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17587

Distr.
LIMITED
IO.33 (SPEC.)
13 July 1989
ENGLISH

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Expert Group Meeting to Review
UNIDO's Proposed Environment Programme

Vienna, Austria, 3 to 5 July 1989

REPORT OF THE
EXPERT GROUP MEETING
TO REVIEW UNIDO'S PROPOSED
ENVIRONMENT PROGRAMME *

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* This document has not been edited.

V.89-57801

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INTRODUCTION

1. Environmental issues have come to the forefront in recent years. The awesome immensity and increasing frequency of natural and man-made catastrophes throughout the world, in Basel, Bhopal or Chernobyl - have dispelled any doubts about the fragile balance between humanity and nature. Facts can no longer be ignored: the reckless depletion of the natural resource base and pollution of our air, water and soil are rapidly threatening to undermine the well-being of human nature, if not the very continuance of life.
2. Direct or indirect responsibility for many forms of environmental degradation lies with some of the very industrial processes and practices that have been created to spur economic development, alleviate poverty and improve the standard of living of growing populations. Industrial development yields obvious benefits, yet it is also frequently associated with damage to the environment and to human health. Development, to be sustainable, must ensure the ability of future generations to meet their needs. It cannot be placed in jeopardy by shortsighted practices geared towards short-term interests. Effective international co-operation is essential to managing ecological and economic interdependence. In short, it is impossible to separate issues of development from those of the environment.
3. In 1987, the General Assembly of the United Nations in its resolutions 42/186 and 42/187, formally called on all organs and organizations of the United Nations system to work towards achieving the objectives of environmentally sound and sustainable development. It transmitted to them two key documents to guide their future policies and programmes: the report of the World Commission on Environment and Development, entitled Our Common Future, and The Environmental Perspective to the Year 2000 and Beyond, compiled by the United Nations Environment Programme (UNEP). In addition to co-ordinating efforts within the United Nations system on environmental issues, UNEP has been the driving force behind such recent historic international agreements as those on protecting the ozone layer and controlling the movement across frontiers of hazardous wastes.
4. More recently, UNIDO supported by its Industrial Development Board, has been encouraged to take a long, hard look at the relationship between environment and industrial development, with an eye towards investing more resources in environmental projects and expanding activities in this area. Environment has also been formally designated one of the priority areas on which UNIDO is placing increasing emphasis in the medium term.
5. Formulating an environment programme for UNIDO, with emphasis on problems encountered in the industrial sector, is an ambitious undertaking. The ultimate aim is to help developing countries build up their own abilities to assess the environmental and social impact of their industrial development through technical co-operation projects, industrial and technological information services, transfer of technology, policy analyses and studies, and a variety of promotional activities, research and training. In all of these activities, UNIDO will ensure that, wherever possible, the knowledge and expertise already available are fully utilized. Many of these areas have been studied, at least in part, by other United Nations organizations and governmental, intergovernmental and private agencies. With their co-operation, modifications can be made to suit the specific needs of UNIDO in the field of industrial development.
6. UNIDO has established a central unit for environment and is in the process of developing a programme of work in this important area. Activities included in this programme can be implemented by this unit and other units of UNIDO, with emphasis on close co-operation with UNEP, particularly considering the initial agreement reached between UNIDO and

7. Given the magnitude of some of the environmental problems, which are compounded on a global scale, the potential cost is staggering. The need to address these problems, is so urgent, however, that a number of Member States have already indicated their willingness to commit additional funds specifically for the development of environmental projects. Therefore, a special UNIDO trust fund for the environment has been proposed. That trust fund would not be new. It would be administered by UNIDO in the same manner as its other trust funds. A separate trust fund on this kind for the environment would yield two benefits. On the one hand, environment-conscious donor countries would be secure in the knowledge that all the money would be directed towards environmental projects. On the other hand, developing countries wishing to address their own environmental problems would find in this trust fund a reliable source of financing specifically devoted to supporting their efforts.
8. The list of ways in which UNIDO can contribute to achieving sustainable industrial development is very long, but so is the list of environmental problems to be tackled. The draft UNIDO environment programme, prepared by Arne Jernelov, Director of the Swedish Environmental Research Institute, and special consultant to UNIDO, aims to tackle these problems. It also represents a turning point in the Organization's environmental activities.
9. It is a viable programme of activities as a base from which UNIDO can begin to promote in a systematic manner environmentally sound industrial development. Two very important activities of UNIDO are highlighted: the transfer of new, often patent-protected clean technologies, and the rehabilitation and upgrading of existing industries, as spearheads of the environment programme. Pursuit of these activities will need to be accompanied by intensive training of UNIDO staff. Furthermore, ten industrial sectors are identified which exert considerable negative impact on the environment. Of those ten, five could be deemed priorities in the first preliminary phase of the environment programme, if adopted.
10. In order to finalize the draft, which will be presented to the third session of the General Conference in November 1989, UNIDO convened the Expert Group Meeting to Review UNIDO's Proposed Environment Programme from 3 to 5 July 1989 at Vienna.

I. ORGANIZATION OF THE MEETING

11. The Expert Group Meeting to Review UNIDO's Proposed Environment Programme was convened at UNIDO Headquarters, Vienna, Austria, from 3 to 5 July 1989. A list of participants is attached as annex I.

Opening of the Meeting

12. The Deputy Director-General, Department of Industrial Operations of UNIDO, delivered an opening speech on behalf of the Director-General, Domingo L. Siazon, Jr., summarizing the steps being taken by UNIDO and emphasizing the need for international co-operation and financing. The work of Arne Jernelov, Director of the Swedish Environmental Research Institute, who compiled the draft UNIDO Environment Programme as a consultant to the Organization, was commended and the advice and comments of the experts on the draft programme were welcomed.
13. The Deputy Director-General outlined eight points for discussion, and requested the experts to advise UNIDO on these matters, which included:

Priority actions for developing countries at early stages of development; infrastructure to be designed and included in the operational programme, in particular regarding technical and industrial information, data bases, training and upgrading skills of UNIDO staff; the needs in terms of staff and financing from the UNIDO budget in the coming four years, subject to the demand from developing countries for UNIDO services, which have to be financed almost totally from voluntary contributions; and the need and the possibility for establishing a special trust fund for projects to be implemented within the context of the programme.

He noted that as the programme would be presented to the third session of the UNIDO General Conference in November 1989, the recommendations of the Expert Group would be highly appreciated.

Election of officers and adoption of the agenda

14. The Meeting elected I. H. Abdel Rahman (Egypt) as its Chairman and Kjell Baalsrud (Norway) as its Vice-Chairman and Rapporteur.
15. The Meeting adopted the agenda: (see annex II). It also adopted a list of eight questions for discussion (see annex III). In facilitating the deliberations of the Meeting, the Chairman proposed that questions number 1, 2, 5, 6 and 7 be reviewed by the Meeting as programme elements and that issues 3, 4 and 8 be reviewed as resource elements.

Introductory remarks

16. Each expert, as well as observers from UNEP, made introductory statements, during which they commended UNIDO for highlighting the importance of environment as an integral part of industrial development through the introduction of the environment programme as outlined in the document of the meeting, the draft UNIDO Environment Programme (attached as annex IV). The experts expressed their appreciation and general support for the draft Programme and emphasized the importance of the programme elements for the future work of UNIDO as a co-ordinating agency for industrial development within the United Nations system. Because of the shortness of time the draft Programme was not examined in detail paragraph by paragraph. The experts were invited, if they so wished, to submit their observations on the Programme to the Secretariat.
17. In their deliberations, the experts had at their disposal other UNIDO background documents

18. Though the main objective of the Meeting was to take a forward look at the role UNIDO may assume in the area of environment, as proposed in the draft UNIDO Environment Programme, the experts were given the opportunity to listen to brief descriptions by UNIDO staff members in various technical units of the many useful activities and technical assistance projects which have been pursued during the last few years.

Adoption of the report

19. This report was adopted by the participants of the Expert Group Meeting.

Concluding remarks

20. In their concluding remarks all participants reiterated their enthusiastic support for UNIDO's full involvement in the environmental field and the decision to develop its own Programme in this field. Several participants stressed the importance of establishing an Environment Fund to support the activities to be undertaken within its Programme.
21. The UNEP observers referred to the moment as 'historic', and praised UNIDO for its commitment to sustainable development. They expressed strong support for the establishment of the proposed UNIDO Environment Programme, including the Environment Fund, and expressed the willingness of UNEP to fully co-operate with UNIDO in the realization of this Programme.
22. The participants thanked UNIDO secretariat for the excellent preparation of this meeting and the hospitality extended to members of the Group.

Closing of the meeting

23. The meeting was closed in the afternoon of 15 July 1989.

II. UNIDO ENVIRONMENT PROGRAMME

A. General remarks

24. All experts, as well as the observer from UNEP, gave short general remarks on the draft UNIDO Environment Programme as presented. There was general agreement that UNIDO urgently needed an environmental programme, and that the one under consideration was a very good basis for discussion, as it identified the present shortcomings of UNIDO that have to be strengthened, and highlighted two very important activities of UNIDO, namely the transfer of new, clean technologies, including those which are patent-protected, and the rehabilitation and upgrading of existing industries. These are expected to be the spearheads of UNIDO's Environment Programme. The pursuit of these activities in the environmental field should be expanded to increase the important contribution by UNIDO to the UN system-wide efforts towards achieving sustainable development. The developing countries should acquire the capacity to deal with the environmental problems they encounter in their development.
25. Some comments dealt with the description in the report of the historic activities of UNIDO in the environmental field. The experts underlined that the draft UNIDO Environment Programme would provide a sound base on which UNIDO would become a predominantly positive force in the environmental field. An environmental component should be integrated in all UNIDO projects and activities, as appropriate.
26. Many experts reiterated the need for a close collaboration with UNEP, as emphasized in the draft programme.
27. Several experts discussed the inclusion of assistance to centrally-planned economies such as those in eastern Europe as part of UNIDO's activities in the environmental field. Concern was expressed that this could divert resources from the efforts to transfer technology to developing countries, although it was pointed to as a highly desirable element of the proposed programme.
28. Several experts stressed the importance of including discussion of the especially severe pollution problems of Industrial Free Zones as a priority within the programme. One suggestion made was that government legislation on creation and enforcement of environmental regulations in these zones would be a better approach than eliminating them altogether.

B. Conclusions and recommendations

29. Following are the conclusions and recommendations of the meeting as they relate to the eight questions:
 1. *What are the priority areas that should be looked into by UNIDO to satisfy the needs of developing countries in the area of development ?*
30. There was general agreement on the importance of the three priority areas as elaborated in the Draft UNIDO Environment Programme. These were:
 - Transfer of non-CFC technologies;
 - Hazardous wastes;
 - Environmental upgrading of existing industries;
31. Among these three priority areas, there was discussion of whether a better balance could be achieved if environmental upgrading of existing industries were given first priority.

- 32. It was argued that the pulp and paper sector should be included among the five priority sectors, chosen from the original ten, in view of the considerable experience already available in UNIDO in that sector.
- 33. It was also stated that great care had to be taken to make sure that absence of an industrial sector from the list was not interpreted as meaning that that sector of industry was regarded as environmentally 'clean'.
- 34. Both energy conservation and the pursuit of alternative sources of energy were mentioned by the experts as priority areas which should be given greater emphasis in a UNIDO Environment Programme.

2. *What areas of the UNIDO programme in the area of the environment should be addressed specifically to developed countries?*

- 35. The first priority was to encourage and facilitate the transfer of environmentally sound technology to developing countries. It was suggested that developed countries, in transferring such technology to developing countries, should ensure that these technologies, to the extent possible, are environmentally safe.
- 36. The Meeting agreed that the development and implementation of environmentally sound technologies should be accelerated.
- 37. It was recommended that participation in training programmes taking place in developed countries be made conditional upon the return of the participant to his/her home country for at least five years after completion of the programme.

3. *Should UNIDO establish a central unit for environment?*

- 38. The meeting recommended the creation of a focal point to be designated by the Director-General, strongly supported by his authority to monitor and co-ordinate the implementation of UNIDO environmental activities in the different units of the secretariat. The focal point will also be responsible for co-ordinating these activities with other UN agencies and relevant external bodies. In addition, the focal point may also be entrusted with the responsibility of securing additional funding for the organization's environmental activities. It has been noted that within the Department of Industrial Operations a central unit for environment has been established.

4. *Should UNIDO establish a special fund for technical assistance in environment?*

- 39. The proposed UNIDO Environment Fund was strongly recommended by the meeting as a means of financing future activities of UNIDO in the field of environment. A target of \$ 20 million for the initial four years was found to be most feasible.

5. *Should UNIDO embark on its own environmental impact assessment methodologies or should it adopt existing ones ?*

- 40. There was general agreement that all projects should be assessed for their environmental impact, before any final decision would be made to go ahead with their implementation.

41. Most participants and the UNEP representatives felt that UNIDO should adopt EIA procedures similar to those employed by UNEP and the World Bank. Many also stressed that 'a practical approach' such as the one developed within the Mediterranean Action Plan could be utilized. Against a background of technologies being carefully evaluated with regard to sustainability, this seemed to provide for an optimal balance.

6. *Is there a need to establish a system of hazardous wastes site inspection similar to that of IAEA for radioactive wastes?*

42. The expert group fully supported UNIDO's activities in assisting developing countries to strengthen the capabilities in the handling, storage and recycling of hazardous waste.
43. As to the proposed inspection system, it was felt that UNIDO should work gradually, and in co-operation with UNEP and WHO, on the development of a voluntary system of inspection. The three organizations should also work together to promote international agreement on such a system.

7. *How can UNIDO implement a training programme for itself in the area of environment?*

44. The Meeting felt that incorporation of an extensive training element was vital to the successful implementation of a UNIDO Environment Programme.
45. The training elements as outlined in the programme were endorsed by the meeting.
46. The expert group went beyond the draft programme and recommended that the question be seen in connection with the larger subject of human resource development. Thus, once the programme is approved by Member States, the human resource development issue can be studied in greater depth in order to elaborate means to best realize its potential.

8. *What are the necessary modifications for the programme for the years 1990 - 1993?*

47. The expert group strongly recommended to the Director-General that in presenting the UNIDO Environment Programme to the third General Conference, an additional amount equal to 1% of the regular budget for the 1990-1991 biennium be used to create the infrastructure required for the execution of the programme. Regular budget resource requirements for future biennia will be dependent upon the level of activities achieved by the programme.
48. In addition, the Chairman introduced a priority area which the expert group adopted: "The question of industrialization as a whole. The basic consideration is that of the image of future industrialization. Today the developing countries want to 'catch up' to the already developed countries. How realistic is that? If they continue to pursue the policies on the basis of which developed countries reached the stage at which they are now, then forget about environmental improvement. There must come about a fundamental change of the development system and the expectations. This should be recognized as a legitimate subject, one which must be thought about by developed and developing countries alike, so as to formulate a future course of value systems. UNIDO, as an industrial organization, must be aware of and think about this situation."

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Annex II

AGENDA OF THE EXPERT GROUP MEETING

1. **Opening of the meeting**
2. **Election of Chairman and Vice-Chairman/Rapporteur**
3. **General introductory remarks**
4. **Discussion of specific questions (open list)**
5. **Summary report of the Draft UNIDO Environment Programme and discussion thereof**
6. **Concluding remarks**
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8. **Closing of the meeting**

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QUESTIONS FOR DISCUSSION

1. **What are the priority areas that are needed to be looked into by UNIDO to satisfy the need of developing countries?**
2. **What areas of the UNIDO programme in the area of environment should be addressed specifically to the developed countries?**
3. **Should UNIDO establish a central unit for environment?**
4. **Should UNIDO establish a special fund for technical assistance in environment?**
5. **Should UNIDO embark on developing its own environmental impact assessment methodologies or should it adopt existing ones?**
6. **Is there a need to establish a system of hazardous wastes site inspection in the manner as a safe guard system of atomic energy?**
7. **How can UNIDO implement the training programme for itself in the area of environment?**
8. **What are the necessary modifications that are to be promised for the programme for the years 1990-1993?**

7 July 1989

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UNIDO
ENVIRONMENT PROGRAMME

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I. Introduction

1. The environment and the process of industrialization

A. Background

1.01 During the latter half of this century, the viability of life on our planet has, for the first time in human history, been called into question. Blame for its destruction, furthermore, lies entirely with what we tend to call progress, or development - words which have hitherto been endowed with generally positive definitions. What has come as a surprising twist in the nineteen eighties is that the threat which had just in the last decades been considered the most grave, namely the possible destruction of the Earth by nuclear war, is no longer perceived as the most likely, although military expansion continues to consume a disproportionate share of natural, human and financial resources. Instead of legions of human antagonists being responsible for an instantaneous and spectacular end of the world, it now appears that a slow suffocation of life will occur, one that would be accomplished by far more mundane means - loss of biological diversity, desertification, global warming, and ozone depletion, among others, bringing gradual but in all likelihood complete disruption of economic and social systems. No longer able to feed ourselves and subject to pervasive health problems resulting from contaminated water and air, topped off by exposure to harmful rays from the otherwise benevolent sun, it is difficult to see how civilization as we know it could continue to function, let alone flourish.

1.02 There is a great disparity between the levels of development achieved in industrialized countries versus those of the so-called "third world". As we become aware of the damage to our environment caused by present technologies and practices, it is evident that alternatives must be found and applied. But these are not only not yet discovered, but many entail a radical change in institutions and priorities and a general lowering of expectations. At the same time, however, it must be made clear that "sustainable" development in developing countries cannot be used by industrialized societies to impede development or to dictate it. Unfortunately, the relatively recent move towards limiting the transfer to developing countries of particularly nasty polluting technologies appears to some of these countries to be aimed at cowing them into accepting a continued subordinate social, economic and political role globally. The issue involves more than a matter of mere rhetoric, however; the developing countries, in which population growth is accelerating the fastest, are locked in a struggle to ensure the very survival of their peoples. Our social environment is very fragile. Nevertheless, it is the fundamental right of every human being to live a decent, healthy life. But poverty is a major cause and effect of global environmental problems, and it is useless to try and deal with environmental problems without addressing the broader problems of underlying world poverty and international inequality. The intricate relationship between people, development, resources and the environment hangs in a delicate balance. It has become apparent that it is impossible to separate issues of development from those of the environment. The connection is unmistakable: many forms of development erode the environmental resources upon which they must be based, and environmental degradation undermines development.

1.03 Organizations such as those within the United Nations system, representing most of the nations of the world, have taken increased notice of the problems as they relate to the urgent and seemingly endless problem of poverty, especially among developing countries. In an effort to understand why, as technology becomes more sophisticated and food production increases, poverty and hunger are also accelerating, the focus of attention has turned to the interconnectedness of all facets of development and the relationship of development to our treatment of the planet's air, water and soil. It was discovered that the very efforts to ameliorate the living conditions of the planet's inhabitants are rapidly threatening to jeopardize their future growth and development. Thus, the need to find a comprehensive approach to protecting and enhancing all life has been gradually becoming more urgent. This approach will mean a fundamental change in attitude, which to be successfully executed will necessitate a massive re-ordering of governments', societies' and individuals' institutions and priorities.

1.04 In 1983 the Secretary General of the United Nations, in response to global concern at the deplorable situation in most developing countries and in recognition of the growing awareness of environmental degradation and its possible consequences, formed the World Commission on Environment and Development. It was charged with the following:

- to recommend ways concern for the environment could be translated into increased co-operation among developing countries and between countries at different stages of economic and social development and which would lead to the achievement of common and mutually supportive objectives taking into account interrelationships between people, resources, environment and development;
- to consider ways and means by which the international community could deal more effectively with environmental concerns; and
- to help define shared perceptions of long-term environmental issues and the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, a long-term agenda for action during the coming decades, and aspirational goals for the world community."

1.05 In 1987 the Commission submitted its final report, entitled *Our Common Future*. With this seminal document, the Commission elaborated a far-reaching vision of physical and spiritual co-operation; indeed, a real "global agenda for change", calling for sustainable development. As developed in *Our Common Future*, also referred to as the Brundtland report, sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs

1.06 As noted in the report, "Development involves a progressive transformation of economy and society. A development path that is sustainable in a physical sense could theoretically be pursued even in a rigid social and political setting. But physical sustainability cannot be secured unless development policies pay attention to such considerations as changes in access to resources and in the distribution of costs and benefits. Even the narrow notion of physical sustainability implies a concern for social equity between generations, a concern that must logically be extended to equity within each generation."

B. Industry and the environment

1.07 Industrial development is central to the economies of modern societies and serves as an indispensable basis for their expansion and growth. It is also essential to developing countries, so as to to widen their development base and enable them to meet growing needs. Industry extracts materials from the natural resource base and in return introduces both products and pollution into the human environment. In doing so it has the potential to improve or degrade the natural environment; both of which it invariably does. The impact is evident through the entire cycle: raw materials exploration and extraction; creation and distribution of products; energy utilization and waste generation; and on through to the use and disposal of products by consumers. Industrialization patterns and their consequent environmental impacts have proven to be unbalanced. Today, in view of the severity of potential disruptions resulting from degradation of the global environment, concerted international action is required.

1.08 One sentence in the Brundtland report summarizes the dilemma: "There has been a growing realization in national governments and multilateral institutions that it is impossible to separate economic development issues from environment issues; many forms of development erode the environmental resources upon which they must be based, and environmental degradation can undermine economic development." Environment and resource management problems have hitherto been addressed entirely apart from economic development problems, and, indeed, have until recently received little serious attention from governments in developing and developed countries alike. As environmental problems reach undreamed of proportions, threatening the viability of life on this planet, it is becoming evident that a fundamental change in attitude must take place.

1.09 A basic problem for most developing countries is that the industrial sector is often too small to produce the goods and services required for the well-being of the population. Added to that, what industry does exist often brings, alongside the social and economic benefits, environmental destruction and health problems which often reach well beyond the scope of the individual activity. In the process, non-renewable resources are wasted and irrevocably depleted. Many sources of environmental and resource management problems lie in policies and practices in sectors which themselves may not be affected, in equal degree, by environmental impacts. For instance, discharge of industrial pollutants into the air and water has potentially disastrous effects on health, but its negative effect on industry per se is not as damaging. Moreover, the technologies of industrial countries are not always suited or easily adaptable to the socio-economic and environmental conditions of developing countries. This is true for numerous reasons associated with the development history of the individual country and which include such varying factors as availability of natural resources, level of skill of the work force and existing infrastructure. To compound the problem, not enough research work done on developing countries addresses the appropriate transfer of technology and the adaptation of recent innovations in materials technology, energy conservation, information technology and biotechnology to best suit the needs of developing countries.

1.10 At present, the industrial structure in developing countries typically contains one or more of the three following elements:

- (i) Industries which utilize cheap labour and sell to export and domestic markets;
- (ii) Those industries which utilize local natural resources such as minerals and energy for sale on predominantly export markets;
- (iii) Industries making products with high transportation costs, often necessitating their sale on predominantly local markets.

1.11 It must be stressed that not all developing countries will share these characteristics, due to the size and diversity of their economies. For instance, a country like India with its vast resources and already possessing major industrial capabilities, consumes far more of its own output and is not as heavily reliant as a small, single resource country on export markets. At the same time, India exports things such as cement, which would normally fall within the category above that relegates products with high transportation costs to local markets.

1.12 In the industrialized countries, there is a strong tendency towards a decline in the energy intensity of industrial production, as these countries move into a post-industrial, information-based era. In the developing countries, however, the gradual shift of the industrial base towards the basic material-producing sectors is leading to an increase in the energy intensity of industrial production. As the leading energy source in a number of places is low grade coal with a high sulphur content, this trend assumes even greater importance from an environmental point of view. Pollution from the burning of fossil fuels is a serious health threat as well as a prime agent in global warming.

1.13 Just a few of the typical environmental problems associated with the present industrial structure in developing countries are the following:

- (i) The presence in water of heavy metals, such as cadmium from pigments used in the textile industry and chromium in the tanning industry;
- (ii) Contamination of both surface and ground water due to mining, which affects groundwater levels and the surface landscape and also leaves behind considerable solid waste.
- (iii) Blow-outs and drilling mud discharges resulting from oil exploration also creates water pollution.
- (iv) All manner of air and water pollution resulting from, among others, the following processes: aluminium smelting, ferro-chrome treatment, cement manufacture, steel mills, food industries, fertilizer production.

1.14 The effects of environmental pollution manifest themselves in a multitude of areas. Sulphur dioxide, for example, was a classic ingredient in the London smog of the last century, with associated health effects ranging from the common cold to fatal asthma. It is a by-product from the combustion of coal and oil - and thus is closely related to industry via energy production. But is it also a by-product of

corrosion and making repair and maintenance more costly. Sulphur dioxide is oxidized in the atmosphere to sulphuric acid and is subsequently washed down with precipitation. As acid rain, and with time delay due to the buffering capacities of water and soil, it contributes to numerous environmental tragedies such as acidification of lakes with loss of fisheries and other living resources, acidification of soil coupled with groundwater destruction, loss of soil ecology and the basis for food and energy production. Many other pollutants have similar complex actions with different effects after different periods of exposure.

1.15 A somewhat different and frequently more difficult situation exists in the numerous industrial zones which have sprung up as the pace of industrialization picks up in developing countries. The concentration of polluting industries and the dense urban population which maintains them multiply environmental degradation in the vicinity as well as aggravates global pollution problems. A special case among industrial zones are the many so-called Industrial Free Zones, where industries from all over the world are invited to establish production with a minimum of regulation and control regarding, in particular, the environmental impact of their operations. Being regarded in many ways as extraterritorial, these zones invite industries to locate there with the promise of relaxed enforcement or non-application of the countries' prevailing laws governing pollution, level of effluents, worker safety, etc. As a result, the types of industries attracted are frequently heavy polluters or others which due to tighter restrictions elsewhere are forced to re-locate from Europe, North America or Japan to those areas in developing countries, in order to continue their operations. The resulting damage to the environment in the host country is in some cases very severe.

C. The problem of industry

1.16 As summarized in the State of the World 1989, "The battle to protect the earth's life-support systems lacks definition in the minds of many. The danger is not so clear and present. Climate change, ozone depletion, population growth, and soil erosion are gradual processes, and therefore difficult to mobilize against. And the adjustments needed are permanent, for they are the prerequisites for long-term progress. Given these characteristics, a timely response to environmental threats depends less on emotion and more on reason - which may explain the growing gap between what needs to be done to secure the future and what is being done."

1.17 In the field of environment and industrialization mankind can not claim to have been farsighted to this date. The path of industrial development in the market economies of Western Europe, North America and Japan has brought with it enormous benefits, mitigated, however by numerous environmental problems. Some of these were foreseeable, others were not; some preventable, others not. However, the process of development in the market economies, especially as in Western Europe a century ago, was carried out at a relatively slow pace by today's standards. Hence, as the negative aspects of environmental degradation gradually become evident, it has been largely possible, though costly, to undertake protective or rehabilitative measures.

1.18 In contrast, in the centrally-planned economies of countries in eastern Europe, the process of industrialization started slightly later but progressed at a much faster pace. The desire to catch up economically with the market economies frequently resulted in negligence towards the environmental aspects of industrial development. Environmental degradation is undermining the future of large regions and the estimated costs of conducting environmental clean-ups are enormous.

1.19 In developing countries, the need and urge for rapid industrial development is even greater than that experienced by the centrally-planned economies, and they aim to achieve within a few decades the level of industrialization that took a century to bring about in Western Europe. Consequently, the temptation is strong to overlook environmental issues and other possible hindrances to rapid industrial development. Nevertheless, the resulting rush towards industrialization compounds the risk that environmental degradation so severe as to be beyond repair will occur before it can be discovered and corrective measures taken.

1.20 The experience garnered from industrialized countries is that environmental measures built into the process from the start are far less costly than those introduced at a later stage. Experience also shows that in the long run, savings on, for example, raw materials and energy, can frequently compensate for the increased costs associated with the incorporation of environmentally beneficial process modifications. This logic applies not only to the rationalization of existing industries but extends to creation of new ones. Through research and development, low- and non-waste technologies are being developed which could, through the concerted actions of organizations such as those in the UN system and through such mechanisms as the proposed UNIDO Special Trust Fund for the Environment, (*see Section 4*) make available to developing countries the means of simultaneously reducing pollution, increasing efficiency and saving precious resources.

1.21 In addition to the short-term economic argument that installation of some environmentally-sound industrial processes can drive up costs initially, there are also other reasons why governments in developing countries have been reluctant to take actions to ensure that their industrialization processes are designed on the basis of environmentally sound technologies. Lack of awareness, especially at the level of decision makers and industrial planners is a prime reason. In addition, there is widespread ignorance among the general public of the causes and effects of environmental degradation. As a result, there is a dearth of legal regulatory instruments in the field of environment, as well as the absence of trained cadres of environmental technicians, economists and ecologists.

1.22 Although some efforts have been made so far to deal with the environmental problems inherent in industry, if the world's environmental problems are not to increase in magnitude, it is essential to formulate and implement a methodical way of preventing pollution and rehabilitating degraded areas and industries and developing technology aimed at preventing future negative impacts. Uncontrolled industrial practices have led to unacceptably high levels of harmful or toxic substances in the air, pollution of water sources such as rivers, lakes, coastal waters and oceans, contamination of the soil and destruction of forests. On an aggregate level the problems of acid rain, global warming and ozone depletion are capturing the world's attention.

1.23 Up until now there has been a tendency to deal with one industry or sector in isolation, which fails to recognize and take into consideration the importance of intersectoral linkages. Gradually, however, there is throughout the world a steadily growing awareness of industrial environmental risks. Recent months have shown unprecedented international co-operation on subjects of over-reaching concern such as the ozone depletion, global warming, transboundary movement of hazardous wastes and emergency contingency planning.

2. UNIDO's role in furthering sustainable industrial development

2.01 The General Assembly of the United Nations at its forty-second session studied the report of the World Commission on Environment and Development (A/42/427, annex), devoting particular attention to the problems of the environment and sustainable development. The Assembly adopted resolutions 42/186 and 42/187 calling for action in this regard by organizations in the United Nations system.

2.02 The General Conference of the United Nations Industrial Development Organization (UNIDO) also, at its second session in November 1987, by its decision GC.2/Dec.11, welcomed the report of the World Commission, and called attention to its conclusions and recommendations as they related to the work of UNIDO. The General Conference requested the Director-General to report to the Industrial Development Board on those aspects of the policies, programmes, budget and activities of UNIDO aimed at contributing to sustainable development.

2.03 Pursuant to resolutions 42/186 and 42/187 and decision GC.2/Dec.11, the Director-General of UNIDO submitted to the Industrial Development Board (IDB) at its fourth session a report on UNIDO contributions to environmental and industrial development. Subsequently, the Board adopted decision IDB.4/Dec.19 in which, *inter alia*, it requested the Director-General, in accordance with Assembly resolutions 42/186 and 42/187, to prepare a report to be submitted to the Assembly at its forty-fourth session.

2.04 One of the criteria for sustainable development is that the needs of the present generation should be met without compromising the ability of future generations to meet theirs. Other criteria involve protection of human health and survival of species. The focal points of sustainable development in this paper are the wise use of resources, prudent management of the environment and rehabilitation of degraded environments. Within the context of the work of UNIDO, technical co-operation activities take into consideration the need for an integrated approach to ensure that industrial development is sustainable. This approach not only integrates the selection and application of appropriate technology and training of both managerial and technical personnel, but also takes into consideration the impact of social, environmental, energy and safety measures on development. Consequently, a focal point for environment was established within the Department of Industrial Operations in the Section for Integrated Industrial Projects to develop and monitor environmental projects, in close contact with the rest of the organization, and ensure that technical co-operation projects executed by UNIDO are designed on a sound environmental basis.

A. Historical background within UNIDO

2.05 Although a paper on the environment was published by UNIDO in 1969, the first real work towards achieving sustainable development began with the publication of a report on "Industrial development and the environment" (UNIDO/ITD.81) prepared for the Conference on the Human Environment, held at Stockholm in 1972. Following the establishment of the United Nations Environment Programme (UNEP), a number of co-operative studies were carried out with UNEP in the field in 1973 and 1974, of which the reports were published. This early work was carried out with limited financial and personal resources. In the Mar del Plata Action Plan, UNIDO was requested to extend its activities into the field of industrial water use and treatment practices, which resulted in a discussion by the Industrial Development Board in 1981, during which suggestions were made regarding water management for industrial use. The heightened awareness of Governments of the importance of this and other environmental work, as well as their willingness to increase resources to carry out such work, is reflected in the action by the Assembly and the Board. The recent attention by the Assembly and the Board gives focus to the work of UNIDO towards achieving sustainable development, and will allow it to continue in a more systematic and co-ordinated way.

2.06 UNIDO has co-operated with UNEP since its founding. At the policy level, UNIDO has participated in the preparation of each of the Unit. At the working level, UNIDO has co-operated with the Industry and Environment Office of UNEP in numerous joint activities.

2.07 Recently, both UNEP and UNIDO renewed their commitment to developing joint environmental projects in the industrial development field. The parameters of a new programme of joint activities were agreed upon in January 1989, and priority will be given to the following areas:

- (a) Integration of environmental consideration into industrial planning and development in developing countries;
- (b) Hazardous waste management;
- (c) Low-cost and environmentally sound technology for recycling and treatment of industrial effluents (solid and liquid) with particular attention to small and medium-sized industries;
- (d) Application of emerging biotechnologies.

2.08 Besides co-operating with UNEP, UNIDO has also participated in the work towards achieving sustainable development carried out by other United Nations bodies. For example, that of the Intersecretariat Group for Water of the Administrative Committee on Co-ordination, which co-ordinates activities dealing with water and publicizes work carried out on water and water resources by the field

disposal, another book, *Hazardous Waste Management*, has been published jointly by UNIDO and the International Association for Clean Technology. UNIDO has also co-operated in system-wide environmental matters by active participation in meetings of the Designated Officials on Environmental Matters and, within UNIDO itself, by the establishment of the Task Force on Industrial Safety and Environmental Matters, which, as part of its work, oversees integration of an environmental element into all its projects.

2.09 Environmental studies issued recently by UNIDO include the "Environmental assessment and management of the fish-processing industry", Sectoral Studies Series No. 28 (PPD.15), and the "Environmental assessment and management in the production of six non-ferrous metals", Sectoral Studies Series No. 30 (PPD.26), both of which have contributed to the work of the UNIDO System of Consultations. Work that was begun many years ago on the pharmaceutical industry continued with the study on "The solvent recovery and disposal of unremovable solvents used in the pharmaceutical industry" (UNIDO/IS.646). In the area of industrial emergency contingency planning two studies were published: the first was entitled "The industrial emergency game" (PPD.78(SPEC.)), which game was played for the first time in a developing country in the second half of 1988. A more technical study was on "Major accident prevention or mitigation in the chemical industry" (IO.22(SPEC.)).

2.10 The pervasiveness of environmental problems and the conviction that common solutions must be formulated has galvanized action among the world's people, governments and institutions. It has become a matter of what kind of world, if any, we will leave to future generations. It is within this relatively recent atmosphere of mutual agreement and concern that UNIDO, as the specialized body responsible for fostering industrialization in developing countries, is now being called upon to systematically integrate environmental components into technical co-operation projects. To prepare for and an analysis of possible adverse environmental effects by industrial development, a study entitled "First guide for UNIDO officers in evaluating the environmental impact of industrial projects" (PPD.76(SPEC.)) was prepared in April 1988.

B. Environmental projects in 1988

2.11 In 1988, UNIDO had 51 approved or operational technical co-operation projects totalling approximately \$US 12.5 million that dealt entirely or in part with the environment and industrial development. Those projects encompassed air- and water-pollution control, solid-waste reduction and utilization and reduction of industrial hazards. The projects varied widely, including forest products and other agro-industries, metallurgical industries, engineering industries, chemical industries, feasibility studies, economic co-operation among developing countries and meetings within the System of Consultations.

2.12 Of the above-mentioned projects, approximately half were concerned exclusively with environmental protection; of the other half, environmental protection was an important component. Of the 51 projects, one-third were large-scale projects, that is, with a total allotment each of approximately \$US 150,000. Three of these had a total minimum allotment each of \$US 1 million of technical co-operation.

2.13 Eight per cent of all on-going technical co-operation projects were found to be directly aimed at sustainable development.

C. Environmental projects in the pipeline

2.14 In order to view environmental trends in technical co-operation, information on projects in the pipeline has been analysed. By early 1989, 84 projects totalling almost \$US 44 million had in some way to do with environmental protection in industry. These covered air-pollution control, water-pollution control, solid-waste control, waste utilization, hazardous-waste management, and various aspects of industrial safety and emergency contingency planning. The analysis of the pipeline projects

shows that the base of environmental projects within UNIDO is expanding. The trend is also towards more large-scale projects. Of the 84 projects in the pipeline, 39 are large-scale; of these, 13 are in excess of \$US 1 million.

D. Geographical distribution of projects

2.15 Asia and the Pacific Region has by far the largest share of operational projects and pipeline projects. Africa, although lagging behind in operational projects, has a greater percentage of projects in the pipeline than any region other than Asia. The most notable decrease from operational to pipeline projects occurs in Europe. The region with the most countries, Latin America and the Caribbean, is also the region with the lowest percentage of operational projects. This position improves somewhat in the case of pipeline projects.

3. Energy and environment

3.01 It is clear that many of today's prominent environmental issues are energy-related; for example global warming and acid rain. At the same time, insurmountable evidence shows that the large-scale long-term use of finite fossil fuels is incompatible with the concept of sustainable development. These general observations hold true also with regard to the industrial sector. Energy generation required to drive industrial development is an important factor behind the release of pollutants into air, water and soil; industrial activities based on energy obtained from fossil fuels cannot without qualification be argued to be sustainable.

3.02 Energy projects constitute ~ 10% of all UNIDO projects. Out of those, half relate to energy conservation and development of sources of renewable energy and fulfill the criteria to be included in 'UNIDO contribution to sustainable development.'

3.03 In this draft UNIDO Environment Programme, the open references are comparatively few, but energy conservation constitute an integrated part of all rehabilitation programmes and the environmental upgrading of power-plants. Using low grade carbon is a priority activity.

3.04 Technical journals and newspapers have reported a number of possible scientific breakthroughs during the last year which could bring about a revolution in the energy field. Some examples are superconductivity, cold fusion, cheap wave energy and super solar energy cells. As these or other technological revolutions result in commercial breakthroughs UNIDO would clearly stand ready to assist in the transfer to developing countries of those technologies deemed conducive to environmentally sound and sustainable industrialization.

II. Programme presentation

4. The programme approach

A. UNIDO strategy and policy in the area of environment

4.01 Hitherto, industrial development strategies promoted by UNIDO have not been designed with the concept of sustainable development foremost. This has now changed, as noted above in section 2, which itself reflects significant alterations in attitudes and priorities globally. Much of this is credited to the severity of recent environmental problems encountered and the recognition of the need for joint solutions, both amply illustrated in *Our Common Future*. Environment is now one of the priority areas for UNIDO, and has become a major consideration in all activities, as, among other measures, the environmental impacts of technical co-operation projects are henceforth to be assessed prior to the execution of projects. Environmental impact assessments have until now not been utilized by UNIDO, partly because existing models developed by other organizations both inside and outside of the United Nations system had not been adapted specifically to the highly specialized patterns of industrial development.

4.02 In the future, environmental issues will receive special consideration in all UNIDO activities, such as in the preparation of studies and environmental impact assessments, in project formulation, in industrial operations, in investment promotion activities, consultations, training, etc., including transfer of computerized environmental information.

4.03 It will be important to identify early on and attempt to successfully resolve conflicts arising between legitimate development goals of the developing countries and the environmental considerations to be found in the industrial sectors of those countries.

4.04 There must be close co-operation in developing the UNIDO Environment Program not only within all Departments and Branches of organization, but also with the various other members of the United Nations system, in particular UNEP. Among activities envisaged are the exchange of information, experience and publications, and the formulation and participation in joint projects. UNIDO has first-rate capabilities in its area of specialization, namely industrial development and technology transfer, and should not be passive in the efforts to solve environmental problems many of which can be traced back to industrial origins. Through its involvement in research and development UNIDO can make a positive contribution to the efforts to achieve sustainable development.

4.05 Emphasis must be given to ensuring the proper maintenance of industrial facilities to preclude malfunctions which could result in negative environmental consequences. Also, special attention will be given to the proper selection, training and/or requalification of personnel. In particular, this latter activity is crucial to the success of the program. All UNIDO staff must be intensively indoctrinated to heighten their awareness of environmental issues. The knowledge and competence in the environmental field developed within UNIDO will, in a following stage, be transferred to member states upon request. Thus, based on the education and on-the-job training programmes for UNIDO staff in such areas as environmental impact assessment, economic assessment of environmental degradation and inclusion of environmental aspects in industrial development planning, similar programmes will be developed for officers in national organizations. The data bases to be created in UNIDO as part of the Environment Programme will thereby be made available to industrial planners at the national level. However, this is expected to happen after the Programme's initial four-year period and is not reflected in the budget estimations presented in this paper. The envisaged training of both UNIDO staff and others will be elaborated on in greater detail in later portions of this paper.

B. Development objectives

4.06 From the retrospective look at past UNIDO activities in environment presented earlier in this paper, it is evident that a growing proportion of projects deal with environmental protection, conservation of energy and conservation of natural resources. The UNIDO Environment Programme as proposed here has the goal to develop methodologies and capabilities within UNIDO to ensure that

future technical co-operation activities deal with the environmental aspects of industrial development. Thus the over-arching goal of this paper is, during an initial four-year period, to sketch a comprehensive blueprint for development of an adequate infrastructure in the environmental field within UNIDO.

4.07 The activities to be implemented under the Environment Program are to help developing countries achieve a sustainable industrial development through:

- (i) the transfer and utilization of environmentally sound technologies and proper assessment of environmental impact for all new industrial projects; and
- (ii) the rehabilitation and environmental upgrading of existing industries and the restoration of polluted areas.

4.08 In particular, technology development and promotion should give priority to clean and low-waste technologies, the recycling and/or safe disposal of wastes, and risk management. From the start, technology transfer has been a basic element in UNIDO's activities and through the years the organization has acquired considerable expertise in the field. In the last few years technology transfer in the environmental field has become a key issue in international efforts to solve many problems of global relevance. Through the efforts of UNEP, for instance, conventions have been signed for the protection of the stratospheric ozone layer and against the export of hazardous wastes. To become effective, these conventions need to cover practically all countries. And in order to live up to the commitments of the conventions without undue sacrifices to living standards or development potentials, developing countries need to get access to new, often patent-protected, environmentally sound technologies. This is clearly an area in which UNIDO's experience in technology transfer, especially the legal and economic aspects of technology licensing, could make an important contribution to the international efforts in environmental protection.

4.09 Also in connection with industrial development in general and technology transfer in particular, there are often several different technologies available to achieve a specific goal. In the selection of technology UNIDO has an important role to play in systematically advising member states so that technologies eventually employed will encourage sustainable industrial development. Unfortunately, after identification of a sustainable technology, questions of access to and transfer of that technology frequently becomes a key issue. In this regard, UNIDO could facilitate access for developing countries to new environmentally sound technologies which are patent-protected intellectual properties of private companies (such as new technologies in the area of non-CFC production processes which would protect the ozone layer).

C. Financing

4.10 UNIDO is not a specialized environment organization like UNEP. However, the particular mandate of the organization to promote the industrialization of developing countries ensures that concentrated activity in the environmental field, specifically directed towards industrial sectors of special relevance for industrial pollution, can contribute enormously to prevention of pollution in new industries and the environmental upgrading of existing industries.

4.11 In order to initiate such activities, outlined in this paper for the consideration of the General Conference, there must occur a considerable strengthening of the resource base available for their implementation. A number of member states have indicated their willingness to finance individual projects of an environmental nature, as well as to consider contributing to special funds, especially those addressing global concerns such as climate and hazardous wastes. If UNIDO is to successfully execute an Environment Programme, the relative freedom derived from independent, assured financing must exist. UNIDO's Environment Programme is modest compared to other, multi-faceted organizations such as UNDP or the World Bank. But UNIDO is unique, and its specialization in industry, a cornerstone of development, assures that it can contribute significantly to reducing environmental degradation, especially given the many adverse environmental impacts inherent to industrialization in developing countries. What is needed now is a firm mandate and the critical mass, not only of skills or expertise but of the financial and manpower resources necessary to realize the objectives of this Environment Programme in enabling UNIDO to make that contribution to sustainable development in the industrializing countries in which it operates.

4.12 Given the current budgetary restrictions, wherever possible in the formulation of the Environment Programme, efforts have been made to combine the implementation of the requests in order to effect budgetary savings and to absorb costs within existing resources. This has been made possible only after close examination was made of the capabilities available both within UNIDO and outside, to determine areas in which existing resources could be adopted or adapted, as well as areas in which new ground must be broken.

4.13 The four-year initial duration of Environment Programme's activities, for the purpose of financing, fall into two categories: those eligible for regular budget funds and those eligible for funding from voluntary contributions. Both are summarized as follows:

- (i) Regular budget - Those portions of the Environment Programme which involve the activities carried out by Headquarters staff and/or consultants at Headquarters. It is envisaged that during the 1990-91 binnium, should the Program receive approval, six professionals and three general service positions will be needed. For the subsequent biennium, 1992-93, staffing requirements to be requested for funding from the regular budget will total 10 professionals and five general service positions. While UNIDO staff possess many talents, there is the distinct need to build up the organization's manpower skills in the particular area of environment, specially if the specific goals outlined later in this paper are to be achieved successfully. Eventually all staff members will be trained to consider environmental concerns in execution of their duties; the core group recruited specially for the Environment Program will become key resources in this process.
- (ii) Voluntary contributions - All field activities foreseen to be executed over the four-year period 1990-93 are to be funded by voluntary contributions.

D. UNIDO Special Trust Fund for the Environment

4.14 In order to ensure the independence and smooth flow of activities within the framework of the Environment Programme, it is recommended that a special trust fund be established to which member states can contribute in the knowledge that all monies would be earmarked for environmental projects. Called the UNIDO Special Trust Fund for the Environment, said trust fund would not be created as a new structure, but would instead be administered by UNIDO in the same manner as its other, existing trust funds. It would operate as a special section of the Industrial Development Fund, whose rules and regulations would thereby be applicable.

4.15 The objectives of the Special Trust Fund are, through the activities outlined in the UNIDO Environment Program, to contribute financially to the evaluation and transfer of environmentally sound technologies to developing countries; to restore hazardous waste dumping sites; and to rehabilitate and upgrade existing industries. The resources could be used not only in developing countries, but also in those countries with centrally-planned economies of eastern Europe which would benefit from planned activities such as rehabilitation of existing heavily-polluting industries.

4.16 Within the Environment Program are elaborated three priority activities, details of which can be found in following Programme Component sections. The first of these priority activities for which contributions to the Special Trust Fund could be utilized relates to the Vienna Convention and the Montreal Protocol for protection of the ozone layer, which center on the transfer of non-CFC technologies. The situation is that as new environmentally sound technologies emerge, they will become the patent-protected intellectual property of private companies. The idea would be for UNIDO to use resources from the Special Trust Fund to purchase the licenses on a commercial basis and subsequently, sell them on soft or symbolic terms to developing countries.

4.17 The second important priority activity deals with an inspection system for hazardous waste dumping sites. No doubt, the inspectors will find dumping sites that are totally unsuitable and which pose a threat to the health and well-being of the surrounding life. Restoration of those sites will be costly, as the experience of the United States with its Super Fund has shown. Therefore, developing countries with their sometimes imported hazardous waste problems would benefit from access to resources to begin the necessary clean-up operations.

4.18 The third priority project deals with the rehabilitation and environmental upgrading of existing industries. The activities planned within the environment Programme foresee the development of manuals and checklists for initially five sectors of industries, all of them relevant for developing countries, some of them relevant also for the centrally planned economies mentioned earlier. Rehabilitation and environmental upgrading, however, will also require considerable economic resources for hardware in the form of equipment and software in the form of know-how and management. The Special Trust Fund could play an important role in facilitating and speeding up the process.

4.19 The initial goal regarding amount of contributions to the Special Trust Fund is \$ US 20 million, reflecting contributions from member states on a voluntary basis.

4.20 Countries receiving assistance from the Special Trust Fund should themselves contribute to any project undertaken with no less than 10 % of the total project cost; this contribution could be made in local currency.

5. Overview of the Major Programme Components

5.01 The three major components of the Environment Programme have a number of areas in which one element of the programme gives support to another, making a programmatic approach to UNIDO's activities in this field clearly advantageous. A brief synopsis of each component is provided in the following three paragraphs. In sections, 6, 7, and 8, comprising the course of the programme, each one of the programme components will be dealt with separately. Within each, activities will be identified that form essential parts of the required UNIDO infrastructure and competence in the environmental field. In addition, activities are also identified that could form the output of UNIDO in this field.

A. Concepts and Tools

5.02 This programme component aims at developing the methodologies and skills required for UNIDO to ascertain that its executed projects employ technologies that are compatible with the concept of sustainable development, and that the environmental impact of the individual projects have been assessed prior to execution and have been found acceptable and in no conflict with the long-term development goals of the country. To ascertain that UNIDO-promoted technologies are compatible with sustainable development, that the environmental aspects are taken into account in industrial development planning and that environmental impact is assessed prior to the implementation of projects.

B. Technological Alternatives

5.03 This programme component aims at developing an information bank and clearing house for technological alternatives, using wherever feasible, the existing information structure mentioned in para 3.04, to provide information to member states on available technological options for obtaining desired goods and services. Environmental properties of the technologies are important parts of this information. Within the programme component there is also assistance to member states with respect to transfer of environmentally sound technologies.

C. Environmental Techniques

5.04 This programme component aims at developing an information bank using wherever feasible the existing information structure mentioned in para. 3.04, with a data base containing knowledge of methods for waste water treatment, purification of gases and handling of solid waste to achieve different levels of environmental protection in a cost-effective manner. A register of international experts and one of location where various environmental techniques have been implemented are other examples of the contents of the information bank. An important activity within this programme component deals with the rehabilitation and environmental upgrading of existing industries.

6. Concepts and Tools

A. Development Objectives

6.01 To ascertain that technologies promoted by UNIDO are compatible with sustainable development, that environmental aspects are taken into account in industrial development planning, and that environmental impact is assessed prior to the implementation of projects.

B. Operational objectives

6.02 To establish criteria for sustainable industrial development. To evaluate initially five industrial sectors with regard to their sustainability based on currently available technology. To establish methodologies for environmental impact assessment (EIA) of industrial development projects.

C. Activities

6.03 Through consultants or contractual arrangements with suitable institutions establish draft criteria for sustainable industrial development. After the preparation of these criteria broad agreement should be sought on them through a consultation procedure involving circulation of documents for comments and a final meeting with broadest possible representation. This should be done in close collaboration with UNEP and other relevant organizations within and outside the UN-system.

6.04 Based on the criteria developed for sustainable development initially five industrial sectors of special relevance for developing countries should be evaluated with regards to sustainability of presently available technologies.

6.05 The idea and function of EIA is to focus on the environmental issues to ensure that the potential impacts are considered in a thorough and systematic manner. In that way, when such impacts cannot be avoided, they may at least be minimized or mitigated. At present UNIDO does not utilize this available assessment tool. It will be necessary to identify suitable criteria for UNIDO's very specific industrial applications, which can be at best, only partially adapted from the existing models in use at other agencies with dissimilar mandates.

6.06 Methodology for conducting EIA's should be developed using a dual approach. On one side existing computer models for EIA should be evaluated by a qualified working group and a small number of models should be selected. These should then be modified to conditions of climates and ecosystems other than those of Western Europe or North America. They should also be modified for applications on PC's rather than on mainframe computers and be presented in a more user-friendly form. This task could be given as contractual work to a suitable institution. The resulting models selected would then be tested and evaluated on actual projects. Those models found to be successful and useful would be transferred to developing countries through special training programmes, seminars, etc.

6.07 Despite such developments, however, computer model-based EIA's are sophisticated tools which in the foreseeable future can be expected to be used only for large-scale projects. The complementing approach to EIA's that UNIDO should promote is for projects that are not unique in nature or size, and is the simplified or practical approach to EIA similar to the one developed within the Mediterranean Action Plan. Here contractual assignments could be made to develop "criteria" for practical EIA's for initially five sectors of industry. Practical tests of applicability would follow on specific projects and based on the experiences, the "criteria" would be modified. Once established EIA procedures should be incorporated in feasibility studies.

6.08 Other sets of criteria to which UNIDO could initially refer exist at UNEP and the World Bank, as well as outside the UN system, for instance with the Environmental Protection Agency in the U.S., as well as the EEC, OECD, etc.

6.09 Environmental aspects should be considered also in the economic analyses of projects. Within UNIDO a way could be through inclusion of an environmental module in COMFAR.

6.10 To follow the establishment of methodologies for EIA's are training programmes and on-the-job training activities for UNIDO staff in their application. A subsequent step is extension of the training activities to user groups at the national level in the developing countries.

D. Resources

6.11 For an initial two year period the recruitment of two full-time staff members; one at the professional level and one at the general service level, will be required with the following brief tasks:

- (i) Establishment of criteria for sustainable industrial development and evaluation of available technologies for five industrial sectors with regards to compatibility with the concept of sustainable development.
- (ii) Establishment of methodologies for Environmental Impact Assessment;
- (iii) Incorporation of EIA's in UNIDO's guidelines for industrial planning and in the computerized methods for integrated sectoral planning;
- (iv) Incorporation of EIAs in the procedure of feasibility studies, etc.
- (v) Application of EIAs for all UNIDO projects, and in the process, cultivation of close collaboration with UNIDO staff to provide on-the-job training in EIA methodology.

6.12 In addition to the resources in the form of staff, additional funds of US \$ 500,000 are needed for field activities to be funded from voluntary contributions; contractual work, consultants, travel, meetings, etc. No allocation is made here for resources for the subsequent training of people at the national level, which is expected to occur at a later stage of implementation of the Environment Program.

E. Projects

6.13 It is not possible to list the many environment projects being pursued at UNIDO. Following are a few examples of projects being formulated at even this preparatory stage in the area of Concepts and Tools.

- (a) Pilot Training Courses on Computer Aided Planning
- (b) Development of Software for Desktop Computers as Tools for Industrial Environmental Management (in collaboration with UNEP)
- (c) Environmental Impact and Risk Assessment Guidelines

7. Technological Alternatives

A. Development Objectives

7.01 To ascertain that member countries have access to information about available technological alternatives for production of desired goods or services, including environmental aspects of these technologies; and to facilitate for member countries getting access to newly-developed, often patent-protected, environmentally sound technologies.

B. Operational Objectives

7.02 Data bases exist already within the UN system and outside. It will be necessary to access and use the wealth of information already existing from these sources. Under this program the team will develop a data-base containing up-to-date information on available technologies, initially in five sectors of industry. The data-base should also contain information on environmental aspects of the technological alternatives, including pre-made evaluations of environmental sustainability. Within the resources of this clearing-house for technological alternatives should also be a roster of international experts and lists of companies with knowledge, patents and practical experience in the application of said technologies.

7.03 The establishment of a UNIDO Special Trust Fund for the Environment, to cover, e.g. the cost to transfer environmentally sound technologies.

C. Activities

7.04 To identify, as closely as possible, through a consultant's study, the full range of potential users of information on technological alternatives, and their specific requirements. Based on these findings the structure of the data-base can be determined so as to most exactly meet the needs of the users.

7.05 To set up the data-base on technological alternatives - initially for five sectors of industry - as well as a roster of international experts and a list of companies with knowledge, patents and/or practical experience in the application of said technologies. This could be done through contractual work or consultants.

7.06 Once developed, the information on alternative technologies should be included in the process of industrial development planning within UNIDO. In addition, in-house on-the-job training of UNIDO staff should take place to increase their awareness of the environmental aspects of industrial development planning. Shortly thereafter, member countries should be informed about the existence of the information system, and specific training packages in the form of courses and seminars should be arranged to instruct key personnel in those countries involved in industrial development planning in the use of the system. At the same time, this will help to establish a contact-net for dissemination of such information in the future.

D. Resources

7.07 The following tasks will require the recruitment of one professional staff member to be funded from regular budget resources:

- Establishment of the data-base and information system for the Technological Alternatives program component.
- Establishment of contact-net for the collection and dissemination of information; provision of on-the-job training for UNIDO staff on the environmental aspects and application of the information system to the technological alternatives identified as part of industrial development planning.

7.08 In addition to the personnel resources in the form of staff, additional funds for field activities in the amount of \$300,000 to be funded from voluntary contributions such as to the proposed Special Trust Fund, are required for consultants studies, and contractual work during the four-year period.

E. Projects

7.09 Among the projects under formulation under this program component are the following :

- (i) Alternative Technologies for Production of Low Toxicity Pesticides (In collaboration with UNEP)

F. Priority Activity I: Transfer of Non-CFC Technologies

7.10 In the field of green-house gases and effects on climate, CO₂ plays a key role as it is estimated that it accounts for 50% of the total heating effect. Atmospheric carbon dioxide increases at a rate corresponding to half the amount released through the burning of fossil fuel. The remaining part is dissolved in oceanic sea-water. Thus, in order to avoid an increase in atmospheric CO₂, global use of fossil fuels would have to be reduced to 50% of today's consumption. In order to make room for an increase on part of the developing countries, the reduction in industrialized countries would have to be in the range of 80-85% of the present use. As fossil fuels today account for ~ 85% of man's global use of energy and as there are environmental arguments voiced against most of the alternative sources of energy, e.g. nuclear and hydroelectric power, clearly a reduction of fossil fuel use with 80-85% in industrialized countries would be a paramount task. Besides CO₂, CFCs are the largest contributors to green-house effect responsible for about 25% of the total.

7.11 The Vienna Convention and the Montreal Protocol for the protection of the ozone layer call for a phasing-out of CFC's (chlorofluorocarbons). The recent Helsinki meeting with the parties to the Convention and a large number of observer countries - likely signatories in the near future - discussed the issue and recommended to speed-up the replacement of CFC's and to include additional ozone-destroying substances on the list, e.g. carbontetrachloride and methylchloroform. The bases for these recommendation are technical reports saying that the destruction of stratospheric ozone is progressing faster than earlier thought and the development of non-CFC technologies, particularly in the U.S., Europe and Japan, is going better than expected.

7.12 The new technologies, however, are largely going to be the intellectual properties of private companies protected by patents. Furthermore the new technologies are in most cases going to be more expensive than the CFC-ones and existing process-equipment in industry will have to be replaced with new ones.

7.13 The question of technology transfer, that is, how to make the new technologies available on acceptable economic terms to all countries, has emerged as the key question in the international efforts to protect the ozone layer. With its long-term experience in technology transfer UNIDO should be able to assist in solving these problems. The objective of sending such assistance is to protect the stratospheric ozone layer and thereby mankind and all other living organisms on earth from excess ultra-violet radiation by assisting in the transfer of non-CFCs technologies to the developing countries.

7.14 Among the requirements to successfully carry out this priority activity is the study of the impact on industry in developing countries of the banning of CFC's, halons carbontetrachloride and methylchloroform. This study should utilize the available material and subsequently provide additional inputs to the four study groups under the Montreal protocol, in particular the one on economic aspects. Where possible, material collected by UNEP for the Montreal and Helsinki meetings should be utilized.

7.15 The non-CFC technology transfer programme will be launched in the following three steps:

- (i) Where technologies and techniques are available, such as for spray propellants, foam plastic production and dry-cleaning;
- (ii) Where CFC substitutes are well on the way, such as for refrigerators, heat-pumps and air-conditioners; and
- (iii) Where cleaning technology is an integrated part of classified high-technology, such as for electronics, silicon chips and germanium arsenide chips.

7.16 For the first group, manuals should be developed describing the non-CFC technologies including practical examples of how identified individual companies have handled the phasing out of CFC's. In this context, full use should be made of the information collected by the study group on technology under the Montreal Protocol. These manuals should then be used in national campaigns and training programmes covering various uses and applications of CFC's.

7.17 For the second group a mechanism has to be identified to transfer technologies held as intellectual property and protected by patents by private companies, so as to put them at the disposal of developing countries which cannot afford these technologies on commercial terms. One possible mechanism is the UNIDO Special Trust Fund for the Environment which is based on member states' voluntary contributions. These funds would buy licenses for CFC-substitutes on commercial terms and sub-licence the rights to countries on soft or symbolic terms.

7.18 For the third group the exact needs of developing countries and the exact limitations on high-technology transfer must be identified. Close contacts have to be kept with the electronic industry to identify technologies as they develop in order that they can be transferred to developing countries.

7.19 The recruitment of one full-time staff-member devoting full time to this subject will be required from the regular budget, in addition to US\$ 100,000 per year for consultants and travel which will be funded by voluntary contribution to the Trust Fund.

8. Environmental Techniques

A. Development Objectives

8.01 To ascertain that member countries have access to information on environmental techniques on waste water treatment, gas purification and solid waste handling to achieve environmental goals in a cost-effective manner; and to speed up the rehabilitation and environmental upgrading of existing industries especially those presently contributing most to industrial pollution in areas of heavy industrialization in developing countries and the centrally planned economies of Eastern Europe, with the objective of substantially reducing the level of emissions before the end of the century.

B. Operational Objectives

8.02 To develop a clearing house and information bank on environmental techniques, together with their performance and cost characteristics; to develop a register of international experts on treatment and separation techniques; to develop sub-programmes for five sectors of industry for rehabilitation and environmental upgrading; and to establish the UNIDO Special Trust Fund for the Environment consisting of voluntary contribution from member states, for the rehabilitation and environmental upgrading of existing industries.

C. Activities

8.03 Identification, through a consultant study, of all potential users of the information on environmental techniques and the specific needs of the users; identification of the sources most appropriate, and forms of information for input into the system; decision on the structure of the system.

8.04 Establishment of information system on environmental techniques. This could be done through contractual work; establishment of a contact-net for the efficient dissemination of information.

8.05 Development of a register of international experts on techniques for waste water treatment, gas purification and solid waste handling, e.g. through contacts with professional societies and Academies of Engineering Sciences.

8.06 The following ten sectors were identified as having very highly negative environmental impacts:

- Cement
- Textile
- Tanneries
- Low-grade coal power plants
- Aluminium smelters

- Metallurgic
- Paper and pulp
- Fertilizer

Within the confines of the present four-year projection for activities to be carried out in the initial phase of the Program, priority will be given to five of these ten sectors, resulting in preparation of manuals and using as much as possible existing information from sources both within and outside UNIDO, for rehabilitation and environmental upgrading of existing industries. The five sectors are the following :

(i) Cement Industries

Cement is the backbone of building and construction activities in all countries. As cement has a high transportation cost in relation to product value, its production is mostly local. Environmental problems related to this industrial activity include physical destruction of limestone quarries or coral reefs; emissions of dust and nitrogen oxides from the production sites; and sometimes high pH recipient water. High temperatures, long residual times and the presence of calcium structure for neutralization and binding of acids and metals make cement industries suitable to utilize energy-rich waste material for fuel.

(ii) Textile Industries

The manufacture of textiles, especially cotton-based ones, is often among the first type of industries to emerge in developing countries. Water pollution from fibre rinsing and washing, as well as contamination from pigment material such as cadmium compounds, are environmental problems commonly associated with this industry.

(iii) Low-Grade Coal Power Plants

Many developing countries and several with centrally -planned economies utilize low-grade coal as the main energy source for industrial development. The environmental problems associated with such power plants are emissions of sulphur-dioxide and dust containing heavy-metal.

(iv) Tanneries

As with the textile industries the emergence of tanning is often among the first steps in agro-industry based industrial development. Environmental problems in the tanning industry range from water pollution resulting from hide cleaning and the discharge of tanning chemicals such as organic acids and chromium, to odour problems.

(v) Aluminium Smelters

A comparatively large part of global aluminium production is based on bauxite from developing countries. Where cheap energy, for example in the form of natural gas is also present, primary smelters for the reduction of aluminium to the metal itself also takes place in developing countries. Environmental problems associated with aluminium smelting are dust emissions, and atmospheric pollutants such as PAH (polyaromatic hydrocarbons) and NOx, associated (nitrogen oxides). In addition water pollution from the discharge of "red mud" is frequently also severe.

D. Resources

8.07 For the initial program period, the recruitment of one professional and one general service staff member to be funded from the regular budget is required to carry out the following tasks :

- establishment of data-base and information system for environmental techniques; establishment of register of international experts; and establishment of contact-net for collection and dissemination of the required information.
- development of a manual and check list for environmental upgrading of existing industries as well as guides on environmental techniques available for the purpose.

8.08 In addition to the personnel resources required in the form of staff, additional funds for the implementation of field activities amounting to US\$ 500,000 and to be funded by voluntary contributions such as to the proposed Special Trust Fund are required for the initial four-year program period.

E. Projects

8.09 The following list contains a sampling of projects envisaged for execution under this component of the Environment Program.

(i) **Low Cost and Environmentally Sound Techniques for Recycling and Treatment of Industrial Effluents with particular attention to Small and Medium sized Industries.** (In collaboration with UNEP). (To be integrated into the information system on Environmental Techniques).

(ii) **Equipping Six Existing Mobile Diagnostic Units for Environmental Diagnostics**

(iii) **Six New Mobile Units for Energy Auditing and Environmental Diagnostics**

(iv) **Three Annual Training Programme on Environmental Auditing**

(v) **Case Studies of the Environmental Situation in Industrial Free Zones in Ten Developing Countries with special reference to Legislation, Enforcement of Rules and Regulations and Management.**

Priority Activities II: Hazardous Waste

8.10 Hazardous waste of industrial origin has been found to be one of the most troublesome environmental problems. Most industrialised countries have their well-published eye-opening cases, such as Love Canal in the USA, Teckomatorp in Sweden and Koko Bay in Nigeria. The costs of cleaning up these old, ill-chosen and ill-managed dumping sites are frequently very high, as is indicated by the size of the so-called "Super Fund", set up by the U.S. some years ago. Naturally most of the hazardous waste dumping sites are found in the country - and mostly in the immediate vicinity of the industry - where the waste originated, but during the last decade export of hazardous waste from industrialised to developing countries has become a practice involving rapidly growing volumes. The environmental hazards and potential damage and future clean up costs are obvious.

8.11 The recently signed Basel convention to control the transboundary movement of hazardous waste is an important first step towards bringing the situation under control. However, the rapid growth of industry, in particular those sectors producing hazardous wastes, make hazardous waste management in developing countries an important issue also in the absence of specific transboundary movement.

8.12 The development objectives of this priority activity are to build the knowledge capabilities and capacities in all countries to handle and manage the hazardous waste and the hazardous waste dumping sites in an environmentally sound way; and to develop a system with authorised and inspected dumping sites, where industries generating hazardous waste would be required to prove that one such site is accepting its waste.

8.13 The operational objectives of this activity are to create an inspection system for hazardous waste dumping sites, based on an IAEA model, to safeguard human health and environment and transfer appropriate environmental techniques in the field. The system would consist of a small core group for administrators and a larger group of experts, available on call from their home countries, working as "international hazardous waste inspectors for 2-4 months a year.

8.14 In order to implement this priority activity, it is intended to create an administrative core group which will in the initial phase, recruit expert groups to inspect 100 hazardous waste dumping sites a year. The inspectors would identify problems connected with, among other things, the present or planned siting, types of waste management practices, drainage systems and a degree of public access.

and propose detailed measures to improve the situation. The group of inspectors would also suggest special assistance for the clean-up of contaminated areas or for the creation of safe places for hazardous waste handling and dumping. The inspectors could also classify the sites with regard to the types of waste that could safely be handled there.

8.15 The group of inspectors would normally consist of specialists in the following fields

- Chemical engineering
- Hydrology
- Public and occupational health

8.16 In general, sites should be revisited within three years. A contact and reporting system is to be set up to follow-up the recommendations of the inspectors and to channel, to the proper authorities, additional requests for information and/or assistance.

8.17 The reports from the groups of inspectors with descriptions of sites and problems and with recommendations and follow-ups will become a prime source of information and practical lessons for the future handling and disposal of all manner of solid hazardous wastes. An exchange of that information between planners and managers of hazardous waste handling and dumping sites is foreseen and will contribute to increasing knowledge and awareness.

8.18 For the administration of the inspection system of hazardous waste dumping sites, the recruitment of one professional and one general service staff member is required to be financed from the regular budget.

8.19 Field activities to be covered by voluntary contributions such as to the proposed Special Trust Fund include 6 teams of experts which will be required to cover initially 100 dumping sites in developing countries annually. At the end of this period, a meeting with ~ 500 participants, including representatives from all of the inspected hazardous waste dumping sites and their inspectors will be convened to evaluate the experience and to recommend future activities.

Priority Activities III: Environmental Upgrading in Special Industrial Sectors

8.20 Rehabilitation of existing industries is a field where UNIDO has substantial experience and a large number of ongoing projects. A growing number of them have an important environmental component. In the foregoing presentation of the Environment Program's major components, an activity is outlined within the Environmental Techniques section where manuals and check-lists for environmental upgrading are added to the rehabilitation programmes. For two of the industrial sectors, tanneries and cement industries, a substantial part of that work has already been done and the possibility exists to move on to a national campaign stage of the sub-programme implementation.

8.21 The development objectives of this priority activity are to reduce pollution from tannery and cement industries by a significant amount, globally, before the turn of the century, and to utilize the potential of the cement industry to make use of energy-rich wastes in an environmentally acceptable way thereby helping to solve other waste problems.

8.22 The operational objectives of this activity are to prepare manuals and check-lists for rehabilitation and environmental upgrading for tanneries and cement industry, and to secure financing and launch global campaigns centering on environmental techniques elaborated for these two sectors of industry.

8.23 In order to achieve its goals, the following activities are foreseen:

Development of a manual on rehabilitation and environmental upgrading based on tanneries based on UNIDO's experience in Africa only; development of a manual on rehabilitation and environmental upgrading of cement industries based on the experience of the project in Freeport, Grand Bahama; securement of the financial resources for global campaigns for environmental upgrading of tanneries and cement industries before the year 2000; establishment of collaboration with corresponding industries in industrialised countries; identification of the industries within these sectors in developing countries in need of rehabilitation and environmental upgrading, and launching of the global campaigns.

8.24 Considering the advanced organization and information capabilities of UNIDO, projects in the area of preparation of the manuals and checklists require no additional staff. Therefore two consultants each for three months would suffice to enable fulfilment of this activity's objectives. These consultants being engaged for Headquarters work, their funding would come out of the regular budget.

8.25 Securing funds for the global projects, including contacts with industry, development aid organizations and commercial investors/present owners, would take consultants 2 x 12 m/m. If successful, project overheads should cover additional UNIDO costs.

9. Additional Training Programme for UNIDO Staff

A. Background

9.01 Most of UNIDO's professional staff received their education and entered their attitude-setting first professional jobs at a time and place when environmental issues were far from priority item on the industrial development agenda. It is therefore necessary to ingrain a certain level of awareness, of the causes and effects of environmental degradation on each and every professional staff member to enable them to think about these issues and then act as a team in incorporating environmental considerations into every one of UNIDO's technical co-operation activities.

B. Development Objectives

9.02 To give UNIDO staff a reasonable level of awareness and knowledge in the environmental field is necessary for UNIDO to fulfill its role in promoting sustainable industrial development.

C. Operational Objectives

9.03 To give a series of lectures, seminars and practical exercises in the environmental field as a component of continuous education for UNIDO staff.

D. Activities

9.04 During the initial period of the programme UNIDO staff should participate in a series of lectures. These lectures should include a number of the following: Basic Ecology, Environmental Chemistry, Climate and Weather, Global and Regional Environmental problems, Technologies Techniques and Environment, Economy and Environment and Development and Environment. The staff member should sectors of industry.

9.05 In practical exercises, the staff members should solve environmental questions relating to their own fields of work. This can be achieved by working through decision games, such as the Industrial Emergency Game (PPD. 78 (SPEC)) or other similar simulation games on paper or computer. Such activities are particularly useful for teaching additional lessons such as industrial management including surveillance, management and personal occupational issues.

E. Resources

9.06 The recruitment of one professional staff member devoting full time to this training and education programme is required. Said staff member will be financed by the regular budget, which an additional US\$ 200,000 for lectures, teacher and educational material would be taken from the voluntary contributions such as in the proposed Special Trust Fund.

Table 1
Regular Budget Expenses

	1990-91 Biennium	1992-93 Biennium	Total 1990-1993
	No. of Posts.	No. of Posts.	No. of Posts
	<u>Est. Cost in US\$</u>	<u>Est. Cost in US\$</u>	<u>Est. Cost in US\$</u>
Professional Staff	6	10	0
	<u>600.000</u>	<u>1.000.000</u>	<u>1.600.000</u>
General Service Staff	3	5	0
	<u>150.000</u>	<u>250.000</u>	<u>400.000</u>
	9	15	0
<i>Sub Total</i>	<u>750.000</u>	<u>1.250.000</u>	<u>2.000.000</u>
HQ Consultants	<u>180.000</u>	<u>180.000</u>	<u>360.000</u>
Total	<u>930.000</u>	<u>1.430.000</u>	<u>2.360.000</u>

Table 2**Estimated Budget for Field Activities to be
Financed from Voluntary Contributions**

	<u>1990 - 1993</u>
Concepts and Tools	500,000
Technological Alternatives	
Priority Activity I	300,000
Environmental Techniques	500,000
Priority Activity II	3,430,000
Priority Activity III	- 0 -
Training	200,000
<i>Sub Total</i>	4,930,000
Environmental Fund Projects	20,000,000
Environment Projects Incl. Special Projects	82,500,000
Energy Projects	32,500,000
 TOTAL	 140 million

Annex V

**LIST OF UNIDO BACKGROUND DOCUMENTS
RELATED TO ENVIRONMENT**

1. **Hazardous Waste Management**
(edited by Sonia P. Maltezou, Asit K. Biswas and Hans Sutter) Volume 23
Published on behalf of UNIDO and the International Association for Clean Technology (IACT)
2. **Achieving Sustainable Development: UNIDO Programme on the Environment**
IO.30 (SPEC.) 12 May 1989
3. **Progress Report on Human Resource Development**
4. **Ongoing and Pipeline Environment-Related Projects implemented by IO/T**
(Status as of December 1988)