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ECLA  
Economic Commission for Latin America

OLADE  
Latin American Energy Organization

IMPLEMENTATION IN LATIN AMERICA OF THE NAIROBI PROGRAMME OF  
ACTION FOR THE DEVELOPMENT AND UTILIZATION OF NEW AND  
RENEWABLE SOURCES OF ENERGY

W/M4404

Report submitted to the Interim Committee on New and Renewable Sources of  
Energy (Rome, Italy, 7-18 June 1982)

BACKGROUND PAPER 1  
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CONTENTS

	<u>Page</u>
1. INTRODUCTION . . . . .	1
2. ACTION PROPOSALS: REGIONAL PROGRAMMES IN THE AREA OF NEW AND RENEWABLE SOURCES OF ENERGY (NRSE) . . . . .	3
(a) Latin American Energy Planning Programme . . . . .	4
(b) Latin American Hydroelectric Programme . . . . .	5
(c) Latin American Biomass Programme . . . . .	7
(d) Latin American Solar Energy Programme . . . . .	8
(e) Latin American Geothermal Energy Programme . . . . .	10
(f) Latin American Wind Energy Programme . . . . .	12
3. OPERATIONAL METHODOLOGY OF THE PROGRAMMES . . . . .	14
4. SUBREGIONAL AND REGIONAL IMPLEMENTATION . . . . .	14
5. PROPOSALS FOR IMMEDIATE ACTION . . . . .	15
6. CONCLUSIONS . . . . .	16

## 1. INTRODUCTION

The Economic Commission for Latin America (ECLA), like the other regional commissions of the United Nations, was requested by the General Assembly, in its resolution 36/193 of December 1981, to submit a report on its activities in connection with the implementation of the Nairobi Programme of Action for the Development and Utilization of New and Renewable Sources of Energy. This document describes the various activities carried out by ECLA and OLADE in that connection and submits some details of the programmes already prepared, those in the process of preparation and the process used to identify, negotiate and implement them.

The important role of technical and economic co-operation among the developing countries has been fully recognized, since it helps to strengthen their independence and self-reliance, which are major factors in promoting and accelerating their economic development. The forums and mechanisms established by the countries through regional institutions are important ways and means of achieving those global objectives. As regards the implementation of the activities listed in the Nairobi Programme of Action for the Development and Utilization of New and Renewable Sources of Energy, the regional dimension takes on the additional importance of helping to place in due perspective the energy transition and the participation of new and renewable sources of energy, together with their effect on the regional socio-economic parameters and their relationship with other sectors (agriculture, human settlements, etc.).

During the process of preparing for the United Nations Conference on New and Renewable Sources of Energy, ECLA co-ordinated its efforts with the Latin American Energy Organization (OLADE) and carried out a series of activities designed to prepare and strengthen the position of the countries at the Conference and to formulate a Regional Plan of Action on New and Renewable Sources of Energy. The Plan was adopted by the ministerial-level Latin American Regional Preparatory Meeting, held at Mexico City in March 1981 (A/CONF.100/8/Add.5).

At the twelfth Meeting of OLADE, held at Santo Domingo, Dominican Republic, in November 1981, the ministers of the member countries adopted the Latin American Energy Co-operation Programme (PLACE).

On the basis of and guided by:

The Regional Plan of Action on New and Renewable Sources of Energy,

The Latin American Energy Co-operation Programme, and

The Nairobi Programme of Action,

ECLA and OLADE have continued their joint efforts in the area of new and renewable sources of energy, as part of their overall activities in the various areas of economic and social development.

The challenge confronting the developing countries to achieve a peaceful and orderly energy transition from an economy based mainly on hydrocarbons to an economic system becoming gradually more and more dependent on new and renewable sources of energy, requires that the international community take integral steps to render possible the massive mobilization of the energy resources, as well as the financial, human and technical resources, that will be needed.

In this connection, and as was clearly stated at the United Nations Conference on New and Renewable Sources of Energy, held at Nairobi in August 1981, the issue is not when the energy transition will take place but whether "the international community will achieve it in an orderly, peaceful, progressive, just and integrated manner".

In view of the fact that the programme of action adopted is designed to attain the objectives of strengthening international co-operation for the promotion of research and development of new technologies; stimulating the mobilization of financial resources; increasing the exchange of information and training; strengthening the programmes on new and renewable sources of energy within the national energy plans; and achieving the maximum feasible development of such sources; sustained and dedicated efforts by Governments, international organizations and organizations of the United Nations system will be required.

In this context, and on the assumption that the Programme of Action will be carried out with maximum effect only if the efforts made at the subregional, regional and international levels support the national efforts, OLADE has at its disposal in the Latin American Energy Co-operation Programme (PLACE) an instrument designed to help the regional efforts and make it possible to achieve the objectives for which the organization in question was established and which, in general outline, coincide with those of the Nairobi Programme of Action. PLACE includes various kinds of activities ranging from the strengthening of the efforts of the member States to the carrying out of regional programmes and harmonizing and co-ordinating all activities with other organizations and institutions outside the region.

Within PLACE, provision has been made for a series of global and integral programmes as well as specific programmes to encourage the development and utilization of new and renewable sources of energy, which are presented in co-operation with ECLA and in terms of the following areas:

- (a) Energy assessment and planning;
- (b) Research, development and demonstration;
- (c) Transfer, adaptation and application of mature technologies;
- (d) Information flows; and
- (e) Education and training.

The energy sources that should be given priority, in view of their applicability in the Latin American region are:

Hydroelectric energy;

Biomass energy;

Solar energy;

Geothermal energy and

Wind energy.

2. ACTION PROPOSALS: REGIONAL PROGRAMMES IN THE AREA OF NEW AND RENEWABLE SOURCES OF ENERGY (NRSE)

Bearing in mind their prime objective of speeding up the incorporation and participation of new and renewable sources of energy in the development of policies and energy planning and satisfying the energy requirements of the region, ECLA and OLADE have strengthened and diversified their activities in this area. There is clearly an enormous potential for regional co-operation with respect to new and renewable sources of energy. The advantages of sharing the costs and risks involved in the development of suitable technologies, the creation of industrial infrastructures and the development of regional human resources, not to mention the obvious advantages of combining efforts with respect to information flows, the exchange of opinions and experience and the financial negotiation of projects and programmes, are of great interest to the Latin American countries.

The following are the regional programmes submitted by this document. They do not represent all possible actions but constitute a package which reflects the highest priorities of the Governments of the region:

- (a) Latin American Energy Planning Programme;
- (b) Latin American Hydroelectric Programme;
- (c) Latin American Biomass Programme;
- (d) Latin American Solar Energy Programme;
- (e) Latin American Geothermal Energy Programme;
- (f) Latin American Wind Energy Programme.

These programmes should be seen in the context of the activities currently being carried out in the Latin American region by the Governments, by ECLA, OLADE and other regional and international organizations, and as a result of bilateral agreements. In some cases, the programmes described will act as catalysts for new activities while other programmes contain proposals for the co-ordination, promotion and amplification of existing isolated efforts. All the areas of action provided for in the programmes have been identified as ones of high priority; each programme is in a different stage of the implementation process.

The activities proposed in each programme, and identified for the next two years, are mainly directed towards the pre-investment activities which are needed to encourage wide utilization of new and renewable sources of energy, in keeping with the priorities of the countries and making use of regional co-operation.

(a) Latin American Energy Planning Programme

Objectives

To define and develop basic energy planning instruments; to strengthen the capacity of the countries of the region to identify, formulate and assess energy projects; to devise machinery to facilitate the exchange of experience among the countries of the region and to promote co-operation with the industrialized countries; to study the various energy planning models that exist both inside and outside the region and to disseminate this experience among the member States; to train the national groups responsible for working out national energy plans; and to establish an integrated system of training courses.

Activities carried out

The energy balance-sheets of 23 countries have been drawn up and national groups have been organized to complete the 1970-1980 historical series and carry it forward.

A historical correlation between the consumption of energy and economic activities has been worked out for the purpose of making projections of the demand for energy.

Activities have begun with respect to energy information, by the establishment and operation of an interagency information system.

Energy balance-sheets

Continuation of the energy balance-sheets programme, incorporation of the rural component and consolidation of the national working groups.

Inventory methodologies

Activities have begun on the preparation of a systematic inventory of the energy resources of the region and methodologies for new and renewable sources of energy will be worked out.

Conservation and rational use of energy

In the industrial sector, there will be some broadening of the actions begun with regard to the rationalization of the consumption of energy in the cement and sugar-cane industries; in the transport sector, an assessment will be made of experience with governmental programmes to replace hydrocarbons by alcohol and vegetable oils.

#### Data bank

In connection with information, a data bank will be established to complement the interagency energy information system.

#### National energy plans

A regional diagnosis will be made of the existing situation with regard to the national energy plans of the countries, including new and renewable sources of energy. In the short term, a training programme will be set up consisting of courses and seminars on the exchange of experience in planning, estimating the future supply of and demand for energy and the identification, formulation and evaluation of projects.

#### Analyses of the Latin American and world energy situations

The aim of this study is to analyse in an annual and on-going form the regional and international energy situations, for the purpose of suggesting measures and actions.

#### Energy pricing policy

It is fundamentally a question of studying the machinery of price formation for energy in the domestic markets of the member States and of analysing the effects of the energy prices on economic growth.

#### Financial requirements

The total cost of the programme would be \$US 1,200,000.

#### (b) Latin American Hydroelectric Programme

##### Objectives

To promote the utilization of the hydroelectric potential of the region through activities aimed at the application and diffusion of existing methodologies for the assessment of large-scale resources and of small-scale and medium resources; the implementation and evaluation of projects using regional technology; the identification of the producers of equipment in the region; and a disintegrated analysis of technologies and the training of professional personnel in preparing and executing both large-scale and small-scale hydroelectric projects.

##### Activities carried out

Four working parties and an advisory group have been convened on subjects connected with small-scale hydroelectric power plants.

Twenty-seven documents have been prepared on aspects of the technology and development of small-scale power plants and project formulation.

Technical assistance has been given to specific projects in Ecuador, Cuba and Nicaragua.

At the request of UNIDO, a handbook on decision-making for the development of small-scale hydroelectric power plants has been prepared.

On the initiative of OLADE and ECLIA, a Latin American meeting on the hydroelectric potential of Latin America was held, as part of the preparations for the Nairobi Conference.

Activities to be carried out

Energy assessment and planning: assessing the hydroelectric resources available through the identification of catchment areas for the selection of specific projects and their arrangement in order of priority, in the development of large-scale and small-scale hydroelectric plants in the following subregions:

Caribbean,

Andean Zone, and

Central America.

Research, development and demonstration: development of regional hydroelectric equipment for small-scale hydroelectric plants and research into multiple-use hydropower applications.

Demonstration projects will be carried out in:

Caribbean, and

Andean Zone.

Transfer, adaptation and application of mature technologies: supporting projects for construction and equipment, preparation of design manuals for small-scale and large-scale hydroelectric plants and support for activities relating to the interconnection of the electric power systems of countries of the following subregions:

Caribbean,

Andean Zone, and

Central America.

Education and training: the holding of an advanced course on the design and construction of small-scale hydroelectric plants.

Financing

(a) Energy assessment and planning . . . . .	\$US 40,000,000
(b) Research, development and demonstration . . . . .	\$US 4,000,000
(c) Transfer, adaptation and application of mature technologies . . . . .	\$US 12,000,000
(d) Education and training . . . . .	\$US 300,000
TOTAL	\$US 56,300,000

State of progress of the Programme

Utilization of the hydroelectric potential of the region is regarded by the Latin American Governments as being of the highest priority, and has traditionally been an area of great activity. Most of the countries in the region already have programmes to accelerate work in this area and ECLA and OLADE have co-operated very actively.

The hydroelectric programme described in this document concentrates on those activities in which regional co-operation is considered essential. The development of small-scale hydroelectric systems is regarded as a special case within an overall programme of hydroelectric power, for which a series of actions will be needed to promote and strengthen development, infrastructure and the transfer of technology.

(c) Latin American Biomass Programme

Objective

To encourage the development of energy conversion of the biomass, using various Latin American techniques through an adequate transfer of technology. This will be achieved by means of various integral projects to be developed in different countries strategically selected so as to obtain the desired impact of diffusing the results throughout the region.

Activities carried out

The programme began with a biogas project consisting of the construction of sixty (60) digesters distributed throughout ten (10) countries of the Latin American area, using systems selected from the technologies available in Latin America and readily transferable. In six of the countries (Bolivia, Guyana, Haiti, Honduras, Jamaica and Nicaragua), pilot demonstration projects were established while, in the other four (Ecuador, Guatemala, Dominican Republic and Grenada), practical courses on the building of biogas plants were held. Two meetings of working parties were convened, the first at Quito, Ecuador (February 1980), which was attended by 11 participants from the region, and the second at Kingston, Jamaica (June 1980), which was attended by 14 experts from 11 Latin American countries.

Four practical courses on the construction of biogas plants.

First Latin American biogas course at Guatemala City, Guatemala (May 1981).

Two Latin American seminars on bioenergy.

First Latin American biogas seminar, held at Santo Domingo, Dominican Republic (August 1980).

Two meetings with the counterpart co-ordinators of the countries involved in the programme.

Co-sponsorship of the Inter-American Biogas Seminar at João Pessoa, Brazil (November 1981).

Activities to be carried out

- (1) Project for rural biodigesters  
Requirements (2 years) \$US 1 million
- (2) Project for liquid fuels derived from biomass  
Requirements (2 years) \$US 2 million
- (3) Project for the gasification of agro-industrial residues, wood and other vegetables  
Requirements (2 years) \$US 600,000
- (4) Project for the industrial use of charcoal  
Requirements (2 years) \$US 500,000
- (5) Project for fuelwood stoves adapted for use in commercial forest plantations  
Requirements (2 years) \$US 350,000
- (6) Energy optimization in sugar mills  
Requirements (2 years) \$US 150,000

State of progress of the Programme

Details of these projects will be made available at the meeting of the Interim Committee on New and Renewable Sources of Energy to be held at Rome from 7 to 18 June 1982.

(d) Latin American Solar Energy Programme

Objective

To promote the development and utilization of technologies which make use of solar energy so as to help meet overall energy needs in Latin America, through the establishment of integral projects which make possible the evaluation, analysis and development of the necessary infrastructure in the scientific, technological, human, industrial, commercial and administrative fields.

Activities carried out

A pre-feasibility study for the construction of a solar pond in Jamaica.

(a) Energy assessment and planning:

To assess Latin America's solar potential, utilizing criteria and methods (based on correlation, photointerpretation and direct measurement) which make it possible to prepare a Latin American solar measurement map and determine promising areas for the development of projects for the utilization of solar energy.

Development and establishment of criteria and methods for assessing, updating and integrating solar energy potential into the planning of the energy sector at the national and regional levels.

(b) Research, development and demonstration:

Technical, economic, social and environmental assessment and development of mature solar applications in specific pre-selected areas, based on their typology, location, availability and limitations with respect to natural, human, social, economic-financial, politico-administrative, scientifico-technological resources, and the urban and rural structure.

Some applications to be considered are: water pumping with photovoltaic systems; telecommunications; refrigeration of foodstuffs and medicines with photovoltaic and photothermal systems; industrial and agricultural water heating; passive space-heating and cooling; crop and fish conservation and drying; and solar ponds.

(c) Transfer, adaptation and application of mature technologies:

Feasibility study on the use of a solar pond for electricity generation. It is planned to carry out studies to determine whether saline or non-saline coastal ponds can be used as a source of energy. An assessment will be made of the feasibility of using non-convecting solar ponds with a Rankin turbine as an electric plant, to supply electricity for rural areas. Contacts will be made with organs possessing the technology for the execution of the project.

Studies concerning the manufacture of solar cells

Establishment of specifications and regional requirements in respect of the manufacture of solar cells, including technologies, materials, staff and accessories for its development, analysis of basic support industries, and actions related to the future manufacture and marketing of solar cells in the area.

Study concerning the manufacture of flat-plate collectors, with regional industrialists.

Establishment of specifications and requirements for the construction of flat-plate collector plants, of various production capacities, in accordance with national and regional market studies, and for export. Determination of the need for the building up and operation of materials and of technologies, staff, accessories, repairs and budget. The existing equipment and industries will have to be identified and the thermal and physical characteristics of the equipment in the region will have to be assessed in specific installations.

(d) Education and training:

Elaboration of educational programmes, areas of work, qualifications, organizational structure, and human, physical and economic requirements; definition of ways of promoting scientific and technical co-operation through training periods for staffs in institutions other than their own; review and selection of institutions that could establish courses and/or accept staff for short training periods; formulation and execution of specific activities in order to consolidate and promote the Latin American Solar Energy Association.

(e) Actions and requirements (2 years)

Energy assessment and planning . . . . .	\$US 800,000
Research, Development and Demonstration	\$US 1,000,000
Transfer, Adaptation and Application of Mature Technologies . . . . .	\$US 2,400,000
Education and training . . . . .	\$US 400,000
TOTAL	\$US 4,600,000

State of progress of the Programme

ECLA and OLADE have prepared a preliminary programme in this area which will serve as a basis for a meeting of Latin American experts in the field of solar energy, to be held in the next few months. The final programme that emerges from this meeting will be transmitted to the various potential financing sources. The tentative programme formulated will be available during the intergovernmental meeting to be held at Rome in June 1982.

(e) Latin American Geothermal Energy Programme

Objectives

To promote and co-ordinate the development of high, medium and low temperature geothermal energy in the region, to lay the foundations for technical training and to encourage the establishment of new exploration and development projects.

Activities carried out

A "Methodological guide for geothermal exploration and exploitation" covering the phases of "prospecting", "pre-feasibility", "feasibility", "development" and "exploitation" and a document entitled "Current state of geothermal energy in Latin America" (1978) have been prepared.

Two programmes have been developed for the exploration of geothermal resources in the Latin American region. The first programme covered the Andean and Caribbean subregions, and prospecting was carried out in Peru, Ecuador, Haiti and the Dominican Republic. The second programme covered Central America, the Caribbean and South America, prospecting being carried out in Guatemala, Nicaragua, Jamaica, Grenada and Colombia. Pre-feasibility studies were conducted in Nicaragua.

The following meetings were held: three seminars at the regional level in Ecuador, El Salvador and Mexico in 1978, 1979, and 1980, respectively, for the purpose of discussing and devising a methodology for geothermal exploration and exploitation.

A subregional training seminar on geothermal exploration in the Republic of Panama, October 1981.

Working parties on various topics.

Two training courses were given, each lasting three months, in reservoir engineering and drilling technology (September-November 1981, Mexico).

At the request of the member States, technical co-operation projects were prepared in different phases and activities for Honduras, El Salvador, Nicaragua, Costa Rica, Panama, Colombia, Ecuador, Peru, Bolivia, Haiti and the East Caribbean subregion (Grenada, St. Vincent, St. Lucia, Montserrat and Dominica).

Activities to be carried out

(a) Energy assessment and planning:

Assessment of the geothermal potential in Central America, initial phase.

(b) Research, development and demonstration:

New available technologies will be evaluated in regional demonstration projects to promote the use of geothermal energy in Latin America. This programme includes the following projects:

Pilot projects for portable generators at shaft heads, in El Salvador and Costa Rica.

Re-injection demonstration project in Costa Rica.

Development of low and medium enthalphy resources, pre-feasibility phase in Haiti.

(c) Transfer, adaptation and application of mature technologies:

Implementation of prospecting studies, which include development as well as pre-feasibility studies, in the Republics of Ecuador and Colombia, based on the request of both Governments and the co-operation agreement signed by them for geothermal development in the frontier area. At the regional level, implementation of studies for the prospecting of geothermal resources. Pre-feasibility studies in priority areas in Honduras, Panama, Colombia, Ecuador, Peru and the East Caribbean; a feasibility study in Nicaragua and provision of technical assistance to Bolivia. A subregional project for the establishment of an isotope laboratory for Central America.

(d) Education and training:

Establishment of eight specialization courses, each lasting approximately three months. For 1982, three courses will be given in the areas of drilling technology (Mexico), geovulcanology (Ecuador), and geophysics (Colombia); for 1983, the above-mentioned three courses, with the addition of reservoir engineering (Mexico) and geochemistry (Central America).

A Latin American seminar on geothermal exploration will be held in Ecuador and a subregional seminar on geothermal exploitation in Nicaragua. For 1983, there will be a training seminar on geothermal plants.

Requirements and activities (2 years)

(a) Energy assessment and planning . . . . .	\$US 4,000,000
(b) Research, development and demonstration . . . . .	\$US 7,000,000
(c) Transfer, adaptation and application of mature technologies . . . . .	\$US 20,200,000
(d) Education and training . . . . .	\$US 800,000
TOTAL	\$US 32,000,000

State of progress of the Programme

The utilization of the geothermal potential of Latin America has for some years now been one of the main programmes of OLADE. The activities suggested in the programme described here are those of the highest priority in the short and medium term and should be regarded in the light of activities currently being carried out in this field.

(f) Latin American wind energy programme

Objective

To improve the assessment of wind energy resources at the regional level through the preparation of the Latin American Wind Atlas which will make it possible to estimate the wind energy potential of each country and identify places of interest for the implementation of specific projects giving preference to the use of regional technology and equipment. A study on potential markets in the region will also be prepared to promote interest in creating a regional infrastructure of goods, services and technologies in this area.

Activities carried out

At the end of 1981, the preparation of the Preliminary Wind Atlas of Central America and the work already initiated on the Regional Wind Atlas as well as the holding of four seminar courses on the use of wind as an energy source, which produced three technical documents, either published or in the process of publication by OLADE may be presented as stages in the progress of the OLADE Regional Wind Energy Programme.

The topics of the courses given covered: prospection, assessment and description of wind energy; wind energy generation and use of windmills for water pumping.

(a) Energy assessment and planning:

The data on variable wind measurement will serve as a basis for completing the Wind Atlas of the region.

The Latin American Wind Atlas will provide an approximate indication of the behaviour of the wind, on a standardized basis. This will make it possible to detect areas of interest for the development of the resource, both from the energy standpoint and from that of its expected socio-economic impact.

Once the areas of interest have been determined according to the intensity and availability of the wind, it is essential that assessments be made of the current and future demand for each of them in order to proceed to the selection of project areas.

(b) Research, development and demonstration:

Implementation of specific pilot projects giving preference to the use of regional equipment and technologies with a view to utilizing them for demonstration purposes in the places where an interest in promoting the utilization of wind energy has been detected.

Each specific project in an area of interest implies the selection of a system for converting wind energy with a given power and the one which is the most appropriate in each case. From the total number of conversion systems selected it will be possible to determine the amount of equipment needed, the total power required and the most appropriate technology. Furthermore, the above-mentioned factors will enable the cost to be estimated and an order of priority to be established in respect to the execution of the projects.

To cover these markets based on the technological capacity existing in the region, it is planned to classify potential zones and the capacity of the equipment in order to permit the establishment of concrete specification classes and the quantification of demand in each of them.

During the design stage, consideration will be given to the participation of local industries, the interchangeability of components and the rational utilization of production lines.

(c) Transfer, adaptation and application of mature technologies:

As part of the Regional Wind Energy Programme, an inventory of technologies available in Latin America will be prepared.

The store of experience gained in the research, development and demonstration of systems designed to use wind energy in most of the countries of the region will serve as a basis for establishing optimized projects aimed at meeting the specific needs of each area.

Requirements and activities (2 years)

Energy assessment and planning . . . . .	\$US	100,000
Research, development and demonstration . . . . .	\$US	400,000
Transfer, adaptation and application of mature technologies . . . . .	\$US	600,000
TOTAL	\$US	1,100,000

State of progress of the Programme

ECLA and OLADE have prepared a preliminary programme which is to be discussed and examined in detail by regional experts in the matter and communicated to potential financing sources.

3. OPERATIONAL METHODOLOGY OF THE PROGRAMMES

The various programmes proposed are designed for the promotion of specific areas of action which have been identified as priority ones by the Governments of the region. The basic operational principle proposed for all the programmes is that of the execution of a series of simultaneous, co-ordinated and decentralized activities by the various participants, i.e.:

Interested Governments through officially designated institutions;

OLADE - as the regional focal point for energy questions;

ECLA - as the focal point of the United Nations system; and

Other subregional, regional or international organs.

It is proposed that the group of participants in a programme should designate a co-ordinating committee which would be responsible for co-ordinating, guiding and assessing the implementation of the programme. In some cases, it is proposed that a national institution should carry out regional activities. This could be so in the case of projects involving research, assessment demonstration, training, etc.

4. SUBREGIONAL AND REGIONAL IMPLEMENTATION

The great diversity of the sources of energy considered, the range of possible final uses or requirements that these may satisfy, together with the variety and different levels of development of the technologies necessary for their utilization, create a very broad field for regional co-operation. Furthermore, the variety of geographic, socio-cultural conditions and strategies applied to development and the economic and technological growth of the countries of the region seem to indicate clearly the great advantage of acting together through subregional groupings, such as those in the eastern Caribbean, Central America, the Andean Zone, etc. in order to take advantage of the elements common to neighbouring countries as factors for accelerating activities and specific programmes.

It is in this context that those activities which should be carried out within the subregional framework have been identified though forming an integral part of the programmes described here. The programmes should take advantage of this experience to strengthen regional co-operation.

During the Regional Preparatory Meeting for the United Nations Conference on New and Renewable Sources of Energy, various Latin American Governments offered their support for the formulation and implementation of specific regional programmes. Taking this offer as a basis, ECLA and OLADE have prepared programmes which will be discussed at meetings of experts from the region, to be convened in the next few months. The programmes which emerge from these meetings will be transmitted to the potential financing sources.

#### 5. PROPOSALS FOR IMMEDIATE ACTION

ECLA and OLADE propose a set of immediate measures to accelerate the implementation of the Latin American programmes indicated. The aim is to maintain a degree of homogeneity in the approach to all the programmes so as to facilitate an overall view of all the activities; however, according to the type of activities proposed, the level of development and the current activities and interests and priorities of the participating countries, each programme will have its specific implementation characteristics.

The various programmes have been prepared as a whole by ECLA and OLADE in consultation with and at the request of the Governments concerned. The implementation of the programmes mentioned, the first steps in the application of the Nairobi Programme of Action in Latin America, will require:

An indication by the countries of their interest in supporting and participating in specific programmes;

Designation by specific countries of the national organ that will act as a counterpart for the programme;

For programmes to be initiated, ECLA and OLADE will convene meetings of participants in order to discuss activities and define responsibilities;

OLADE, as a specialized organ concerned with ensuring co-operation and co-ordination in energy activities in Latin America, will insert the programmes described into the execution machinery of the Latin American Energy Co-operation Programme, without prejudice to any other energy plans which the countries of the region may have.

ECLA, acting as the focal organization of the United Nations system, will co-ordinate the participation in the programmes of the various organs and specialized agencies.

ECLA, in constant collaboration with OLADE, will serve as a vehicle for the incorporation of the Latin American programmes in the implementation process of the Nairobi Programme of Action.

## 6. CONCLUSIONS

With a view to accelerating the implementation of the Nairobi Programme of Action for the Development and Utilization of New and Renewable Sources of Energy, ECLA and OLADE have formulated and are negotiating the initiation and/or strengthening of specific programmes based on the priorities identified by the countries of the region. Some programmes are already under way, and others are at the preliminary stage of preparation and negotiations with financing mechanisms and organs have begun. Figure 1 indicates the activities carried out in each programme, the dates proposed for forthcoming activities, the global budget and immediate financial requirements.

Details of the programmes proposed will be available during the meeting of the Interim Committee to be held at Rome from 7 to 18 June 1982.

The Latin American programmes on new and renewable sources of energy presented here form an integral part of the energy programmes being developed in the region through OLADE and ECLA. The financial requirements of these programmes amount to \$US 99,800,000, broken down as follows:

	Millions of \$US
Energy planning	1.2
Hydroelectricity	56.3
Biomass	4.6
Solar Energy	4.6
Geothermal Energy	32.0
Wind Energy	1.1
TOTAL:	<u>99.8</u>

The immediate activities proposed for the programme, i.e. working parties to determine the details of the activities, advisory services, and visiting missions urgently require financial (and material and human) resources amounting to \$US 500,000.

STATE OF PROGRESS OF THE LATIN AMERICAN PROGRAMMES FOR  
THE IMPLEMENTATION OF THE NAIROBI PROGRAMME OF ACTION

Programme	Formulation of programme	Consultations with governments	Consultations with financing sources	Global budget	Budget for immediate activities	Date proposed for working parties
Energy planning				1,200.00	100.0	October 1982
Hydroelectric energy				56,300.00	80.0	October 1982
Biomass conversion				4,600.00	80.0	September 1982
Solar energy				4,600.00	80.0	July 1982
Geothermal energy				32,000.00	80.0	October 1982
Wind energy				1,100.00	80.0	July 1982

TOTAL

99,800.00

500.0

