foster the reduction of industrial waste in the production process. The investment promotion activities of UNIDO will play a major role in providing enterprises in developing countries with the means to approach sources of financing required for diversification of their products and services into environment-related areas.

### Environmentally Sound Technology, Cooperation and Capacity-Building (chap. 34)

Inherent in all efforts to promote sustainable industrial development is the need to select appropriate technologies based on social, technical,

economic and environmental criteria and to develop the absorptive capacity for these technologies. Support is also provided in the negotiation of technology transfer contracts in order to ensure that the transfer mechanism matches the needs and capabilities of the recipient. The efforts of UNIDO to assist developing countries in effective technology transfer will strengthen the ability of those countries to meet the obligations of international agreements relating to environmental protection, as outlined in the recommendations of ESID. For example, the transfer of appropriate technology reduces dependence upon technologies using chemicals damaging to the ozone layer; it is thus in accordance with the aims of the Montreal Protocol on Substances that Deplete the Ozone Layer. Similarly, appropriate technologies can minimize the quantities of hazardous wastes produced by industry, which supports the principles of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

## Information for Decision-Making (chap. 40)

Adequate decision-making for industry is directly related to the adequacy of information available. UNIDO is working at three interrelated levels to provide information to developing countries: collection and dissemination of industry-related environmental information to developing countries through a referral/clearing-house system; data and information collection, analysis and modelling as a basis for policy formulation and decision-making; inclusion through the UNIDO feasibility study programme of environmental considerations in the calculation of the costs and benefits of potential investments. The Organization's activities also take on a further dimension in enhancing public awareness, with the public information programme advocating sustainable industrial development through the print and audio-visual media, among other approaches, and by promoting closer and continued linkages between UNIDO and developing-country counterparts, donors, the media and the public at large.

## National Mechanisms and International Cooperation for Capacity-Building in Developing Countries (chap. 37)

Capacity-building permeates the many different layers of the Organization's response to Agenda 21. Its support to national capacity building concentrates on three fundamental aspects of sustainable industrial development: enhancing national capacities to incorporate environmental considerations into industrialization policy and strategies; enhancing capacities to disseminate and analyse technological information; improving capacities to analyse and exercise choices among technological options. Closely linked to technology cooperation, UNIDO's experience forms a substantial base upon which to continue, in cooperation with Governments, the United Nations system, NGOs and the private sector, to strengthen and amplify those activities.

**Category 2**

## Combating Deforestation (chap. 11)

On the basis of its experience and ongoing activities, UNIDO supports the concepts of Agenda 21 related to deforestation by promoting the value of forestry products, maximizing the return on forestry products and publicizing the use of secondary wood species, agricultural residues and non-wood products. The programmes include using agricultural residues such as cotton-stalk wastes for charcoal manufacture, non-wood fibres such as bagasse for paper manufacture, recycling waste paper and increasing the efficiency of pulp and paper mills.

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## Combating Poverty (chap. 3); Promoting Sustainable Agriculture and Rural Development (chap. 14)

The organization's promotion of safer and more environment-friendly agro-chemicals such as pesticides and fertilizers and their formulations, should contribute to industry's role in the development of sustainable agriculture. It will also complement integrated pest management as well as add to the International Code of Conduct on the Distribution and Use of Pesticides. Furthermore, the assistance provided by UNIDO to such areas as low-cost housing, use of agricultural residues for energy, construction materials and pulp and paper will lend the necessary impetus to rural development.