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ECA Multidisciplinary
Regional Advisory Group

**REPORT ON AN ADVISORY MISSION TO IDEP ON
A SHORT-TERM SPECIALIZATION TRAINING COURSE
IN ENERGY, ENVIRONMENT AND DEVELOPMENT
DAKAR, SENEGAL
4 - 18 February, 1995**

By

**Regional Advisors on Energy and Development
and Environment and Development**

UNITED NATIONS ECONOMIC COMMISSION FOR AFRICA
MULTIDISCIPLINARY REGIONAL ADVISORY GROUP

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LUSAKA
MAY 1995

1. INTRODUCTION

Mission purpose

At the request of the Director of the African Institute for Economic Development Planning (IDEP), a two man team from the UNECA Multidisciplinary Regional Advisory Group (MRAG) undertook a mission from 4 to 18 February 1995, to the Institute in Dakar to provide assistance in the finalization of a three-month specialization Training Programme in Energy, Environment and Development.

The team members were:

Mr. Haile Lul Tebicke, Regional Adviser on Energy and Development (mission leader) and
Mr. S. K. Imbamba, Regional Adviser on Environment and Development

Terms of Reference

The objectives of the mission were:

- (a) To revise and finalize the three-month training curriculum on energy, environment and development in Africa which MRAG had earlier proposed, paying particular attention to the reviewers comments as well as the recent trends in the fields of energy and environment.
- (b) To prepare a draft project proposal for use by IDEP in securing funding from cooperation partners for the implementation of the course.

- (c) To assist in identifying resource persons for the various course modules for the coordination of the programme.

Mission activities

At the start of the mission in Dakar, the Director briefed the team on the new orientation being developed for IDEP work programmes 1995-99, on the basis of the in-depth review of current activities and a new programme proposal in research, consultancy and IDEP advisory services to member States. The current training programme consists of three tiered structure leading to the MA degree as follows:

- the basic nine-month training in economic planning,
- a choice of independent three-month sectoral specialization training options to select from, and
- six-month research and theses preparation.

It is, however, planned that with effect from 1995, the M.A. degree programme will be delinked from the three month specialization programme (see Page 16 of project proposal).

The three-month training programme in Energy, Environment and Development would constitute one of four self-contained optional programmes that participants may pursue as short-term training courses leading to the award of a certificate.

The mission was kindly received by H.E. the Minister of Environment and Nature Conservation of Senegal and held discussions with senior officials of the Ministry as well as senior officials of the Ministry of Energy, Mines and Industry.

Consultations were also held with senior staff (Annex II) of relevant institutions including:

- the African Regional Center for Technology (ARCT)
- the Energy Programme at ENDA-TM.
- the Council for the Development of Social Science Research in Africa (CODESRIA)
- the Institute des Sciences de l'Environnement of Chiek Anta Diop University
- the Center des Recheche des Energies Renouvelables (CERER) of Chiek Anta Diop University

Acknowledgements

The team expresses its appreciation to IDEP management and staff for the excellent arrangements that facilitated the smooth conduct of the mission. Dr. Jeggan Senghor, Director of IDEP shared his views with the mission on environment and development issues which should be accorded priority consideration in energy planning and management in Africa. Thanks are due also to Professor Philip Quarcoo, IDEP's Chief of Training Programmes for valuable suggestions and comments and for the tireless support services of Training Programme Secretariat.

2. BACKGROUND

IDEP, a bilingual (English and French) Institute was established under UN Resolution 58 (IV) of 1 March 1962, and subsequently revised 1 March 1977, by resolution 320 (XIII) of the Conference of Ministers of the Economic Commission for Africa (UNECA). Its primary function is the training of African economic planners at postgraduate level, research and the provision of advisory and consultancy services in the field of socio-economic development planning in the African region. Every

year about one hundred African planners and decision-makers nominated by government agencies participate in various training programmes at the ECA sponsored Institute in Dakar. IDEP also organizes ad-hoc conferences, seminars and workshops on topics of relevance to development in Africa.

The membership of the Governing Council of IDEP is drawn from member States representing the various sub-regions of Africa. The Council which oversees and provides guidance to the Institute is chaired by the Executive Secretary for UNECA.

IDEP Training Programme Structure

IDEP's training programmes have to date been comprised of the following courses:

1. A two-year postgraduate course leading to the MA degree in Economic Planning and Development for eligible staff nominated by African governmental organizations. The course consists of a nine-month basic training programme in economic development planning combined with a three-month specialization training course in a trainees selection of one of four fields, and subsequently six months of research ending with the writing of an MA degree thesis.
2. A three-month independent training programme in a participant's selection of one of the four specialization fields, taken as a self-contained short-term course leading to certificate in one of the four areas namely:
 - (i) Industrial development
 - (ii) Population and human resources development

- (iii) Agriculture and rural development
- (iv) Energy, environment and development

Training in the first three of the above specializations has for many years been offered at IDEP in the Masters or Certificate programmes of study. The three-month specialization course in energy, environment and development, however, has to date been conducted only in 1985/1986. When it was launched in 1985, the course had been jointly designed, organized and conducted in close collaboration with ENDA-TM (ENVIRONNEMENT ET DEVELOPPEMENT DU TIERS MONDE), which is a Dakar-based non-governmental international organization (NGIO). The 1985 course had enjoyed the backing of a number of bilateral and multi-lateral agencies, most notably the Economic Development Institute (EDI) of the world Bank. The lecturers were delivered by experts from industrialized and developing countries including some from Africa.

Misunderstandings that arose during the running of the training course unfortunately led to the break up of further collaboration between the two institutions. Suspended after 1986 at IDEP, the programme has nevertheless been included in the list of IDEP specialization training programmes since then.

The ENDA training course in energy planning

ENDA, however, subsequently decided to go it alone and has since 1987 conducted postgraduate training courses on energy planning for 20 to 25 African participants initially every year, but more recently at intervals of two years. The ninth course is scheduled to run from 24 April to 24 June 1995 in Dakar. One of the training courses was held in Brazil for Portuguese speaking African countries and another one in Botswana for Anglophone SADC

countries. The other six training courses have all been conducted in French as will be the forthcoming 1995 course.

ENDA training courses focussed on energy planning at the outset and had over time laid increasing emphasis on sustainable energy development. The course has recently evolved giving more emphasis on the integration of environmental considerations in energy planning process. The new title of the course in 1995 "Energy, Environment and Development" duly reflects this emphasis.

The aims of the forthcoming course are as follows: to deepen the appreciation of energy problems in the context of combatting poverty, to strengthen planning of energy development through integrating environmental considerations, mastery of the analytical and planning tools at the local, national and regional levels, strengthening operational capacity at centralized and field levels and enhancing cooperation and exchange of experience among African countries and organizations as well as with those of Third World countries in general.

ENDA also provides advisory and consultancy services. Another major area of activity is research into energy development issues. In these areas of work ENDA collaborates closely with and is the African member of COPED a network of well-known research institutes in Asia, Europe and Latin America engaged in studies of energy development in the Third World.

Training relevant to energy and environment at other Dakar-based institutions

The African Center for Technology (ARCT), an ECA-sponsored African Inter-Governmental Organization in Dakar, is mandated to provide advisory and consultancy services on technology to member

States and to assist them in identifying alternative sources of technology on request. Its scope of services includes feasibility and design services, sectoral studies and provision of information. The ARCT also conducts ad-hoc workshops and seminars on various themes, training and demonstration to promote diffusion of innovative energy technology, such as biogas. The ARCT has also organized regional training course in energy when resources were available.

The Center de Recherche des Energies Renouvelables (CERER) of Cheikh Anta Diop University in Dakar is one of the eight AMCEN networks under the umbrella of UNEP and appears to be a prospective Center for the training programme on environmentally sustainable energy in the AMCEN network. CERER, however, appears to have made little progress towards taking up this regional training responsibility. The Center reports to have conducted some ad-hoc training courses on-request such as the two-week course it recently conducted for Customs Officials on solar panels in preparation for removal of customs duty on their importation.

The Institute of Environment Sciences (ISE) of the Faculty of Science of Cheikh Anta Diop University in Dakar conducts post-graduate training programmes at Masters, M.Phil. and Ph.d. degree levels. The training lays emphasis on preparing participants to identify the principal issues, interactions and the evaluation of techniques for rational management of the environment.

The Council for the Development of Social Science Research in Africa (CODESRIA) is a Pan-African NGO established in 1973. Its members are African research institutes, social science faculties of African Universities as well as professional organizations. Its principal aims are facilitating research from a perspective relevant to African needs, to promote cooperation

in research, provision of fora for the exchange of views and information among African researchers and provision of small grants for young researchers in African graduate schools. Research results are disseminated through a variety of publications.

All CODESRIA research programmes include a training component of short-term duration.

The Curriculum MRAG proposed in 1991

At the request of IDEP in 1991 a two-man team including Regional Advisers on Energy and on Environment undertook a mission from 10 to 19 April to the Institute in Dakar.

The MRAG mission, in accordance with its terms of reference, reviewed the structure and content of the three-month specialization training programme on energy, environment and development conducted at IDEP in 1985/86. The mission also held extensive discussions on various aspects of such training with IDEP as well as senior staff responsible for the Energy Programme at ENDA.

The MRAG mission report included a critique of the original curriculum, and detailed proposals for a revised course content. The proposals reflected the growing concern internationally over the adverse health and environmental impacts of predominant fossil energy and fuelwood and charcoal supplies as well as uses and the urgency to mitigate the impacts.

IDEP had invited comments on the MRAG proposed curriculum from various parties with a view to enhancing its relevance to inter-relations of energy-environment development in Africa. It had also been hoped that the commentators would contribute

African perspectives on emerging international concerns over adverse environmental impact of increasing energy uses and proposals for the mitigation of these impacts. The responses from the African training and research institutions approached and UNEP, to IDEP's invitation for comments on the MRAG proposed curriculum were long delayed and with one exception far less than had been hoped for.

3. MISSION FINDINGS

Training programme in energy environment and development in Africa.

It appears that in Africa, regular training opportunities in the area of policy analysis in energy, environment and development have been limited to the programmes originally launched at IDEP in the mid- 1980s and subsequently conducted at ENDA-TM.

Consequently, Africans wishing to pursue training in the areas of integrated planning and management of energy, environment and development have to date to rely on (i) training programmes in other regions and (ii) ad-hoc sub-regional training seminars and workshops for African countries organized by bilateral and/or international institutions. While these have been indeed of considerable benefit, access to such ad-hoc training opportunities has been limited to a very few. Moreover, these externally designed programmes have all too often been based on well researched case studies of policy issues and problems that arise in non-African contexts. It is worthy of note that economic, cultural and environmental factors of decisive importance prevailing in other regions of the world are markedly different in general from those in Africa.

This means that the perspectives adopted and the solutions developed are all too often of very limited relevance in the African context.

The specialization programme in energy, environment and development, which IDEP envisages to offer on a regular basis at least once a year, would be a step in the right direction of remedying the pressing need of training opportunities for African policy and decision-makers within the region. The training modules would be delivered mainly by competent African policy researchers, analysts, management experts based on their first-hand experience in the field and qualified experts from other regions as appropriate. The course materials and case studies would as far as possible, be based on relevant African research and analysis of the subject conducted recently at IDEP and other African institutions, government departments, parastatals, universities and research networks such as AFREPREN.

The existence in Dakar of the above six institutions involved in overlapping activities in the areas of energy policy and planning, research, advisory services and training, offers challenges and unique opportunities to all the institutions to collaborate and assist each other with a view to avoiding wasteful duplication and competition for dwindling support resources. Most importantly, collaboration would aim to optimize the benefit African countries may derive in capacity building in all the important areas of policy analysis and design in sustainable energy, environment and development.

4. MISSION RECOMMENDATIONS

The energy, environment and development nexus in Africa

It is well recognized that energy is an indispensable input into physically developing, establishing, applying, utilizing, operating and maintaining the material basis of survival and development systems without exception. Energy security is, therefore, fundamental for sustainable survival and development.

Though generally assumed in development planning to be readily achievable, attainment of national and local energy security has recently been proving to be an intractable problem and a goal that demands competent integrated planning and sustained commitment.

Energy supplies extracted from primary resource endowments occurring in the environment, are utilized in the environment. Each stage in the chain from extraction to final end-uses, exerts its own characteristic impact on the environment. The nature and intensity of the impact depends on the nature of the processes the co-products, waste products and emissions arising in the extraction/production/conversion processes, the energy carrier produced (be it charcoal, electricity or gas for example) and the end-use. The environmental and health impacts of chemical and thermal residues and waste products of fuels in general and fossil fuels in particular have in recent decades grown to become of world-wide concern.

Environmental impacts of energy supplies and end-uses had in the past been generally regarded as acceptable risks and disadvantages of the benefits of energy application. The magnitudes and intensities of the impacts have, however, grown recently with rapid increases of energy use. The impacts in air

and water pollution, soil contamination, acid deposition, deforestation, greenhouse gas accumulation inducing global warming and climate change etc., have become so severe that they are considered to be posing serious threats to existing life forms at local, regional and global levels.

Levels of development and quality of life, have commonly been regarded as closely correlated to energy consumption levels. The local health and environmental impacts of energy uses and supplies where they were acute, had been formerly dealt with by application of minimal remedial measures and regulations. But escalating costs of high levels of energy uses and perceived national security risks of major import dependence for supplies, had triggered vigorous promotion of energy efficiency improvement in the developed countries following the first OPEC oil price hike in 1973/4.

As a result, major improvements were achieved in the OECD countries in efficiency of energy supply and end-uses in the decade 1975 to 1985. These efficiency improvements are considered to have led to substantial decoupling of levels of development from high levels of energy use as a result of substantial reductions in energy consumption per unit of GDP in the developed countries with considerable economic and social benefits. In the developing countries on the other hand, and in particular in the majority in the African region, energy intensity of GDP has remained high at levels that according to one estimate, are at least 40% above those generally prevailing in the developed countries.

The major contribution of high energy intensity to precipitous deterioration of energy security and to the increasing adverse economic, environmental and social consequences of energy, has been all too often disregarded in

development policy and planning in Africa. These factors contribute as both cause and effect, to the unrelenting intensification of the energy - environment - development crisis in African countries.

There can be no question about the crucial role of cost-effective high energy efficiency in optimizing the benefits to be derived from limited energy supplies. But there can be no improvement of survival and development prospects in Africa without improvement of energy security i.e. increased energy availability, for the vast majority now experiencing acute energy scarcity. Energy requirements for survival and development increase with population growth and the challenge confronting integrated policy and planning of energy, environment and development is to devise ways and means attain and maintain adequate energy security, the major obstacles to such a quest notwithstanding.

The prospects for attaining energy security are, however, becoming more difficult by the emergence of the following factors of decisive importance in the African context in general and the 32 LDCs of the region in particular.

1. Global warming inducing climate changes which are expected to lead to greater aridity, and resulting in drastic declines in biomass growth and survival and reduction of hydro-energy potential in the vast semi-arid and sub-humid areas of the continent. Some 2/3 of Africa's population inhabiting these areas can therefore expect to suffer intensification of current acute scarcity of biomass and hydro-electric energy in rural and urban areas and deterioration of future prospects for achieving energy security.

2. The ever growing competition for and the consequent rising scarcity and costs of investment resources essential for expanding, developing, and diversification of centralized and stand-alone energy supplies and for improving energy efficiency in supplies and end-uses towards the goal of energy security.

These intricate linkages and interaction constitute the energy, environment and development nexus which requires policy and planning capacity competent to devise pragmatic, country-specific and resource-specific solution. The energy-environment-development crises prevalent throughout the region, reflect in part the general inadequacy of such capacity at functional levels in the countries. This condition heightens the urgency and need for African capacity building programmes such as the one IDEP proposes.

The mission therefore, recommends that:

1. The course focusses on the intricate linkages and interactions of energy environment and development of principal concern in the developmental and ecological contexts specific to African countries.
2. The course be geared to capacity building in policy analysis of integrated energy, environment and development issues of rural and urban areas in Africa.

The strategy of the course

The basic strategy of the course would be that of a demand-driven training programme that is self-contained and flexible in order to focus on emerging key issues of significance to energy sector development integrated with sustainable environment and development at the local, and regional levels in Africa.

The mission, therefore, proposes that:

1. The content of each annual programme be flexibly recast in accordance with important development unfolding at the regional and global levels, so as to contribute to building and strengthening of national capacity necessary to formulate and implement appropriate policy and management response in IDEP member States.
2. In conducting the course IDEP collaborates with the other five Dakar based institutions involved in various aspects of energy, environment and development, so as to enhance complementarity and benefits and avoid wasteful duplication of programmes. During consultations held with Senior officials of each of the institutions, the mission received assurances of their readiness to collaborate with IDEP and vice versa.

Course structure and content

The content of the IDEP training programme in energy, environment and development should be relevant to:

- the felt needs in energy sector management and development in rural and urban areas of African countries, take advantage of IDEP's accumulated experience in African economic development planning and that of relevant national, regional and international institutions agencies active in the field such as the SEI, IIED, GEI, IEA, World Bank/EDI, etc.

The conceptualization, analysis and design of pragmatic policies for orderly transitions towards rural and urban energy security as integral components and in support of endogenous

self-reliant development shall be given special emphasis. The objective would be a clear grasp of often disregarded but critical macro economic linkages and reciprocal interactions of the energy sector with productive and service sectors, and with environment, poverty, women, etc. Special emphasis would be laid on learning the practical application in African settings, of analytical and management techniques, through lectures, case studies, computer modelling and simulation to explore alternative future energy scenarios. The scope and limitations of adopting in African contexts, solution devised in other regions will receive focal attention in order to elucidate the realities and the achievable options in the interdependent context of sustainable energy, environment and development.

The course objectives

The main objective of the course is capacity building for need-oriented, end-use based analysis and management of the energy sector so as to enhance sustainable energy security geared to poverty alleviation, and sustainable improvement of quality of life in rural and urban areas of IDEP member States. To this end the course objectives shall encompass but not be limited to the following:

1. To enhance and broaden conceptual and analytical capabilities of planners and managers in energy system/concepts that are environmentally sustainable, economically viable, technologically sound and socially equitable;
2. To improve their skills in analysis and management of sustainable energy and environment policies and programmes;

3. To develop their capacity for applying analytical skills to the practical solution of energy and environment problems;
4. To enhance their ability to engage in meaningful policy dialogue and negotiations with energy sector stakeholders at the local and national levels and with their international interlocutors and cooperating partners.

Core topics

The core topics of the course shall include:

1. An overview of the interdependent crisis in energy, environment and development in Africa and a critical review of direct and indirect impacts of traditional and modern energy systems on environment, health and socio-economic development, and introduction of cost benefit analysis of integrated energy development within sustainable environment.
2. Energy sector development planning within a framework of end-use focussed and needs-oriented policy analysis emphasizing micro and macro intersectoral linkages in rural and urban settings.
3. The integration of environmental concerns in planning process, emphasizing environmental monitoring, assessment and accounting as well as harmonization of environmental legislation.

4. Assessment, planning and management of resources of Africa's major ecosystems; understanding basic elements of the relevant conventions and the energy provisions of Agenda 21. Greenhouse gas emissions in Africa and mitigation of impacts of climate change.
5. Thematic workshops, on computer simulation exercises, analytical tools and methodologies for sustainable environmental policy and for gender policy in the energy sector.
6. Field visits, study tours and participants presentations in poster sessions on selected topics.

The Participants

The course should be offered in both English and French. This will provide an invaluable opportunity for the exchange of ideas and experiences across different operating administrative and political structures in the continent. In any case, the course should be open to all individuals responsible for any of the following:

1. Energy sector and sustainable environment planning;
2. The administration and management of rural and urban energy and environment projects and programmes; and
3. Energy and environment development policy analysis and negotiations.

Participants should be middle - to senior-level staff in:

1. The planning Departments of Ministries of Energy, Environment and staff dealing with energy issues in sectoral ministries;
2. The Energy and Environment Departments of Ministries of Planning;
3. The Energy and Environment Departments of Central Banks;
4. Energy and Environment Development Projects including River Basin Development Projects;
5. lecturers and Tutors in Faculties offering policy-oriented courses in energy and sustainable development; and
6. Private organizations involved in energy and environment development, including IGOs and NGOs.

In selecting the participants, due consideration should be given to the following points:

1. The need for making a sustained effort to ensure an adequate representation of women in the course;
2. Adequate equitable geographical distribution in terms of balanced representation of countries from all the regions of the continent;
3. The number of participants at the course should be limited to 25 to 30 persons at one time.

Eligibility Requirements

The participants should generally hold a minimum of a BA or BSc degree or its equivalent in economics, science or engineering or a related discipline. Sufficient experience in energy and environment, planning and policy analysis at the mid-career level may be considered as a substitute. In any case, it would be desirable for participants to have a minimum of three years post-qualification work experience. The participants should be citizens of an African country, and be currently employed by a government department, national agency, IGO, NGO and should be active in energy and environment development activities. Candidates wishing to be considered for sponsorship should be nominated by their employers.

Resource requirements

The course coordinator will be a distinguished engineer or scientist with a deep understanding of the linkages and interaction between environment and energy in sustainable development. He will be responsible for the management of the course. Short-term consultants for a period of five man/months will also be recruited to teach the various modules outlined. Computer equipment and other related equipment will be critical for the success of the course.

Course Modules

Eight modules have been proposed for the course which will be delivered in a period of three months. The amount of time allocated to each module will vary from 1 1/2 to 2 weeks. The specific areas to be covered as well as the objectives of each module are also provided.

ANNEX I

I D E P

THREE-MONTH SPECIALIZATION
TRAINING
PROGRAMME IN ENERGY, ENVIRONMENT
AND DEVELOPMENT

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I. ENERGY, ENVIRONMENT AND DEVELOPMENT IN AFRICA

Background

The use of energy is indispensable for human survival, for improvement of quality of life and for development of productive sectors such as agriculture, construction, energy, industry, mining, transportation, etc and services such as education, health, water supply and sanitation, etc. It is harnessed from primary energy resources in the environment. The resources may be renewable, such as biomass, hydro, geothermal, solar, wind, etc or non-renewable, such as coal, petroleum, natural gas, nuclear, etc.

Primary energy resources may be converted into energy carriers such as charcoal, electricity, liquid or gaseous fuels or even heated solids or fluids to facilitate energy transportation, distribution and utilization. The extraction and harnessing of primary resources, the conversion of energy supplies, their transportation and energy end-uses all take place in the environment. Each link in the process chain from a primary resource to energy end-use, affects directly and/or indirectly the local environment and often remote environments. The residues and waste substances resulting from extraction, production, supply and utilization of energy have impacts on the local environments and usually induce or at least contribute to adverse impacts on remote and even on the global environment.

Development and survival activities take place in and also affect the environment. But there has hitherto been inadequate effort to balance environmental imperatives and energy demands.

Development and survival activities are thus intricately linked and interact with energy supplies and uses and with the environment. Adverse environmental impacts of energy and

development were disregarded generally as inconsequential repercussions of economic growth. Recently, however, growing concern over irreversible adverse impacts have made the interactions of energy, environment and economic development, of major concern nationally, regionally and internationally.

A case in point is the high level of threat to the survival of present life forms posed by global warming and ozone layer depletion as well as deforestation and degradation of land resources, pollution of fresh water resources and sea water contamination resulting from the predominant patterns of energy uses and supplies.

It is further acknowledged that environmental conservation which previously was perceived to be in conflict with development, is in fact compatible and mutually reinforcing with sustainable development. Therefore, environmental conservation is no longer adequate without utilizing the resources (land, water, forests, etc.) sustainably for development. It is also argued that development cannot subsist upon a deteriorating environmental resource base, and that environmental concerns must be adequately incorporated into existing and future economic and social development policies to ensure that the environment and the natural resource base are protected and if possible improved rather than being subjected to irreparable degradation.

Low levels of energy access in Africa

The African average of annual per capita energy access has stagnated over the last two decades at its current low level of 20 GJ which is the energy content of 480 kg oil equivalent or about 3 barrels of oil. This African energy access is just 1/3 of the world

average, 2/3 of the Asian, 1/2 of South American and 1/7 of West European energy access levels.

Oil, coal and natural gas constitute the energy sources by a wide margin in the developed world while most of the African countries rely heavily on fuel-wood and other biomass. Overall consumption of energy in Africa is far lower than in the developed countries. In 1988, Africa's population comprising 12% of the world total, accounted for only 3.5% of world total energy consumption. On the other hand, Europe with 9.7% of world population for instance, consumed some 22% of world total energy.

Over 75 percent of Africans live in rural areas. With the possible exception of the four north African oil producing countries and South Africa, the vast majority of Africa's rural and urban populations depend overwhelmingly on biomass for energy. The average citizen is driven by poverty and underdevelopment to over-exploit the natural resources available to him often resulting in severe degradation of the environment.

Charcoal fuel used mainly in urban African households for instance, is one of the causes of deforestation of the surrounding country side and far beyond. The adverse effects on the environment, have prompted some African Governments to promote various measures of curbing household energy runaway demand growth, including the design and production of efficient charcoal stoves.

Energy requirements are not only for household use. Rural industrialization requires energy. The latter is a prerequisite to halting current mass exodus of young people from rural to urban centres. Modern agricultural production requires energy inputs in various forms including fertilizers much of which end up

contaminating surface and ground water resources. Motorised transportation over land, sea and in the air and industrial production in urban areas also require considerable energy inputs, particularly in fossil fuel form.

Greenhouse gas emissions of energy supplies and uses

The emissions of gaseous products of fossil fuel combustion are the principal causes of increasingly severe air pollution in industrial and urban areas in the developed and developing world. Carbon dioxide, the principal gas emitted in fuel combustion is accompanied by lesser quantities of carbon monoxide, nitrogen oxides, sulphur oxides, etc. Inadvertent emissions of some volatile organic compounds (VOC) that are component of solid and liquid fossil and biomass fuels, gaseous fuels such as natural gas and methane emissions from organic matter and also chloro-flouro-carbons (CFC) are other air pollutants released into the atmosphere in fuel supply and utilization processes and systems.

The gaseous emissions from fuel systems being greenhouse gases, add to the global warming effect of carbon dioxide and water vapour content of the natural atmosphere. The additions to the global atmosphere of greenhouse gases from fossil fuel energy supplies and uses principally in the developed countries todate, is the principal cause forcing acceleration of global warming that is inducing climate change.

The emissions of large quantities of the oxides of sulphur, nitrogen and other components of fossil fuel uses in sectors such as industry, households, transportation resulting in acid rain are also causing acidification of the environment.

Energy prospects under global warming and climate change in Africa

Africa has a total of some 1 960 million hectares of dry lands that constitute 65% of its land mass and one third of the world's dry lands. About 1/3 of the continent's dry lands are uninhabited hyper-arid deserts. The remaining 2/3 of Africa's drylands consisting of semi-arid and sub-humid areas are inhabited by about 400 million, that is some 2/3 of the continent's total population of about 610 million in 1988. The overwhelming majority of the rural and urban population in the semi-arid and sub-humid areas depend almost entirely on woody biomass for energy.

If the drylands of Africa become drier as is expected under global warming and climate change, the majority inhabitants of these areas will experience energy scarcity of unprecedented severity leading to acute deprivation and suffering.

Of all the continents, Africa is the most vulnerable to the harsh effects of climate change induced by global warming. The expected consequences are reduced rainfall, increased evapo-transpiration, lower average soil moisture levels, and more frequent severe droughts and flooding. Some of the anticipated results include:

- i drastic declines in the rates of biomass growth and survival;
- ii reduction of water resources potential for hydro-energy and irrigation due to less rainfall and run-off in dryland areas;
- iii substantial fall of ground water levels and depletions of reserves, with increased energy requirement for pumping up water particularly in the arid and semi-arid areas.

The major proportions of Africa's population inhabiting the semi-arid and sub-humid areas can, therefore, expect to face much harsher environmental conditions and acute scarcity of biomass and hydro-energy under global warming.

Climate change in Africa induced by global warming is also likely to accelerate desertification being driven by human over-exploitation of the fragile arid and semi-arid ecosystems wide spread in the continent. Surveys by UNSO and UNEP recently show that desertification is worsening throughout the region. Intensification of drought and desertification due to climate change, would substantially reduce the output of agricultural commodities, on which the economies of the majority of African countries depend heavily. Many countries have expanded agriculture into fragile and marginally productive ecological zones in order to increase production of export agricultural commodities to enable them to pay their foreign debts. Of course the realities have turned out to be contrary to their expectations.

In order to enhance development, African governments have in the past adopted national management plans for energy and environment. In this endeavour they have benefitted from guidelines and policies contained in various documents, including the following: the Monrovia Declaration (1979), the Lagos Plan of Action (1980), the African Ministerial Conference on the Environment (AMCEN), Cairo (1985), Africa's Priority Programme for Economic Recovery (APPER), and the United Nations Programme of Action for African Economic Recovery and Development (UN-PAAERD).

Available information, however, suggests that current energy patterns and trends in Africa are unsustainable economically, socially and environmentally, and that a transition to sustainable energy systems, which requires planning at national and

international levels, must be put in place. This is more so because the implementation of UNCED Agenda 21 programme areas in Africa require greater energy security and self-sufficiency. The enhancement of energy security and sufficiency would over time improve per capita energy access for satisfaction of essential needs as well as raising the availability of energy services for development and economic growth.

On the easing of fuel-wood shortages in developing countries, the World Commission on Environment and Development (WCED) recommends the need for the affected countries to reorganize their agriculture with a view to produce large quantities of wood-fuel and other plant fuels. This would entail the promotion of agro-forestry practices as well as using improved fuels. The report further recommends the need for both developed and developing countries to shift their energy paths towards the development of alternative sources of energy, including renewable forms of energy, which should constitute the foundation of the global energy structure for the 21st century.

The Convention on "Desertification", the major follow-up of the Earth Summit, which was signed in October 1994 also urges governments to include in their national action programmes the development and efficient use of various energy sources as well as the promotion of alternative sources of energy, particularly solar and wind energy.

II. JUSTIFICATION

The development crisis which is widespread in Africa has closely interlinked dimensions in energy and environment that await to be effectively addressed in development of policy and planning in general. African governments have made considerable resource

investments in energy development in the past three decades in compliance with donor guidelines and prescriptions. But the vast majority of Africans continue to experience persistent deterioration of energy availability whether in traditional wood-fuel, charcoal, agri-residues or petroleum fuels and electricity.

Raising African energy access levels

The population of the continent which was 224 million in 1950, and 555 million in 1985 is projected to exceed 700 million in year 2000. In the face of the doubling of population expected in 30 years, it will be a formidable task, even in the absence of climate change, to maintain the average African per capita energy access at its current low level of 20 GJ or just 3 barrels of oil equivalent per year.

The task would require considerable investments in tree planting. But even greater investments would be needed in developing modern energy supplies from biomass, hydro- and geothermal, solar and wind resources. Further considerable investments would also be needed for exploration and development of new, and expansion of production from existing coal, petroleum and natural gas reserves. Global warming and climate change can be expected to make the task more formidable and the investments much higher.

With the possible exception of tree planting, the bulk of energy investments would require foreign exchange for the acquisition of technology and for greater imports of petroleum supplies. But the current deterioration in terms of trade of Africa's major commodity exports and the tariff barriers that face their meagre manufactured exports in industrial country markets are reducing export receipts at the same time as concessionary investment flows are dwindling. It is questionable whether under

the circumstances African countries would ever command sufficient investible resources to afford the huge capital and foreign exchange sums that would be required for sustainable energy development.

The environmental dimensions of energy systems generally underestimated in the past and, therefore, inadequately provided for in sectoral and overall planning and policy, have subsequently emerged as key constraints for the achievement of policy goals and strategy targets. The grave consequences of environmental degradation on the carrying capacity of ecosystems and on human health have made it imperative to integrate fully environmental considerations into energy policy and planning as well as in development policy and planning in general. But few if any African countries have the institutionalized capacity essential to elaborate and implement integrated sustainable energy and environment policies and strategies.

Despite the urgent need for African capacity building in the area of energy policy analysis to take up the challenge and cope with the above threats and obstacles, African training and research opportunities in relevant fields have been very limited. African energy and environment planners and managers have consequently had to acquire and up-grade training and sharpen policy research skills mostly in programmes essentially designed for other regions.

Capacity Building in African Energy and Environment Policy and Planning

IDEP, a bilingual (English and French) Institute was established under UN Resolution 58 (IV) of 1 March 1962, and subsequently revised 1 March 1977, by resolution 320 (XIII) of the Conference of Ministers of the Economic Commission for Africa

(UNECA). Its primary function is training African economic planners at postgraduate level, research and the provision of advisory and consultancy services. Every year some one hundred African planners and decision-makers nominated by government agencies participate in various training programmes at this ECA sponsored Institute in Dakar.

IDEP plans to conduct demand-driven short-term training and research programmes that will be self-contained and responsive to changing needs of its member States. Emphasis is to be laid on the problems of sustainable sectoral as well as overall development. In this context, IDEP envisages to relaunch the specialization training course in Energy, Environment and Development that was run once only in 1985.

In the pursuit of these objectives, IDEP expects to collaborate closely with appropriate national, regional, continental, international and non-governmental organizations and institutions. Such collaboration is expected to enhance synergy and complementarity of their efforts thereby optimising benefits for capacity building in the nexus of energy, environment and development policy and analysis in African countries. It is anticipated that the demand-driven training approach will enable IDEP to flexibly respond to the changing training needs and priorities of member States in planning and policy analysis and formulation in this field of growing importance.

III. IDEP AND OTHER DAKAR-BASED TRAINING PROGRAMMES IN ENERGY, ENVIRONMENT AND DEVELOPMENT

In 1985 a three-month post-graduate training course on energy planning and development was jointly organized and conducted at IDEP in collaboration with the Dakar based non-governmental

organization on Environment and Development in the Third World, better known by its French acronym ENDA-TM. The course was mounted with the backing and contributions of several bilateral and international institutions including the EDI of the World Bank. A selection of planners and decision-makers from both anglophone and francophone African countries participated in the course. Experts from industrialized and developing countries delivered the various modules.

Misunderstandings that arose during the conduct of the training course unfortunately led to the break down of collaboration between the two institutions. Although the programme has since 1985 been included in the list of IDEP specialization training programmes, the Institute has not offered it since then.

ENDA, however, has subsequently conducted postgraduate training courses on energy planning for 20 to 25 African participants initially every year, but more recently at intervals of two years. The ninth course is scheduled to run from 24 April to 24 June 1995 in Dakar. One of the training courses was held in Brazil for Portuguese speaking African countries and another one in Botswana for Anglophone SADCC countries. The other six training courses have all been conducted in French as will be the forthcoming one.

The content of ENDA training courses has evolved over time with increasing emphasis being devoted to planning for sustainable energy development through greater integration of environmental considerations. The new title of the 1995 course "Energy Environment and Development" duly reflects this emphasis.

The aims of the forthcoming course include the following: to deepen the appreciation of energy problems in the context of

combatting poverty, to strengthen planning of energy development integrating environmental considerations, mastery of the analytical and planning tools at the local, national and regional levels, strengthening operational capacity at centralized and field levels and enhancing cooperation and exchange of experience among African countries and organizations as well as with those of Third World countries in general.

ENDA also provides advisory and consultancy services. A major area of activity is research into energy development issues. In this, it collaborates closely with a network of well-known research institutes in Asia, Europe and Latin America engaged in studies of energy development in the third world.

The African Centre for Technology (ARCT), an ECA-sponsored African Inter-Governmental Organization in Dakar, is mandated to provide advisory and consultancy services on technology to member States and to assist them in identifying alternative sources of technology on request. Its scope of services include feasibility and design services, sectoral studies and provision of information. The ARCT also conducts ad-hoc workshops and seminars on various themes, training and demonstration to promote diffusion of innovative energy technology, such as biogas. The ARCT has also organized regional training course in energy when resources were available.

The Centre de Recherché des Energies Renouvelables (CERER) of Cheikh Anta Diop Univepsity in Dakar is mandated to conduct the training programme on energy of the AMCEN network of UNEP.

The Institute of Environment Sciences (ISE) of the Faculty of Science of Cheikh Anta Diop University in Dakar conducts post-graduate training programmes at Masters, M.Phil. and Ph.D. levels.

The training lays emphasis on preparing participants to identify the principal issues, interactions and the evaluation techniques for rational management of the environment. The trainees will be enabled to form part of interdisciplinary teams engaged in the identification and implementation of development policies for the satisfaction of essential needs with minimum environmental pollution to preserve the basis of sustainable development.

The Council for the Development of Social Science Research in Africa (CODESRIA) is a Pan-African NGO established in 1973. Its members are African research institutes, social science faculties of African Universities as well as professional organizations. Its principal aims are facilitating research from a perspective relevant to African needs, to promote cooperation in research, provision of fora for the exchange of views and information among African researchers and provision of small grants for young researchers in African graduate schools. Research results are disseminated through a variety of publications.

All CODESRIA research programmes include a training component of short-term duration.

The existence in Dakar of these six institutions engaged in overlapping activities in the areas of energy policy and planning, research, advisory services and training offers challenges and unique opportunities to all the institutions to collaborate and assist each other with a view to avoiding wasteful duplication and competition for dwindling support resources. Most importantly, collaboration would aim to optimise the benefit African countries derive in capacity building in all important areas of policy analysis and design in sustainable energy, environment and development.

African planning and management in integrated energy, environment and development has to date had to rely on (i) training programmes in other regions and (ii) ad-hoc sub-regional training seminars and workshops for African countries organized by bilateral and/or international institutions. While these have been indeed of considerable benefit, access to such ad-hoc training has been limited to a very few. Moreover, these externally designed programmes have all too often been based on well researched but non-African case studies of issues and problems that arise in energy, environment and development policy and decision making in non-African countries where socio-economic, cultural and environmental factors of decisive importance are markedly different.

The specialization programme in energy, environment and development, which IDEP envisages to offer on a regular basis at least one a year, would be a step in the right direction of remedying the pressing need of training opportunities for African policy and decision-makers within the region. The training modules would be delivered mainly by competent African policy researchers, analysts, management experts and experts on their first-hand experience in the field and qualified experts from other regions as appropriate. The course materials and case studies would as far as possible be based on relevant African research and analysis of the subject conducted recently at IDEP and sister institutions, government departments, parastatals, universities and institutions, etc.

IV. COURSE CONTENT

Objectives

Energy policies and strategies followed in African countries with the encouragement and considerable support of bilateral and international institutions in the two decades since the 1974 oil price shock, have not proved effective in reversing deterioration of per capita energy access or improving energy security for the vast majority. At the same time, the contributions of the energy sector to environmental degradation and pollution have grown markedly. The predominance of excessively high wastage in energy end-uses and supplies in the traditional and the modern energy sub-sectors have served to aggravate the adverse impacts of energy on environment and the national economies.

It is, however, possible through the right policy analysis and strategies and with effective management of the energy sector and the environment to substantially improve energy access and security while conserving the environment in rural and urban areas.

To this end, the capacity building objectives of the proposed course are:

1. To enhance and broaden conceptual and analytical capabilities of planners and managers in energy systems that are environmentally sustainable, economically viable, technologically sound and socially equitable ;
2. To improve their skills in analysis and management of sustainable energy and environment policies and programmes;

3. To develop their capacity for applying analytical skills to the practical solution of energy and environment problems;
4. To enhance their ability to engage in meaningful policy dialogue and negotiations with energy sector stakeholders at the local and national levels and with their international interlocutors and cooperating partners.

Structure of IDEP training programme

The current training programme of the Institute, which has been in existence since 1978, consists of a nine-month basic programme in economic development and planning, a choice of four independent three-month specialization programmes, and a six-month research training programme which forms the final part of the M.A. programme.

It is, however, planned that with effect from 1995-96 biennium the M.A. programme will be delinked from the current three-month specialization programmes (Industrial development; Population, human resources and development; Agricultural policy analysis; environment and energy development).

The successful candidates in the masters programme will be awarded a Master of Arts degree in Economic Analysis and Management, while those in the specialization programme will be awarded a certificate in their respective areas of specialization.

Delivery modalities

The course consists of lectures, group discussions, field visits and energy sector computer model simulation exercises.

Lectures will be delivered by a panel of reputable African and other experts who possess relevant experience in the topics addressed in the modules. The experts will also provide notes to the participants.

Simulation Exercises

Energy sector computer simulation models will be designed to help the participants enhance their ability to solve problems related to sectoral and multidisciplinary planning with emphasis on integrating environment in the planning process. In addition, the exercises will enhance the ability of participants to evaluate, monitor as well as carrying out EIA of projects.

Poster Sessions and Group Discussions

Participants will be expected to present a seminar on a topic of their choice related to main themes of the course in the specific context of their home country. They will be expected to assemble data and relevant materials for the seminar before they arrive at IDEP. Each seminar presentation will be followed by a discussion in which the lecturers and participants will participate.

Field Visits to selected localities close to Dakar involving both sustainable and unsustainable energy projects will be made. This will enable the participants to familiarize themselves with real world situations.

Course duration

The course will last for three months (approximately 13 weeks). The various modules to be delivered are listed here below.

Proposed course modules

- I. Linkages between environment, energy and development
(1 Week)
- II. Integrated planning of energy and environment for sustainable development (2 Weeks)
- III. Management of the African environment in the context of Agenda 21 (2 Weeks)
- IV. Energy uses, supplies and resource management in Africa
(2 Weeks)
- V. Strategies for building human, institutional and infrastructural capacities for sustainable development
(1 1/2 Weeks)
- VI. Strategic imperatives for sustainable development requiring energy input (1 1/2 Weeks)
- VII. Poster sessions for individual participants and country presentations (seminars and workshops) (1 1/2 Weeks)
- VIII. Case studies, field visits, etc. (1 1/2 Weeks)

Content of Course Modules

MODULE 1 : *Linkages between environment, energy
and development*

1. Environment and energy crises in Africa
2. Impacts of energy systems on environment and health
3. Concepts of sustainable development and energy systems
4. Reconciling environment and economic development
5. Benefits and costs of environmental protection

MODULE 2 : *Energy utilization, supplies and primary
energy resources*

1. Energy for meeting essential needs
2. Energy for economic development and growth
3. Primary energy resource endowments
 - Renewables : animate, biomass, geothermal, hydro, solar
and wind
 - Fossil fuels: coal, petroleum and natural gas
 - Energy efficiency: cost effective energy efficiency in
end uses and supplies

4. Energy balances
 - energy accounting and energy demand and supply models
5. Centralized and decentralized energy supply from alternative sources for thermal, mechanical and electrical energy needs
6. The end-use perspective in energy analysis and policy
 - energy demand management
7. Optimal matching of energy end-uses and sources

MODULE 3 : *Integrating environmental concerns in
Energy planning for development*

1. Environmental impact and risk assessment (EIA)
2. Environmental economics and accounting
3. Environmental monitoring and assessment
4. Development and implementation of legal instruments for mitigation of environmental impacts
5. Integrating environmental concerns in energy planning for development in agriculture, construction, households, industry, transportation and other sectors.
6. Direct and indirect environmental impacts of energy utilization and supply from renewable and fossil resources
7. Socio-economic impacts of rural and urban energy uses and supplies

**MODULE 4 : *Environment and energy development in the context
of agenda 21***

1. Brief review of major global environmental events (1972-1991)
2. The Earth Summit - UN Conference on Environment and Development (UNCED) 1992: Rio Declaration, Agenda 21, Forest Principles and the Conventions
3. Management of Africa's terrestrial ecosystems, urban environments and industries, fresh water resources, marine and coastal ecosystems: status and trends, factors responsible for deterioration, coping mechanisms
4. Energy demand management in major energy end-uses eg in agriculture, households, industry, transportation etc.
5. Optimizing industrial production and preventing pollution
6. Strategies for implementation of Agenda 21 in the context of African Common Position with emphasis on energy aspects
7. **Greenhouse gas** emissions of African energy supplies and uses
8. Anticipated impacts of global warming and climate change on African energy systems
9. African capacity to respond to impacts of climate change and variability
10. International cooperation in mitigating the impacts of climate change on energy in Africa

**MODULE 5 : *Strategic imperatives for environment
and energy development***

1. Merging environment and economics in decision making
2. Promoting environmental awareness, education and training
3. Energy policy and planning for rapid orderly transition to sustainable energy systems
4. Cost-effective energy self-reliance and efficiency in national energy systems
5. Conserving and enhancing the resource base
6. Ensuring a sustainable level of human population
7. Energy for sustainable rural and agricultural development and poverty alleviation
8. Promoting participation of major actors and stakeholders in African sustainable energy/environment planning and management: the roles of women, the private and public sectors, NGOs, scientists and technologists, farmers, government and international cooperating partners
9. Reorienting technology
10. Sub-regional and regional energy cooperation and integration, including energy research and development and trade in all forms of energy, towards establishment of the African Economic Community under the Abuja Treaty.

11. International cooperation for sustainable energy development in Africa.

**MODULE 6 : *Tools and technology for energy and environment
assessment and management***

1. Social and environmental costs of application of energy technology alternatives
2. Life-cycle costing of energy end-use and supply technology
3. Technology choice, acquisition and adaptation for energy self-reliance
4. Participatory rural appraisal of energy-environment-development alternative options
5. Interpretation of air photos and satellite imagery
7. Computer modelling of energy-environment-development interactions
7. Geographical information systems
8. Data collection, analysis and presentation
9. Public awareness, training and community-based action plans
10. Resource evaluation: physical, biotic and human

**MODULE 7 : *Financing sustainable environment and energy
development***

1. The role of the public sector
2. The role of the private sector
3. The role of consumers and NGOs
4. Foreign direct investment and joint ventures
5. Energy pricing and marketing
6. Global Environment Facility (GEF)
7. Debt relief (debt swaps)
8. Tradeable greenhouse gas emission permits
9. Relevant and specialized UN agencies
10. Multilateral institutions

MODULE 8 : *Poster sessions for individual participants
and country presentations (seminars/workshops)*

Each course participant is expected to give a presentation of personal experience in a chosen topic

MODULE 9 : *Case studies and field visits, etc.*
Outline of Module

Case studies and field visits form part of the training programme

Performance Objectives and Module Outlines

Module 1

Linkages between environment, energy and development

Performance Objective

The principal objective of the module is to broaden participants' understanding of the intricate linkages between energy, environment and development in particular in relation to national accounts, economic development, GDP, "Green" GNP, sustainable development with emphasis on the role of energy in the development process. A historical sketch of the energy and environment crises in Africa forms an introduction to the module. The module is intended to enable the participants to:

1. Identify and analyse energy-environment-development linkages.
2. Appreciate the urgency of the need to protect the environment for sustainable development.

3. Reconcile environment and economic development in relation to environmental and health impacts of energy uses and supplies.
4. Understand the difference between the "Green GNP" and the economist GNP and GDP.
5. Understand the linkage between population pressure and sustainable development.

Module Outline

- 1.1. Energy, environment and development in Africa
- 1.2. Impact of energy systems on environment and health
- 1.3. Environmental impacts of socio-economic development and underdevelopment
- 1.4. Benefits and costs of environmentally sustainable, economically and technologically viable and socially sound development

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Module 2

Energy Utilization, Supplies and Primary Energy Resources

Performance Objective

The principal objective of this module is to provide training to participants in the application of an end-use perspective in energy analysis, policy and planning. This will be introduced to participants through a recapitulation of the current structure, components, trends and constraints of energy uses, supplies and primary resource endowments in Africa as seen from an end-use perspective. They will learn energy balance compilation techniques and review the processes of conversion of primary energy resources to produce supplies of various forms of energy as required for use and understand the critical importance of matching energy uses cost-effectively to energy supplies.

The module is intended to enable participants to:

1. Identify and assess social and economic uses of energy.
2. Review accessibility and affordability of energy supplies produced from alternative primary resources.
3. Compile energy balance sheets.
4. Understand the principles of matching energy end-uses cost-effectively to supplies.
5. Apply the end-use approach in energy development policy.

Module Outline 2.1. Energy for meeting essential needs.

- 2.2. Energy for economic development and growth.
- 2.3. Primary energy resources.
- 2.4. Energy balances.
- 2.5. Energy supply production from alternative resources.
- 2.6. The end-use approach to energy analysis, policy and system design.
- 2.7. Matching energy end-use cost effectively to energy supply.

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Module 3

Integrating Environmental Concerns in the Planning Process

Performance Objective

The purpose of this module is to briefly recapitulate the elements of socio-economic planning process underscoring the importance of incorporating environmental concerns in the planning process. Emphasis will be placed on environmental impact assessment, environmental monitoring, environmental accounting and auditing, development and harmonisation of environmental legislations and the formulation of policies and strategies as well as making sound investment decisions taking into account environmental concerns.

The module is intended to enable the participants to:

1. Understand and apply the principles and practices of environmental impact assessment, environmental planning, environmental monitoring, environmental economics and accounting in their own spheres of operation, especially in project planning for sustainable development.
2. Contribute to the development and formulation of relevant policies on environmental legislations.
3. Advise on appropriate institutional mechanisms for implementation of environmental planning, assessment, monitoring and evaluation.
4. Plan capacity building in terms of personnel and institutions in these critical fields of environment geared towards sustainable development.
5. Formulate sectoral plans integrating the life-cycle costed benefits and adverse impacts on the environment and society, of energy uses and supplies in specific sectors such as agriculture, households, industry, transport, etc.

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Module Outline

- 3.1. Environmental impact assessment, environmental accounting and economics.
- 3.2. Planning of energy and environment involving major stakeholders including women, the private sector, etc. and based on life-cycle costs and benefits.
- 3.3. Environmental monitoring and development of institutions, legislations, instruments and enforcement.

- 3.4. Assessment of rural and urban energy development incorporating environmental and social concerns such as health, employment, etc

Module 4

Energy and Environment Development in the Context of Agenda 21

(3 weeks)

Performance Objective

The purpose of Module 4 is to acquaint participants with the major global environmental events from 1972-1991; their objectives and outcomes. The UNCED held in 1992 in Rio, as well as its various outputs such as Agenda 21, the Forest Principles and the Conventions. Training will be provided in the assessment, planning and management of terrestrial and aquatic ecosystems and urban environments as well as mechanisms for the implementation of various provisions of Agenda 21 and the Conventions. The region's greenhouse gas emissions including the likely economic, social and environmental consequences of global warming will be presented. Various proposed forms of international cooperation in mitigation of climate change impacts will be addressed.

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The module is intended to:

1. to heighten awareness of the consequences of climate change and the urgency of building capacity including popular participation in coping with and mitigating the impacts.
2. Acquaint participants with the growing world wide concern over the impacts of energy development on the environment, and the international response.

3. Acquaint them with the nature and aims of various outcomes of the Earth Summit - UNCED in 1992.
4. Impart to them assessment, planning and management principles to maintain ecosystem equilibrium.
5. Acquaint participants with the provisions of Agenda 21 and in particular its energy specific provision with a view to preparation of plans for implementation of the provisions.
6. Explain the effects of greenhouse gas emissions and the adverse consequences of the climate change in Africa.
7. Underline the urgent need to build capacity at local and national level to cope with and mitigate the effects of climate change.
8. Enable participants to discuss and seek international cooperation in mitigating climate change impact.

Module Outline

- 4.1. Overview of global major environmental events including the Earth Summit.
- 4.2. Ecosystems management principles.
- 4.3. Strategies for implementation of Agenda 21.
- 4.4. Greenhouse gas emissions in Africa and anticipated impacts of global warming and climate change.
- 4.5. Building capacity to cope with and mitigate climate change at local and national levels.

4.6. International cooperation in mitigating climate change impacts

Module 5

Strategic Policy Imperatives for Sustainable Development

Performance Objective

The principal objective of this module is to elaborate further on national strategies which must be put in place for an orderly transition from unsustainable to sustainable development.

This module is intended to enable the participants to:

1. Appreciate the significance of merging economic and environmental policies, especially since they are integrated in the workings of the real world, i.e. economic and ecological interdependence.
2. Appreciate the need to pursue sustainable development which requires the interdependence of sectors rather than fragmentation of sectoral responsibilities.
3. Acknowledge the fact that sustainability requires legal and institutional frameworks as well as community support and participation in decision-making, especially in the management of resources.
4. Understand the imperatives of incorporating environmental objectives in non-traditional sectors - taxation, foreign

trade, investment, etc. and not only agriculture, industry...

5. Appreciate the importance of reorienting technology in order to respond effectively to challenges of sustainable development, bearing in mind that technologies of industrialized countries are rarely suited to socio-economic and environmental conditions of developing countries.
6. Ensure that environmental factors are taken into consideration in the development of new technologies as well as upgrading traditional ones and adopting imported ones.
7. Appreciate the importance of carrying out vulnerability and risk analysis of technologies.
8. Appreciate the need to provide alternatives for peoples' livelihoods in order to avoid stressing one particular resource - fish stocks, forests, energy, etc.
9. Appreciate the importance of relating population planning to development planning, ensuring that population policies embrace broader areas than merely controlling numbers.
10. Recognize the importance of strengthening the participation of social groups (women, farmers, youth, NGOs, etc.) in achieving sustainable development.
11. Appreciate the critical importance of cost-effective self-reliance and efficiency in energy systems and of enhancing energy access for sustainable rural and agricultural development.

12. Understand the importance of sub-regional and regional energy cooperation and integration under the Abuja Treaty and of international cooperation for outstandable development.

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Module Outline

- 5.1. Merging environment and economics in decision-making.
- 5.2. Conserving and enhancing the resource base.
- 5.3. Sustainable levels of human population.
- 5.4. Promoting participation of major groups (women, youths, farmers, NGOs and the S & T community) in the management of environment and resources.

- 5.5. Energy for sustainable rural and agricultural development (SARD).
- 5.6. Cost-effective energy self-reliance and efficiency.
- 5.7. Sub-regional and regional cooperation in energy for the attainment of the African Economic Community under the Abuja Treaty.
- 5.8. International cooperation for sustainable energy development.

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Module 6

Tools and Technology for Energy and Environment Assessment and Management

Performance Objective

The main aim of this module is to sharpen the participants' skills and abilities in assessing and analyzing energy and other natural resources. Mastering these techniques and technologies will

enable the participants to plan for sustainable management and utilization of natural resources while at the same time protecting the environment.

The module is intended to enable the participants to:

1. Assess life cycle costs and benefits of energy end-use and supply technology taking environmental and impacts social considerations into account.
2. Appreciate the use of Geographical Information System in storing, retrieving and analyzing environment data for effective management and planning.
3. Appreciate the principles and techniques of remote sensing as applied to natural resource assessment and monitoring for formulating appropriate management plans.
4. Understand that empirical good data are critical in defining the real extent and severity of environmental and resource degradation.
5. Learn about computer based analysis of environmental and energy data for monitoring changes and how the technique can be used to perform their jobs more effectively.

Module Outline

- 6.1 Social and environmental costing of application of energy technology.
- 6.2 Remote sensing, geographic information systems, computer modelling and data collection, analysis and presentation.

- 6.3 Public awareness, training and community based action plans.
- 6.4 Technology choice, acquisition and adaptation for energy self-reliance.

Module 7

Financing Environment and Energy Development

The main objective of this module is to acquaint participants with the constructive roles that major stakeholders and actors in the energy sector can play in financing sustainable energy and environment development. Design of energy pricing policy will be taught for promoting efficiency in energy end-uses and supplies for poverty alleviation and sustainable economic development and growth in rural and urban areas. International funding for encouraging environmental conservation will be described.

Module 7 is intended to:

1. Familiarize participants with the roles of major stakeholders and actors in financing energy and environment for sustainable development.
2. Enable them to design energy pricing policies that promote efficiency in energy end-uses and supplies and offer incentives that attract investments while assuring affordable energy access to low income strata of society.
3. Familiarize participants with the Global Environmental Facility (GEF), Debt Relief, Joint Implementation Debt-for-Nature Swaps and other international financing mechanisms for promoting environmental protection.

Module Outline

- 7.1. The role of Government, the public and private sector.
- 7.2. The role of consumers and NGOs.
- 7.3. The role of foreign direct investment.
- 7.4. Energy pricing and marketing.
- 7.5. The "polluter pays" principle.
- 7.6. The GEF and other international, bilateral and multilateral mechanisms for promoting environmental protection.

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V. TARGET PARTICIPANTS AND ELIGIBILITY

Participants

The course will be offered in both English and French to all individuals responsible for energy and environment planning and development and/or administration of energy and environment projects and programmes and/or energy and environment policy analysis and negotiations. The course is targeted to middle - to senior-level staff in:

- (i) The planning departments of ministries of responsible for energy and environment.
- (ii) The energy and environment departments of the ministry of planning.
- (iii) The research departments (energy and environment) of central and development banks.
- (iv) Energy and environment development projects including River and Lake Basin development projects.

- (v) Lecturers in faculties and colleges of science, agriculture, engineering, forestry, livestock offering policy oriented courses in energy and environment.
- (vi) Private organizations involved in energy and environment development including IGOs and NGOs.

An effort will be made to ensure an adequate representation of women in the course as well as ensuring a balanced geographical representation from all the regions of the continent.

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Eligibility

Applicants would generally be expected to hold a minimum of Bsc degree or its equivalent in science or engineering or related disciplines. Extensive experience in energy and environment planning and policy analysis at the mid-career level may be considered as a substitute. All applicants will, however, be expected to have a minimum of four years post-qualification work experience. The course is available to any African citizen (preferably under 30 years old) and should be currently employed by a government department, national agency, IGO or NGO. Candidates wishing to be considered for sponsorship should make their requests to their employers for nomination.

VI. RESOURCE REQUIREMENTS

Indicative Costs for Running the Programme

1. Personnel Costs

- (i) **Coordinator:** The Coordinator will be responsible for managing all aspects of the course under the supervision of the Chief of Training Division. The post will be equivalent to L5 level (UN scale). US \$90,000

- (ii) **Short-Term Consultants:** The consultants required for a total of 5 man/months to supplement the existing teaching staff of the Institute. Funds will also be required for round trip air fare and DSA where necessary. The estimated cost for this activity is US \$5,000 per man/month, that is: $US \$5,000 \times 5 = US \$25,000$
- (iii) **Training Officer:** A training officer is required to assist the Coordinator. He/she would be responsible for tutorial assignments as well as assisting the participants in computer techniques and other practical

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exercises as recommended in module 6. The position is for 4 man/months, a level equivalent to L2 (UN scale) at a total cost of US \$25,000.

- (iv) **Secretary:** A locally recruited bilingual secretary at the level of G7 (UN scale) will be required for the project for entire duration of the project at the cost of US \$7,000.
- (v) **Interpretation/Translation Staff:** As IDEP is a bilingual institution, there will be need for simultaneous interpretation of the lectures as well as the translation of the training materials for the course. This activity would require a minimum of two interpreters/translators for 4 man/months each at a total cost of $US \$(25,000 \times 2) = US \$50,000$.

2. Fellowships

Financial resources will be required to support the participation of a maximum number of 25. The trainees will need stipend to cover living expenses, book allowance and medical

allowance. Also included in the fellowship is a tuition fee of US \$ 2,000 as stipulated by the IDEP regulations. Provision will also need to be made for round-trip air-fare which will vary with each trainee. The total fellowship cost per trainee is estimated to be approximately US \$5,500 for the entire period of three months. The total cost of fellowships for the 25 participants will amount to: US \$ 5,500 x 25 = 137,500.

3. *Equipment*

The course will use a variety of simulation packages for IBM compatible micro-computers for resource inventory (remote sensing and GIS), modelling of environmental impacts of energy systems, etc. A number of softwares (eg. 1²S, ERDAS, ARC/INFO and IDRISI, latest version of LOTUS, DBASE) will be needed. A minimum of 10

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micro-computers will be adequate for the trainees and their staff. The following hardware, software and supplies will be required:

10 IBM PS/2 for trainees and staff
5 Printers (4 Epson LQ-570 and 1 HP Laserjet)
Power Storage Device/Noise Filter/Surge Suppressor
Software: 1²S, ERDAS, ARC/INFO, IDRISI, LOTUS, DBASE
Supplies: Diskettes, paper, ink, ribbon, etc.

The equipment will be ordered at bulk rate and imported tax-free. However, provision must be made for air freight and handling charges. If an assumption is made that each PC will cost US \$3,000; EPSON printer US \$600; Laserjet printer US \$1,600; the power storage device US \$2,000; Software US \$4,000 and supplies US \$3,000, the total cost of computer hardware, software and supplies would be:

US \$ (30,000 + 4,000 + 2,000 + 4,000 + 3,000) = US \$43,000

A heavy duty photocopier (eg. Canon PC heavy duty photocopying machine) and accessories as well as an overhead projector will also be required. Each is estimated to cost US \$7,500 and US \$3,000 respectively, totalling to:

US \$ (7,500 + 3,000) = US \$ 10,500

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4. *Summary costs*

The cost of running the training course will be as follows:

Personnel costs	:	US \$ 197,000
Fellowships	:	US \$ 137,500
Computer equipment	:	US \$ 43,000
Additional equipment:		US \$ 10,500
Sub-total	:	US \$ 388,000
Administrative overheads (13%)	:	US \$ 50,440
Total	:	US \$ 438,440

ANNEX II
List of persons met in

1. Dr. Jeggan C. Senghor
Director
IDEP
2. Prof. Philip K. Quarcoo
Chief
Training Division
IDEP
3. Prof. Jean Elendjon
Coordinator
Industry Specialization Programme
IDEP
4. Mr. T. Fakhfakh
Chief
Administration and Finance Division
IDEP
5. Dr. Youba Sokona
Coordinator Energy Programme and
International Relations
ENDA-TM
6. M.J.P. Thomas
Energy Programme
ENDA-TM
7. Dr. Ousmane Kane
Deputy Executive Director
OIC-ARCT
8. Mme M.B. Gaye
Socio-economist
ARCT
9. Mr. Seila Toure
Technical Adviser on Energy
Ministry of Energy, Mines and Industry
10. H.E. Abdoulaye Bathily
Minister of Environment and
Nature Conservation
11. Mr. Boubaca Niane
Technical Advisor
Ministry of Environment and
Nature Conservation

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Annex II

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12. Prof. Abou Thiam
Director
Institute of Environmental Sciences
Chiekh Anta Diop University

13. Prof. Mansour Kane
Director
CERER
Chiekh Anta Diop University

14. Mr. K. Young Gyanpo
Consultant
ARCT