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Addendum

REGIONAL PROGRAMMES IN THE FIELD OF NEW AND RENEWABLE SOURCES OF ENERGY

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REGIONAL PROGRAMMES ON NEW AND RENEWABLE SOURCES OF ENERGY

I. INTRODUCTION

1. As indicated in the Draft Programme of Action of the United Nations Conference on New and Renewable Sources of Energy, the regional dimension is a very important component for its implementation. It is clear that the present energy scenario is different from one region to another and that these differences and specific regional characteristics need to be taken into consideration when designing and implementing an international concerted effort such as the Programme of Action of the Conference. The Programme will contain basic premises and principles aimed at guiding the international collaboration in the field of new and renewable sources of energy; the character of the energy requirements of each region, together with identified priorities for action by the countries of different regions of the world should be seen as the specific framework for future action. Global actions, in conjunction with subregional and regional collaborative programmes, both in support of priorities defined at the national level, form a "system" through which the UNCNRSE Programme of Action will be implemented: the subregional dimension, the participation of subregional and regional institutions, the interregional activities and the inter-governmental and non-governmental institutions all have an important role to play and the Programme of Action should consider them as main channels for implementation.

2. During the preparatory process for the Conference, a large number of regional and subregional activities took place, such as experts' meetings, specialized studies, consultations, inter-agency meetings, etc. which culminated, in several cases, in intergovernmental meetings attended by Ministers of Energy or of related areas. These activities resulted in a definition of the specific regional energy framework, the identification of priorities for action and of the "ad hoc" regional institutional arrangements for the implementation of the defined priorities.

3. The bulk of regional preparations was carried out under the responsibility and coordination of the regional commissions. One of the results of this preparatory process was the identification of areas of work of the competence of these commissions and the required subregional and regional coordination with specialized institutions.

4. At their meeting on 3 - 4 July 1981, the Executive Secretaries of the regional commissions reaffirmed their commitment to the success of the United Nations Conference on New and Renewable Sources of Energy and to the implementation of the Programme of Action to be approved by the Conference. In this regard, they emphasized the unique role which the regional commissions have to play in promoting the development and utilization of new and renewable sources of energy at the subregional, regional and inter-regional levels and in supporting national efforts, taking into account the differing energy situations in their respective regions. As indicated above, during the preparations for the Conference, regional action programmes were formulated

which should be taken into account in the preparation of a global action programme. In addition, any global action programme in this field must deal with general issues which are of fundamental concern to the regional commissions. For example, regional commissions in their regular activities deal with questions of energy, including new and renewable sources of energy, in both their sectoral and multi-sectoral aspects, including rural development, economic and technical co-operation among developing countries, industrialization and urban development.

5. In view of the above, the Executive Secretaries decided to submit to the Conference the following report which presents in an abstracted form the areas for priority action as identified by the regional commissions. The basic materials for this document are the following:

- Report submitted by the Economic Commission for Europe (A/CONF.100/8/Add.
- Report submitted by the Economic Commission for Africa (A/CONF.100/8/Add.
- Report submitted by the Economic and Social Commission for Asia and the Pacific (A/CONF.100/8/Add.3)
- Report submitted by the Economic Commission for Western Asia (A/CONF.100/8/Add.4)
- Report submitted by the Economic Commission for Latin America (A/CONF.100/8/Add.5)

II. REGIONAL PROGRAMMES

A. Economic Commission for Europe

6. The information abstracted is contained in the ECE report A/CONF.100/8/Add which was prepared from recent studies undertaken by the ECE secretariat 1/ and from the results and conclusions of seminars and symposia convened on subjects relating to new and renewable sources of energy. These latter included the ECE Seminar on energy aspects of the forest industry; the Symposium on the prospects of hydro-electric schemes under the new energy situation 2/; the Seminar on improved technologies for the extraction of primary forms of energy 3/; the Seminar on co-operative technological forecasting: solar energy 4/; and the Seminar on technologies related to new energy sources 5/. The following is a summary of the main areas of work of ECE regarding:

1/ See, inter alia, the report entitled "Energy reserves and supplies in the ECE region: present situation and perspectives" (E/ECE/984).

2/ EP/SEM.6/2.

3/ ECE/SEM.4/2

4/ SC.TECH/SEM.6/2.

5/ SC.TECH/SEM.7/2 of which a limited number of copies will be available to delegations participating in the session.

- Energy in General
- Specific activities pertaining to New and Renewable Sources of Energy.

Energy in General

Area I: Energy Assessment and Planning

(1) Exchange of information on policies, programmes and problems; analysis of comparative merits of the various new and renewable sources of energy on the basis of common methodological guidelines; monitoring of progress in the application of these sources; and identification of areas of international co-operation.

(2) Preparation of a list of documents on ECE activities (seminars, symposia, studies, etc.) which could provide relevant information to specialists from developing countries.

(3) Dissemination of results of assessment in ECE related to trends in the development of new and renewable sources of energy.

Area II: Information flows

(1) To enhance participation in ECE meetings and seminars by providing travel and subsistence funding for delegates from developing countries.

(2) To improve access to ECE documentation by means of a special newsletter on "New and renewable sources of energy".

Area III: Research, development and demonstration

(1) To establish an information network of institutions involved in the formulation and implementation of policies (including R and D policies) in the field of new and renewable sources of energy.

(2) To invite representatives from interested developing countries to participate in relevant ECE activities relating to new and renewable sources of energy.

Area IV: Applications of future technologies

(1) To facilitate trade and co-operation, including triangular co-operation projects involving market economy countries, centrally planned economies and developing countries.

(2) To undertake further studies and seminars on technology concerning these energy sources.

Area V: Education and training

(1) To organize exchanges of scientists, training and seminars on specific topics.

(2) To encourage the use of new and renewable sources, for example, through the preparation of educational material such as a handbook, and training of teachers.

ECE activities pertaining to New and Renewable Sources of Energy

Seniors Advisers to ECE Governments on Energy

Project:	Appraisal of the potential for new and renewable sources of energy
Method of work:	Studies to be prepared by the secretariat on information transmitted by Governments

Committee on Housing, Building and Planning

Project:	Energy conservation in buildings (application of renewable sources of energy in buildings)
Method of work:	An analytical report to be prepared jointly by Government rapporteurs

Conference of European Statisticians

Project:	General energy statistics including renewable forms of energy
Method of work:	Study of the methodological problems involved in the development of statistics for renewable forms of energy

BIOGAS

Committee on Agricultural Problems

Project:	Biogas production from organic agricultural wastes
Method of work:	A report to be prepared by the secretariat on the basis of technical papers prepared by Government rapporteurs in the context of agricultural mechanization

SOLAR AND WIND ENERGY

Senior Advisers to ECE Governments on Energy

Project:	Assessment of the comparative merits of centralised and decentralised energy supply strategies
Method of work:	Symposium on the Comparative Merits of Various Energy Sources in Meeting End-Use Heat Demand, to be held in Ohrid, Yugoslavia, 6-10 September 1982

Senior Advisers to ECE Governments on Science and Technology

Project:	Co-operative technological forecasting and scientific and technological research related to new energy sources

Method of work: Secretariat will start work on the first stage of a study on solar energy utilisation

Committee on Agricultural Problems

Project: Application of solar energy in agriculture

Method of work: Study to be prepared by government rapporteurs

GEOTHERMAL ENERGY

Committee on Electric Power

Project: Utilisation of geothermal energy for electric power production and space heating

Method of work: Report to be prepared by Government rapporteurs from Italy

Senior Advisers to ECE Governments on Science and Technology

Project: Co-operative technological forecasting and scientific and technological research related to new energy sources (inter alia, geothermal)

Method of work: To be determined in the light of the decisions of the UN Conference on New and Renewable Sources of Energy

ENERGY DERIVED FROM WOOD

Timber Committee

Project: Harvesting of wood for energy purposes

Method of work: A report will be prepared by a team of specialists

Project: Energy conservation and self-sufficiency in the mechanical wood processing industries

Method of work: A seminar on this subject will be held in the Federal Republic of Germany

Project: Information on the use of wood for energy

Method of work: A special report will be prepared by a team of specialists

HYDROPOWER

Committee on Electric Power

Project: Selected problems of hydro-electric power stations

Method of work:	A Report to be prepared on the basis of the documents submitted at the Athens Symposium on the Prospects of Hydro-Electric Schemes under the New Energy Situation and on Related Problems, held in November 1979
Project:	Dynamic behaviour of pumped storage plants in electric power systems planning
Method of work:	A report to be prepared by a Government rapporteur from Italy
Project:	Prospects for the use of hydro-electric schemes under the new energy conditions and on the relat[illegible] problems
Method of work:	A symposium on this subject was held in 1979. The recommendations of the Symposium will be submitted to the Committee
Project:	Application of heat pumps in the industrial and tertiary sectors
Method of work:	A study on this subject to be prepared by a team of experts

TAR SANDS, OIL SHALES AND PEAT

Senior Advisers to ECE Governments on Science and Technology

Project:	Scientific and technological research related to existing energy sources - the utilization of low-calorific-value fuels (inter alia, oil shales and peat)
Method of work:	A Seminar on this subject to be held in the USSR

Senior Advisers to ECE Governments on Energy

Project:	Specific measures for energy conservation - improved extraction, processing and rational utilization of energy (inter alia, tar sands and oil shales)
Method of work:	A seminar on Improved Techniques for the Extraction of Primary Forms of Energy was held in Vienna in 1980

Committee on Agricultural Problems

Project:	Systems and equipment for efficient use of wood, straw and peat as fuel in agriculture
Method of work:	A study to be prepared by Government rapporteurs and submitted to the Committee

B: Economic Commission for Africa

7. The African Plan of Action for development and utilization of new and renewable sources of energy (Document E/CONF.100/8/Add.2) has been prepared by the Intergovernmental Regional Preparatory Meeting on New and Renewable Sources of Energy in Africa which was organized by ECA and held in Addis Ababa from 14 to 16 January 1981. It defines the African policy for the development and utilization of new and renewable sources of energy as endorsed by the Sixteenth Session of the Economic Commission for Africa - Seventh Meeting of the Conference of Ministers responsible for Economic Planning / Development, Freetown (Sierra Leone), 6 - 11 April 1981.

8. The African Plan of Action is based on the fundamental assumptions of the Lagos Plan of Action, which is itself based on self-reliance and self-sustaining growth and its implementation will obviously depend to a large extent on initiatives taken at the national level.

9. The main elements of this Plan of Action are:

a. The development and/or expansion of national and multinational capabilities to assess the distribution and evaluate the potential of existing new and renewable sources of energy;

b. The creation of an institutional infrastructure to develop, utilise and demonstrate the economic viability of new and renewable sources of energy, making full use of modern technologies adapted to African conditions or produced locally;

c. The incorporation of activities related to new and renewable sources of energy into national, subregional and regional energy development programmes;

d. The development of capabilities at all levels to disseminate and exchange information on the development and utilization of new and renewable sources of energy;

e. The creation of infrastructure to co-ordinate activities at the national, subregional and regional levels, promote co-operation and undertake negotiations for the development and utilization of new and renewable sources of energy on the most advantageous terms.

10. The Plan has been drawn up by African experts in the field of energy with a view to rectifying, inter alia, the following weakness and deficiencies common to energy problems in Africa: absence of national energy policies and development programmes integrated in national development plans, insufficient national capabilities to draw up an inventory of all energy resources, lack of capability for planning, absence of qualified manpower and training institutions, inadequate R and D activities, lack of information and of financial resources and inadequacy of co-operation.

11. In preparing the Plan, the African experts have taken into consideration the fact that although it might be difficult to evaluate the specific contribution made by new and renewable sources of energy in various African countries in the context of a global economic approach, it is nevertheless clear that these sources of energy can and should play an important role in improving the living conditions of the population and the rate of development, particularly of rural areas.

12. The African experts consider that the new and renewable sources of energy, because of the numerous possible or potential ways in which they can be used in a decentralized manner, can make it possible to delay or avoid the setting up of a complex energy production, transport and distribution system modelled on the pattern of energy growth in industrialised countries.

13. Moreover, the utilization of new and renewable sources of energy can be of strategic interest for the development of African countries in that it may contribute significantly to national energy self-sufficiency and to a long-term improvement in the balance of payments since the energy costs involved would be much lower than for the costs of installing and operating thermal power stations or than the costs of oil products which would have to be imported if these energy resources were not developed.

14. The activities to be carried out under the African Plan of Action are grouped in two: general activities which apply to new and renewable sources of energy as a whole and specific activities which refer to particular sectors such as those defined by the General Assembly's resolution 33/148.

15. Under general activities, the following main recommendations have been considered as the most important:

- elaboration of a comprehensive and co-ordinated energy policy which should be based on as complete an inventory as possible of all energy resources;
- assessment of energy consumption and estimates of future needs;
- building of national technological and political structures responsible for energy problems (design, planning and management);
- establishment of co-ordination machineries at subregional and regional levels;
- setting up of African consultancy firms;
- training of skilled manpower;
- development of science and technology in the field of new and renewable sources of energy and dissemination of scientific and technological information;
- setting up of a data bank of energy;
- promotion of R and D through a policy clearly aimed at strengthening existing centres and creating new centres if necessary;
- organization of seminars, study tours and training courses;
- assistance on special efforts on the part of African financial institutions and on larger contributions, on the most favourable terms possible, from International organizations.

16. As far as specific activities are concerned, the following main recommendations by sector are contained in the African Plan of Action:

a. In the Hydropower and Ocean Energy sector, in the short term, it is recommended that:

- Special attention should be given to the development of these resources taking into account the water required for the population, animals and agriculture;
- Full use of the services of genuinely African firms should be made;
- Priority should be given to the building of small hydropower plants;
- [illegible] specifications [illegible] and enforced at national, subregional and regional levels;
- establishment of industries and construction firms for electrical equipment should be promoted;

In the medium and long-terms, it is recommended:

- Standardization of capital equipment of hydropower stations and of the voltages with a view to facilitating joint construction of power stations and the interconnection of power grids of neighbouring countries;
- the ongoing research and experiments on the possibilities of exploiting ocean energy should be pursued in Africa and research of technologies needed to utilise these forms of energy should be promoted.

b. In the geothermal and peat sector, the African countries are invited to familiarise themselves with the possible uses of geothermal energy, not only for electricity generation but also for applications requiring heat sources at different temperatures, such as drying of agricultural products and fish, health purposes, tourism, etc.

- In the short term, stepping up of geothermal exploration is urged and immediate expansion of training activities is recommended with reliance particularly on those institutions specialised in geothermal energy which generally receive support from United Nations bodies;
- Those African countries where peat is widely available are urged to request technical and financial assistance from regional and international agencies in exploiting known deposits and to provide training courses for a larger number of technicians involved in peat exploitation.
- In the medium and long-terms, the establishment of an East-African Geothermal Institute is recommended as a matter of priority;
- Also, African countries are urged to undertake the improvement of the rural infrastructure of areas containing geothermal resources and to establish, separately or jointly, seismological and volcanological monitoring systems in the countries located in geothermally potential areas.

c. In the oil shales and tar sands sector, it is recommended that an urgent evaluation of these resources should be undertaken by those African countries which have known deposits. Also, they are urged to carry out cost-benefit studies of oil shales and/or tar sands exploitation in the light of existing techniques.

d. In the biomass, fuelwood and charcoal sector, it is recognized that fuelwood and charcoal play and will continue to play a basic role in meeting Africa's energy needs.

In the short term, African countries are urged to determine current and future consumption by sector and identify ways to meet the demand;

- forest resources should be efficiently exploited by determining consumption priorities and using simple, low-cost and improved burners;
- land-use plans should be formulated;
- intensive reforestation should be undertaken;
- educational and training programmes should be drawn-up with a view to stressing the use of the most efficient and low-cost system to meet the population's energy needs;
- the African governments are requested to offer as many financial incentives as possible, to overcome financial obstacles which hamper the development and utilization of improved systems of biomass conversion;

In the medium and long terms, development of new biomass conversion systems, increase in production of agricultural products and development of fast-growing drought-resistant species is recommended.

e. In the solar and wind energy sector, establishment of a network of modern measuring stations and ratification of the African Solar Energy Centre's Constitution is urged. It is also requested that priority should be given to the rapid implementation of the recommendations already adopted for the development and utilization of wind and solar energy by previous meetings organized by ECA.

f. As far as draught animal power is concerned, improvement of output and performance of draught animals through better farming methods and promotion of standardization of farms equipment and tools are recommended as short term actions; in the medium and long terms, upgrading of draught animals quality, eradication of tsetse fly, control of trypanosomiasis and mass production of better designed and more adaptable farm tools using local resources, are considered essential activities to be undertaken.

17. For the implementation of the above-mentioned recommendations, the African Plan of Action suggests a series of guidelines addressed to different parties at the national, subregional and regional levels. As the success or failure of the measures called for in the Plan of Action depends on their translation into national programmes by the states, the ECA Secretariat is supposed to be fully involved, at this level, in the advisory services activities and for this purpose the strengthening of its Energy Resources Unit has been strongly recommended.

18. At the national levels, actions are classified as follows:

a. Immediate and short-term actions

- Evaluation of existing techniques and local capacities for developing and utilizing different sources of energy with a view to determining the specific supports, measures and promotional activities which would enable these sources of energy to play their role fully; for example, the establishment of special sections within national offices of geology, mines, hydrology, energy, forestry, agriculture, livestock, meteorology, etc., which would be responsible for listing and evaluating energy resources (inventory) within their sphere of competence;
- Establishment or strengthening of bodies responsible for the development, planning, co-ordination and implementation of national energy policies in collaboration with the different ministries concerned;
- Evaluation of needs in manpower for the next ten years with a view to readjusting in advance both the number of state grants and technical assistance policies in the field of education and training;
- Organization of study tours to universities and other research and development institutions, located within the country or abroad in those countries with socio-economic conditions similar to those of African countries;
- Elaboration of studies on energy supply and demand for the next ten years, taking into account the planned sectoral development contained in the Lagos Plan of Action, the role of new and renewable sources of energy in the transformation of the rural sector, etc.

b. Medium and long term actions

- Establishment and development at the local level of the infra-structure required to manufacture and market accessories, equipment and spare parts for the development and utilization of new and renewable sources of energy.

19. At the subregional and regional levels, in parallel with international organizations such as the Economic Community of West African States (ECOWAS), the ECA's Secretariat will be fully involved in the implementation of the African Plan of Action through both its Multisectoral Programming and Operational Centres (MULPOCS) and Energy Resources Unit. Moreover, once the African Energy Commission has been established, it will also deal with most of the activities listed below, taking into account the objectives set for it in the Lagos Plan of Action.

The actions to be undertaken are classified as follows:

a. Immediate and short-term actions

- Evaluation of existing education and training resources within the subregion or region with a view to strengthening and developing them and rendering them as effective as possible;
- Study of the possibilities for organizing and developing research and development within a regional context;
- Study of the possibilities for interconnecting electrical networks and for the joint implementation and operation of hydro-electric facilities;
- Establishment of institutional infrastructure and technical associations responsible for co-ordinating and supporting activities for the development and utilization of new and renewable sources of energy (African Regional Centre for Solar Energy, East African Geothermal Institute, etc.);
- Centralization and dissemination of information on equipment, its use and its limits;
- Establishment of documentation centres with a view to sensitizing decision makers and the general public to the advantages of developing and utilizing new and renewable sources of energy;
- Organization of technical meetings, seminars, conferences, study tours, etc., with a view to facilitating and developing exchanges of information and experience on the utilization of new and renewable sources of energy;

b. Medium and long term actions

- Establishment and development of specialized training institutions in the area of new and renewable sources of energy;
- Contribution to the establishment of multinational enterprises for the local manufacture of equipment, accessories and spare parts and for their marketing;
- Establishment of pilot installations;
- Establishment of a bank or fund to finance projects for the development and utilization of new and renewable sources of energy.

20. The current state of the technological development and economic profitability (in the classical sense of the term) of projects dealing with new and renewable sources of energy varies greatly according to the types of utilization planned and the various sources of energy considered. In many cases R and D may still be necessary before adequate installations can be built.

21. In this respect, the African Plan of Action considers that it would be dangerous if, given the efforts that must be made to develop and utilize these energy resources, member States will react passively by expecting everything at the scientific, technical and industrial levels to come from external sources.

22. On the contrary, the Plan considers that African countries should view the promotion of R and D as a priority through a policy clearly aimed at strengthening existing centres, creating new centres if necessary and promoting the prompt utilization of new and renewable sources of energy.

C. Economic and Social Commission for Asia and the Pacific

23. The Economic and Social Commission for Asia and the Pacific, at its thirty-seventh session, held in March 1981, noted that imported energy sources formed a significant part of the total commercial energy supplies in the developing countries of ESCAP, and that large and sudden price increases of imported energy had strained their balance of payments and had necessitated considerable adjustments in their economies. The Commission recommended, inter alia, that ESCAP should accelerate efforts to develop alternative indigenous energy sources rapidly.

24. The current programme of work of ESCAP in the energy field for 1982-1983 which was endorsed by the Commission at that mission was tentative and might be amended with due regard to the final decisions of UNDP concerning the regional energy development programme, the Pacific regional energy programme and the outcome of the United Nations Conference on New and Renewable Sources of Energy to be held at Nairobi in August 1981.

25. Since the technical panels on various energy sources and the ad hoc groups of experts on related issues have completed their work and the studies on specific energy sources have been made, and all of their recommendations were reported to the third session of the Preparatory Committee for the Conference held in April 1981, and as Regional Commissions also submitted to the Committee, the reports of respective regional preparatory meetings, it may be desirable that regional commissions review and recast their short, medium and long-term programmes of work in the field of new and renewable sources of energy taking into account the views expressed at the third session of the Committee and the recommendations of various bodies referred to above. Nevertheless, it should be noted that the programme of work of ESCAP as suggested below was prepared tentatively and urgently for submission to the Committee for consideration at its fourth session to be held in June 1981. It is hoped that the Committee will give its comments in sufficient detail so as to enable ESCAP to reformulate its programme of work in this field in a more complete form for submission to the Conference at Nairobi for its consideration and endorsement.

SUGGESTED PROGRAMME OF WORK OF ESCAP IN THE FIELD
OF NEW AND RENEWABLE SOURCES OF ENERGY:
SHORT, MEDIUM AND LONG-TERM

Programme element and objective	Suggested activity	Expected outcome	Approximate time frame
1. Policy and Planning To strengthen national capabilities in respect of policy formulation planning and programming for development of new and renewable sources of energy and their integration into the overall national energy policy and plan and in harmony with rural development plans	1. Identification of assistance needed by countries, including strengthening of manpower and technical support to concerned organizations at various levels. It is envisaged that this would require a fact finding mission and/or investigation and analysis through correspondence. 2. Provision of assistance: (a) advisory/consultant services, (b) training, fellowships and (c) group meetings.	1. Enhancement of national capability with respect to energy policy; planning and programming. 2. Inclusion of appropriate national policy on new and renewable sources of energy. 3. Greater awareness of the public in the role and potential of new and renewable sources of energy.	short, medium and long-term
2. Data and Information Base To compile information on the resource availability, energy usage patterns, demand trends etc. in the countries of the region, and improve the coverage of data on specific sources of energy such as solar and wind energy, biomass, fuelwood and charcoal.	1. Review of existing data and identification of missing data. This activity could be carried out by a survey team who could visit regional countries, if necessary; also for providing advisory services in data collection, if required. 2. Specific activities relating to data collection: (i) compilation and publication of a handbook on solar radiation in co-operation with WMO,	Improvement in the coverage of data which provides better inputs for planning and programming of national energy plans Solar radiation handbook/ maps would be used by researchers and designers of solar devices	2 years from start

Programme element and objective	Suggested activity	Expected outcome	Approximate time frame
	(ii) compilation and dissemination of wind data to enable assessment of wind energy potential in specific locations. This activity could be carried out in conjunction with 2(i)	Wider coverage of wind data than what is normally available from existing meteorological stations. Data would include hourly, daily and monthly variations, frequency distribution, etc.	2 years from start
	(iii) regional survey of biomass resources - availability of agricultural residues, farm waste, domestic waste, etc. - in co-operation with FAO and UNEP,	Data for assessing the potential, for determining suitable locations for biomass energy production, for determining alternative uses of available biomass.	3 years
	(iv) improving coverage of data on supply and use of fuelwood resources and charcoal in the region in association with FAO,	Specific identification of scarcity, deficit and prospective deficit areas for appropriate action.	2 years
	(v) compilation and dissemination of data on geothermal energy potential,	Assessment of the scope for development of geothermal potential in the region.	2 years
	(vi) compilation and dissemination of data on the potential and availability of ocean energy,		
	(vii) compilation and dissemination of data on the potential and use of animal power.		
3. Research and Development, Technology adaptation, and application To strengthen national R and D capabilities, generate capacity to assess, select, adapt and improve existing technologies either indigenously available or imported.	1. Provision of technical assistance to develop basic R and D infrastructure. This would entail the provision of consultancy and advisory services for setting up R and D facilities in distinct areas such as solar energy, wind energy, biomass, geothermal energy, etc., co-ordination with other agencies of the UN system, and the supply of equipment, hardware and special materials.	R and D infrastructure for indigenous development/ adaptation of appropriate technologies.	short, medium and long-term

Programme element and objective	Suggested activity	Expected outcome	Approximate time frame
	2. Advisory and consultant services for technology assessment, technology selection, project formulation, negotiations involving technology transfer (see also section on institutional support).	Strengthening of indigenous capability in renewable energy technology transfer negotiations.	
	3. Development and co-ordination of regional co-operative R and D projects on specific aspects of common and widespread interest to countries, as for example, in the areas of solar drying, solar pumping, mini-hydro, biomass which have been identified as priority areas. This activity will involve establishment of a network of R and D institutions (see also section on institutional support).	Network of co-operating R and D institutions; joint programmes for scientific research and technology development.	
	4. Development of proposals for supporting the establishment of national testing and evaluation centres for facilitating standardisation and quality control of components and devices developed in connexion with utilisation of new and renewable sources of energy.	Testing and evaluation facilities; training centres for quality control personnel.	1 year
	5. Strengthening of institutional arrangements (covered separately)		
	6. Undertaking studies on specified topics such as the economics of the certain renewable sources of energy, the social and environmental implications attached with their use, special case studies, etc.		
b. Dissemination of Information To collect relevant information on the scientific, technological and application aspects of new and renewable energy as well as on socio-economic and environmental [illegible]	Some of the publications envisaged are: 1. Directories of national institutions and experts concerned with R, D and D of each type of new and renewable sources of energy.		Continuing

Programme element and objective | Suggested activity | Expected outcome | Approximate time frame

Programme element and objective	Suggested activity	Expected outcome	Approximate time frame
	2. Newsletters on rural and renewable energy sources giving progress of R and D, programmes, demonstration projects etc., for each source of new and renewable energy.		Continuing
	3. A series of guidebooks and manuals on selected topics such as solar collector design and construction; wind mill design, manufacture and selection; biogas development; wood and charcoal stoves; mini-hydro plants, etc.		Continuing
5. Institutional support To create then institutional arrangements for policy analysis, research and development, pilot plant work, demonstration programmes, training and manpower development and extension work.	Establishment of regional centres on each type of new and renewable energy sources. Such centre will be developed from an existing institute in a regional country, if any, which is known by its interest and activity in the selected field. In the absence of existing bodies, new regional centres may be established. It is planned to establish centres to deal with research, development, training and providing advisory services for the following energy sources: 1. Solar energy (may be in Australia or Japan) 2. Wind energy (may be in Republic of Korea or Thailand) 3. Biogas (may be in China or India) 4. Geothermal energy (may be in New Zealand or Indonesia) 5. Biomass (may be in the Philippines or Malaysia) 6. Fuelwood and charcoal (may be in Pakistan or Sri Lanka) 7. Mini-hydroelectricity (may be in Bangladesh or Nepal)	The creation of these centres is expected to lead to accelerated development through increased research and development efforts. These centres should be well equipped to build prototype projects for demonstration and training purposes as app appropriate (see number 6) and in co-operation with national institutions; to design and produce equipment, tools and devices including measuring instruments suitable for being manufactured in regions of developing countries.	

Programme element and objective	Suggested activity	Expected outputs	Approximate time frame
	8. Ocean energy (may be in one of the Pacific countries) 9. Energy system analysis (may be in Japan or India)		
6. Demonstration Projects and Pilot Plants To promote regional demonstration projects and pilot plants which are intended to demonstrate the technical feasibility and economic viability of mature technologies under actual conditions of use and to determine their socio-economic and environmental impacts. In addition, the objective is to foster mutual assistance and co-operation among the participating countries.	Establishment of regional demonstration plants in the ESCAP countries. In general, these should be established in the regional centres mentioned in 6. above, or otherwise in other suitable places. The type of the plant will be selected taking into account the needs, resources, interest of the country. Examples are given below: 1. Solar drying 2. Solar water pumping 3. Solar heating for industry 4. Solar cooking 5. Solar refrigeration 6. Small scale solar electricity generation 7. Solar distillation 8. Water pumping using wind energy 9. Electricity generation using wind energy 10. Family-scale biogas plant for lighting and cooking 11. Community-scale biogas plants for various purposes including running of engines 12. Biogas use in buses and trucks 13. Firewood and charcoal stoves 14. Production of ethanol and its use in transportation		short, medium and long-term

Programme elements and objectives	Suggested activity	Expected outcome	Time frame
	15. Plantation of fast growing and multi-purpose species of trees		
	16. Mini-hydro plants		
	17. Electricity generation from geothermal energy		
	18. Heating and cooling using geothermal energy		
	19. OTEC plant		
	20. Generation of electricity from wave energy		
	21. Integrated rural energy system demonstration		
7. Training and Manpower Development The objective The objective is to support training and manpower development programmes in the area of new and renewable sources of energy. This should cover the areas of policy and planning, research and development; design technology development and application; installation, operation maintenance, testing, evaluation of energy system; production of equipment, hardware measuring instruments; extension services	The following training programmes could be arranged in the regional centres. 1. Training programmes for planners		medium an long-term
	2. Training programmes in various fields of new and renewable sources of energy for scientific and technical personnel	Trained scientific and technical manpower	
	3. Training programmes for technicians, laboratory personnel	Improvement of skills for utilization of new and renewable sources of energy	
	4. Training programmes for maintenance personnel	Creation of a cadre of field-level workers and extension workers trained in various aspects of new and renewable sources of energy	
	5. Training programmes for personnel involved in field work and extension services Note: In view of language barriers, training at regional centres should be provided for trainers from participating countries in a manner that they should be able to train countrymen in their own countries after their return.		

Programme element and objective	Suggested activity	Expected outcome	Approximate time frame
8. Worshops/symposia/seminars	The following workshops/meetings are envisages: 1. Renewable energy for human settlements 2. Solar energy for industrial heat production 3. Fuels from biomass 4. Decentralized electricity production 5. Integrated rural energy systems 6. Progress in the efficient utilization of fuelwood and charcoal	Reports of meetings	All these workshops are to be carried out over a period of 3 or 4 years
9. Promotion of technical and economic co-operation among developing countries activities	1. Exchange of information 2. Exchange of expert services 3. Joint projects involving exchange of hardware, mutual sharing of training facilities 4. Promotion of trade among developing countries in renewable energy equipment and systems which have reached commercial production 5. Promotion of joint manufacturing ventures, for example - solar water heating systems, wind mills, water pumping systems, alcohol production units, etc. 6. Arrangement of study tours to the regional centres (item 5) and the demonstration plants (item 6)	Increased technical and economic co-operation among developing countries of the region	Continuing

D. Economic Commission for Western Asia

26. The Economic Commission for Western Asia (ECWA), in resolution 94(VIII) of 6 May 1981, recognized the importance of harnessing new and renewable sources of energy for the development of member States. It also noted with appreciation the success of the Regional Preparatory Expert Group Meeting for the Conference organized by the secretariat of the Commission at Beirut from 12 to 16 January 1981. The Commission requested, inter alia, that appropriate additional resources be allocated to the secretariat of ECWA for the proper implementation at the regional level of any programme of action stemming from the Conference, as well as for any other functions in the field of new and renewable sources of energy which may be entrusted to it in the aftermath of the Conference

27. The Commission further urged member States to ensure that the recommendation adopted by the Regional Preporatory Expert Group Meeting for the Conference be fully reflected in any programme of action stemming from the Conference. These recommendations are:

At the National Level:

(a) ECWA member countries are requested to build and strengthen the machinery for energy planning and to formulate a comprehensive national policy for the utilization of new and renewable sources of energy for the present time and for the near future. Governments of the ECWA countries should also give priority to the initiation of a programme of action in the field of renewable energy, after an assessment of the new and renewable resources available in their countries. This plan should be co-ordinated with and integrated within rural development and should take into account the real needs and the social, environmental and cultural acceptability of the proposed energy alternatives.

(b) The ECWA member countries should set up and strengthen the appropriate institutional infrastructures needed to promote and undertake research and development and the testing of new and renewable energy technologies, taking into account the experiences gained by other countries in the region.

(c) A system of incentives, subsidies and assistance should be formulated by each ECWA member State to encourage the use of economically viable and technically proven renewable energy technologies and the commercialization of their processes and prototypes.

(d) The ECWA member countries are requested to introduce into their educational systems, at all levels, special topics on science and technology relating to new and renewable energy sources.

(e) The research and development institutions in the ECWA member countries should participate actively in a consultative and/or executive capacity in the various phases involved in the process of formulating and adopting policies related to new and renewable sources of energy.

(f) The ECWA member countries are requested to allocate sufficient funds for activities on research and development and demonstration of new and renewable energy technologies.

At the Regional Level:

(a) The ECWA member countries are requested to establish, in consultation with the Economic Commission for Africa (ECA) and the League of Arab States an inter-Arab renewable energy technology transfer advisory body, to assist interested ECWA countries, at their request, in negotiating with foreign manufacturing firms for the local manufacture of well-established commercial renewable energy system components. This body should place emphasis on the assessment of the technology, its suitability for local application and the terms of relevant commercial, technical and economic agreements.

(b) ECWA member countries should periodically organize regional meetings to exchange information regarding the optimum utilization of new and renewable sources of energy and to facilitate the exchange of scientists and experts on new and renewable energy between the individual countries of the region.

(c) It is recommended that the ECWA member States initiate the implementation of co-operative and joint projects for the exploration and utilization of renewable energy technologies.

(d) It is recommended that the ECWA member States should establish education institutions and training centres at the regional level to train scientists, engineers and technicians in various areas of new and renewable sources of energy relevant to the region.

(e) Co-operation at the regional level should start to enable the ECWA member States to manufacture components, equipment and other materials related to the development and utilization of new and renewable sources of energy, and to build an indigenous technical and industrial infrastructure capable of testing and manufacturing all components needed for systems for the utilization of such sources of energy.

At the Global Level:

(a) The United Nations should make the appropriate institutional and other arrangements needed to enhance its role in the area of new and renewable sources of energy, more particularly in the interest of the developing countries.

(b) The existing bilateral and multilateral agreements of the ECWA member countries on technical co-operation, at both the regional and the interregional level, should be strengthened to include explicitly the area of new and renewable sources of energy.

(c) The ECWA countries should participate actively in interregional and international seminars, symposia and conferences on new and renewable sources of energy.

(d) The interregional and global organizations and institutions concerned should co-operate to establish an information network on new and renewable sources of energy.

(e) The developing countries should co-operate to exchange information and to produce collectively components and equipment related to the development and utilization of new and renewable sources of energy, in order to enhance their collective self-reliance in this area.

(f) The existing international channels should be used to exchange and disseminate information on the development of new and renewable energy technologies, and on field testing, demonstration projects and progress in the implementation and evaluation of previous experience, including any negative results.

28. ECWA's draft work programme in energy for the biennium 1982-1983 contains a programme element entitled "Regional Programme for New and Renewable Sources of Energy, with Special Reference to Rural Applications". The expected final output of this programme element is a report to the Commission which, in the light of the outcome of the Nairobi Conference (August 1981), will deal with (a) the identification of suitable forms of new and renewable sources of energy for the region; (b) the promotion of low-cost, non-waste applications of new and renewable sources of energy; (c) ways and means of developing indigenous technologies or of transferring appropriate technology; (d) documentation and information exchange at the interregional and global levels; and (e) technical assistance, training and institutional aspects.

29. ECWA would be ready to consider formulating and implementing a more ambitious work programme in new and renewable sources of energy, in the aftermath of the Nairobi Conference, provided that "appropriate additional resources be allocated"1/ to this end. Such work programme could include:

1/ ECWA resolution 94(VIII) of 6 May 1981, operative paragraph 4.

(i) Assessment of energy needs;

(ii) strengthening the machinery for energy planning;

(iii) identification of suitable technological possibilities;

(iv) formulation of a detailed national policy on the utilization of new and renewable sources of energy, through decentralized systems as part of comprehensive national energy policy;

(v) strengthening national and regional capabilities on data collection and dissemination regarding new and renewable sources of energy;

(vi) intensification of research and development on new and renewable energy technologies, and its wider applications;

(vii) organization of regional demonstrations and pilot projects in terms of extensive trials of available technologies and equipment to test their suitability;

(viii) organization of seminars and symposia at frequent intervals to exchange information and knowledge on specific common technological problems to the region.

E. Economic Commission for Latin America

30. At the Regional Preparatory Meeting for the United Nations Conference on New and Renewable Sources of Energy held in Mexico City from 16 to 20 March 1981, a Regional Plan of Action was adopted, the rationale and programmes are presented in this document.

31. The Latin American countries strongly reaffirmed their desire to seek formulas that will make it possible to achieve progress in their socio-economic development. These countries are of the opinion that the principal responsibility for their economic development lies in themselves and that international economic co-operation constitutes a fundamental instrument for aiding such development. Accordingly, co-operation among developing countries is an important element in strengthening their overall negotiating position, while at the same time it contributes directly to promoting their development.

32. The Latin American countries are of the opinion that the use of new and renewable sources of energy constitute part of the tasks linked to their development. In this perspective the United Nations Conference on New and Renewable Sources of Energy represents an opportunity to make progress on a global scale with respect to international economic co-operation and also a new stage in international economic negotiation, presently directed towards a portion of the extensive field of energy within the general content of development problems.

33. The Latin American countries are fully aware of and support the concept of transition, in the sense of an orderly, progressive, integral and just change over from one era, based mainly on the consumption of hydrocarbons, to another, capable of making available and utilizing a multiplicity of energy sources. They are also aware of the need to make careful use of natural resources and to protect the environment in carrying out this energy transition, within the context of economic development.

34. The energy substitution which lies ahead will differ qualitatively, as it involves the use of what may be more expensive alternatives. Presently available international institutional and political decision-making machinery was not designed to handle situations like this one that call for great foresight in the taking of decisions. The foregoing demands adequate planning, which will acquire augmented importance as it will involve approaches and methodologies differing from the traditional ones, designed to cover both supply and demand.

35. Problems of financing constitute a substantial restriction in achieving the effective development of new and renewable sources of energy. The magnitude of financial requirements is such that a considerable challenge is faced by developing countries in obtaining sufficient funds opportunely for this purpose.

36. The Regional Plan of Action adopted for new and renewable sources of energy is based upon two fundamental concepts: that the potential for the use of new and renewable sources of energy is of a dynamic nature, and that the effective development of these sources requires decided support for research, demonstration and the generalized use of technologies that have attained a certain degree of maturity and that such development should be directed towards large-scale application of such technologies.

37. Generalized utilization of new and renewable sources of energy through integral programmes requires knowledge of the source, final use and the appropriate technology that links them. In addition, the concept of final use must be taken into account as the optimum means of designing the best systems of distribution. It will then be possible to identify tentatively the uses and geographical areas for which demand evaluation projects must be initiated.

38. The objectives and programmes set forth in the Plan of Action open up possibilities for fruitful subregional and regional co-operation. The long tradition of regional and subregional economic co-operation could acquire renewed vigour under concerted programmes in this field, which should cover co-operation in the field of energy as a whole, with special attention to co-operation in respect of new and renewable sources of energy. In this respect, the region already possesses a valuable institutional framework in the form of OLADE to put this co-operation into effect.

39. Within the above-mentioned programme, the identification of properly planned and politically supportable actions and projects is of the greatest importance. To this end it will be necessary to count on the United Nations' broad institutional infrastructure at the CEPAL level and the United Nations system's agencies and organizations, whose collaboration could provide rapid and efficient support in view of their respective fields of specialization and their human and technical resources. Priority will be assigned to the co-ordination of regional and subregional actions and programmes through the existing specialized regional and subregional organizations in Latin America in collaboration with CEPAL and other agencies and organizations of the United Nations system, thus ensuring the participation of all the countries in the region.

40. International co-operation should make an effective contribution to the building of the New International Economic Order, in which co-operation in the energy sector, and new and renewable sources of energy should play an important part. In that spirit, the United Nations Conference on New and Renewable Sources of Energy should constitute a concrete instrument for the achievement of the New International Economic Order and the promotion of new and renewable sources of energy.

41. International co-operation, implemented through the Conference's Plan of Action, should:

(a) Grant technical and financial support to the work of evaluation and planning data in developing countries for the purpose of speeding up the introduction of new and renewable sources of energy into their respective energy balances.

(b) Support activities in the field of training and education with respect to new and renewable sources of energy in order to satisfy the need for the training and preparation of human resources in the developing countries.

(c) Promote the flow of technological and financial assistance from developed to developing countries, for the purpose, inter alia, of strengthening the technological capacity of the latter and of facilitating the adaptation and dissemination of existing technologies, as well as supporting scientific and technological research carried out at sub-regional, regional and national levels related to the generation, transfer and adaptation of technologies appropriate to developing countries and regions.

42. For greater efficiency in the accomplishment of its purposes, international co-operation should to the greatest extent possible make use of and support both regional and sub-regional organizations and their subregional and regional programmes, as an effective means of strengthening national programmes in the field of new and renewable sources of energy. These should be accompanied by measures of an inter-regional nature taken to foster exchanges among the developing countries.

43. The Conference's Plan of Action should:

(a) Urge multilateral financing agencies and institutions to participate in bilateral co-operation efforts and urge regional and subregional banks and other institutions for development co-operation to review the approach they have hitherto employed in carrying out financing co-operation programmes and projects with developing countries in the field of new and renewable sources of energy.

(b) Strengthen the United Nations system's capacity for action in the field of new and renewable sources of energy through financial contributions on the part of the industrialized countries to the development of new and renewable sources of energy.

(c) Urge the developed countries and donating institutions to increase their financial contributions and support for international organizations and bilateral co-operation agencies.

(d) Include the discussion of international co-operation in new and renewable sources of energy and its follow-up by governments within the scope of an appropriate United Nations agency, so as to ensure the ongoing orientation and identification of priorities for international co-operation. The establishment of new agencies for such purposes shall be avoided.

44. Finally, the programmes considered to be of priority in the region are presented, with a brief explanation of the criteria used to identify them. The raison d'être of these programmes is the decision of Governments of Latin America to draw up their national strategies for the development of new and renewable sources of energy and to put them into practice. The programmes themselves only supplement the activities and programmes which the governments decide to carry out in their countries. They are intended to support rather than replace national efforts. It should be noted that since OLADE is the specialized organization for co-operation and for the co-ordination of actions concerning energy in Latin America, any specific

plan of action for the use of new and renewable sources of energy should be included within the Latin American Energy Co-operation Programme, without prejudice to any other energy plans formulated by the Latin American countries.

45. It is suggested that priority be given to the following programmes:

Regional Basic Support Programmes

(a) Energy Planning

(b) Information and Dissemination Programmes

(c) Training Programmes

Integral Regional Programmes

(a) Hydroelectric Development

(b) Firewood and Charcoal

(c) Liquid Fuel Production

(d) Solar Energy Programmes

(e) Programme for Vegetable Residues and Energy Efficiency for Agro-Industry

(f) Geothermal Energy Programme

(g) Biogas Programme

(h) Wind Power Programme

Programmes	Objectives	Expected Outputs
1. Energy Planning	(a) To provide concerned Governments with methodological tools for formulating their national energy development plans and strategies, particularly with regard to NRSE.	(1) Methodological guidelines for estimating the potential of NRSE on the basis of surveys of resources and needs and information relating to technologies.
		(2) Manual on the formulation and appraisal of investment projects in the field of NRSE.
		(3) Personnel trained in the application of the methodologies referred to above.
	(b) To facilitate the exchange of experience in this field and of technical and economic data among the countries of the region.	(4) The provision of advisory services in these subjects to Governments which require them.
		(5) Publications, technical exchange meetings and diverse activities.
2. Information and Dissemination Programme	(a) Support of Governments interested in establishing effective mechanisms for transmitting specialized information at national, regional and subregional levels.	(1) Provision of advisory services on these topics to Governments requiring them
		(2) Preparations of periodical publications of regional interest, such as technical information bulletins, regional scientific magazines, directories of researchers and institutions, and the like.
		(3) Establishment of a regional technical information system on NRSE, including access to international data banks.
	(b) Creation of public awareness of n NRSE in interested countries within the scope of the communications media and educational systems.	(4) Preparations of educational material and training of journalists in this subject area.

Programmes	Objectives	Expected Output
3. Training Programme	(a) To contribute to the training of the human resources required in the region for effective development of new and renewable sources of energy.	(1) Identification of personnel training needs at national and subregional levels for various specialization levels and areas. (2) Determination of existing institutional capacity at national, regional and subregional levels for the training of human resources. (3) Promotion of additional training mechanisms as required, which might include academic programmes, specialization courses at various levels, in-service training, seminars and the like.

Programmes	Objectives
4. Hydroelectric Development	(a) To complete evaluation of hydroelectric potential for small and large-scale use.
	(b) To strengthen the ability to prepare small and large scale hydroelectric projects.
	(c) To promote standardization and quality control to stimulate the production of equipment for small scale hydroelectric power plants.
	(d) To provide support to governments in the realization of hydropower projects.
5. Firewood and Charcoal	(a) To determine the social, environmental and economic characteristics and effects of the present use of firewood and charcoal in Latin America and its prospects for the future.
	(b) To promote formulation of an inventory of forest resources in the region, including zoning according to use.
	(c) To promote the development of new forest resources for energy use and the proper management of existing resources.
	(d) To promote the development and widespread application of highly efficient domestic devices for the use of charcoal in rural areas.
	(e) To promote the development, manufacture and widespread dissemination of equipment for the production and efficient use of charcoal on small and large scales.
6. Liquid Fuels Production	(a) To provide support to Governments interested in the production of ethanol and vegetable oils to replace liquid fuels, especially for transportation purposes.
	(b) To co-operate in determining the potential for producing ethanol and vegetable oils from various crops.
	(c) To transfer technologies for the growing of plants for the manufacture of ethanol and vegetable oils for distribution and use in interested countries.
7. Solar Energy Programme	(a) To determine the potential for the use of solar energy in participating countries.
	(b) To promote the development and exchange of technologies, designs and projects for various applications in this field.
	(c) To facilitate regional follow-up of world scientific and technological advances in this area.

[illegible]		[illegible]
8 [illegible] Vegetable Residues and Energy Efficiency in Agro-industry	(a)	To determine the [illegible] agricultural, forest and agro-industrial residue available in the participating countries as sources of energy, including their possible use in generating electricity.
	(b)	To acquire, adapt, [illegible] and transfer technology for the use of vegetable and forest residues as sources of energy and for [illegible] the energy efficiency of agro-industry.
9 Geothermal Energy Programme	(a)	To determine the potential for the use of geothermal energy in interested countries for generating electricity, for use in agro-industry and decentralized applications.
	(b)	To support the development of projects for the use of geothermal energy in interested countries.
	(c)	To facilitate regional follow-up of world scientific and technological advances in this field.
10 Biogas Programme	(a)	To determine and develop the energy potential of rural and urban wastes that can be transformed into biogas, and the potential for the production of organic fertilizers.
	(b)	To contribute to environmental sanitation and to provide a new element for improving the living standards in rural and urban areas.
11. Wind power Programme	(a)	To identify the most promising areas for the development of wind power in interested countries and to determine its potential.
	(b)	To promote development, technological exchanges and widespread applications of wind power in participating countries.
	(c)	To facilitate regional follow-up of world scientific and technological advances in this field.