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DEVELOPMENT AND INTERNATIONAL ECONOMIC CO-OPERATION

Ways in which the United Nations system can more effectively
assist Member States in the area of new and renewable
sources of energy

Report of the Secretary-General

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I. INTRODUCTION

1. In paragraph 11 of resolution 34/190, the General Assembly requested the Secretary-General and the concerned organs, organizations and specialized agencies of the United Nations system to identify and submit a report for consideration by the General Assembly at its thirty-fifth session on the ways in which, pending the holding of the United Nations Conference on New and Renewable Sources of Energy, the United Nations system can more effectively assist Member States, and in particular the developing countries, in the area of new and renewable sources of energy, with particular attention, inter alia to:

(a) Concrete measures for the transfer of relevant technologies to developing countries;

(b) Exchange of research and information on the latest developments and experiences in the practical application of new and renewable sources of energy;

(c) Provision of appropriate technical assistance, as necessary, to the designated national focal points in the preparations for the Conference;

(d) Provision of financial assistance for the measures listed above.

2. The present report is being submitted in response to that request. The information provided, especially in so far as it concerns technical assistance activities, should be read in conjunction with the Secretary-General's report concerning technical assistance activities in the context of development and international economic co-operation. 1/

3. Recent years have witnessed a growing involvement of the United Nations system with issues of non-conventional, new and renewable sources of energy. At its seventh special session in 1975, the General Assembly addressed itself, inter alia, to the problem of providing more effective assistance in the energy field to developing countries. The Committee on Natural Resources, the Advisory Committee on the Application of Science and Technology for Development and the Economic and Social Council also examined questions of research and development in non-conventional sources of energy during the following years.

4. At the same time, the United Nations and the various organs, organizations and specialized agencies of the United Nations system concerned with energy questions developed a variety of activities and programmes in the area of new and renewable sources of energy. These organizations are also participating actively in the preparatory work for the Conference, as stipulated in resolutions 33/148 and 34/190.

5. For the majority of the organs and organizations of the United Nations system,

1/ "United Nations Conference on New and Renewable Sources of Energy: report of the Secretary-General" (A/35/321).

the programmes of work and corresponding budget appropriations had already been determined for the period under consideration, namely, 1980 and the first half of 1981, at the time of adoption of resolution 34/190. Thus, responses to the resolution's request, other than those being undertaken by the Conference secretariat and the regional commissions, with funds provided by the General Assembly for that purpose, had for the most part to be devised within their previously approved programme budgets. Nevertheless, several organizations have allocated additional resources and staff-time for their preparatory work, as can be seen from the contributions in chapter II below.

6. A great many of the ongoing and planned activities of the system in the area of new and renewable sources of energy correspond to the four priority areas given in paragraph 11 of resolution 34/190. Detailed information on those activities was provided to the Committee for Programme and Co-ordination for its examination of the activities of the United Nations system in the field of energy (see chap. II below).

7. All concerned organs, organizations and specialized agencies were informed of resolution 34/190. Their attention was drawn specifically to paragraph 11, and they were invited to provide information, as requested, for submission to the General Assembly. The responses were discussed at two interagency meetings.

II. SUMMARY INFORMATION ON THE CROSS-ORGANIZATIONAL
ANALYSIS OF THE ENERGY PROGRAMMES OF THE UNITED
NATIONS SYSTEM

8. At its eighteenth session (1978), the Committee for Programme and Co-ordination decided to carry out a cross-organizational analysis of the energy programmes of the United Nations system. The initial report on the energy programmes of the United Nations system was prepared early in 1979; an annex brought it up to date for the Committee's twentieth session (1980). 2/

9. In the light of the decision to convene the United Nations Conference on New and Renewable Sources of Energy in 1981, the Committee's report devotes a specific section (subsection B of chapter II, "New and renewable sources of energy") to those energy sources singled out in paragraph 3 of resolution 33/148 for coverage by the Conference - i.e., solar, geothermal and wind power, tidal power, wave power and thermal gradient of the sea, biomass conversion, fuelwood and charcoal, peat, energy from draught animals, oil shale, tar sands and hydropower. This presentation of the material was intended to assist in the preparatory work for the Conference. The more conventional sources are dealt with in subsection A.

10. The annex to the report (E/AC.51/99/Add.1) provides comprehensive information on energy-related activities of the United Nations system, including those in areas singled out for priority action in paragraph 11 of resolution 34/190, by:

(a) Classifying them into eight broad areas, namely, prospects and trends, exploration and production, processing and refining, transport, trade, utilization and conservation, research and development, and management;

(b) Applying this classification to all sources of energy analysed in the report, including the new and renewable sources mentioned above;

(c) Categorizing, as far as possible, each activity according to whether its emphasis is on any of the following aspects: scientific; technological; economic (including financial); legal and institutional; or environmental.

11. The time-span for the activities covered is the biennium 1978-1979 for the majority of organizations, or corresponding as closely as possible to that period for those organizations that do not have the same budget cycle. The report also provides information on costs, both regular budget and extra-budgetary resources. This information was updated in a background paper submitted to the Committee at its twentieth session. Table I in the annex to the Committee's report (E/AC.51/99/Add.1) presents information on the activities of each organization, by energy source and in accordance with the broad areas mentioned above. Table II also organized by energy source, summarizes the specific means of action used by

2/ "Cross-organizational analysis of the energy programmes of the United Nations system: report of the Secretary-General" (E/AC.51/99, and Corr.1 and Add.1).

organizations for each energy source. These means of action have been defined as follows:

- (a) Collection and dissemination of information;
- (b) Studies for the general use of Governments and experts;
- (c) Studies and support for intergovernmental bodies;
- (d) Conferences, symposia and expert meetings;
- (e) Education and training, including seminars;
- (f) Pilot demonstration projects;
- (g) Technical co-operation projects;
- (h) Financial and other assistance, including monetary grants or loans and equipment.

12. The Committee's report indicates those activities of the United Nations system - including those providing direct assistance to Member States - completed in the past two years or currently being implemented. Special attention is drawn to paragraphs 64-108 of the report and to tables II.A.1, II.A.2, II.I.1 and II.I.2 of the annex, which provide descriptions of programmes according to main areas covered and their means of action.

13. The Committee for Programme and Co-ordination, at its twentieth session, recommended that its report and the annex to it (E/AC.51/99, and Corr.1, and Add.1) be brought to the attention of the Preparatory Committee for the United Nations Conference on New and Renewable Sources of Energy at its second session (A/35/38, chap. X, para. 358). In paragraphs 55-56 of its report (A/35/43, part II), the Preparatory Committee considered the report of the Committee on Programme and Co-ordination.

14. Concerned organs, organizations and specialized agencies of the United Nations system were invited to provide complementary information on their current activities specifically related to the aims and purposes of the Conference, in so far as they could be considered to provide assistance to Member States, pending the holding of the Conference (see chap. III below).

III. RESPONSE OF THE UNITED NATIONS, CONCERNED ORGANS, ORGANIZATIONS
AND SPECIALIZED AGENCIES TO PARAGRAPH 11 OF GENERAL ASSEMBLY
RESOLUTION 34/190

15. The United Nations, concerned organs, organizations and specialized agencies have provided additional information on their activities aimed at assisting Member States, and in particular the developing countries, in the area of new and renewable sources of energy, with particular attention to the measures singled out in operative paragraph 11 of resolution 34/190, as follows:

A. UNITED NATIONS

1. Department of Technical Co-operation for Development

16. The Department of Technical Co-operation for Development, through its Division of Natural Resources and Energy, supports an active programme of advisory services and technical assistance in the field of new and renewable sources of energy. The Division is in a position to respond to requests for short-term advisory assistance from developing countries concerning various aspects of new and renewable energy development. Its expertise is largely centred in the areas of solar energy, wind energy, hydropower, bioenergy and geothermal energy. Upon receipt of a request for a short-term advisory mission, the Division arranges for one of its interregional advisers to visit the country concerned. Such assistance is provided under the United Nations regular programme of technical co-operation and involves no cost to the requesting country. During the past year, such short-term advisory missions have been undertaken, inter alia, to Burundi, Jordan, El Salvador, the United Arab Emirates, Costa Rica, Jamaica, Kenya and the Phillipines.

17. In addition, the Department of Technical Co-operation for Development executes projects financed by the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP) in the field of new and renewable energy sources, such as village demonstration projects involving several new and renewable sources of energy in Senegal, Mongolia and Pakistan. ^{3/} It is also implementing wind energy projects in Mauritius, Cape Verde and China, small-scale hydropower projects in Ethiopia and Burundi and is providing support to research institutions in Cyprus, China, Turkey and Costa Rica concerning solar energy. In the field of geothermal energy, the Department currently supports projects in Djibouti, Ethiopia, India, Jordan, Kenya, Madagascar, Mexico, the Philippines and China.

18. Through the United Nations regular programme of technical co-operation and through funds-in-trust that have been made available to the United Nations, the Department is undertaking small-scale hydropower site evaluation missions in six countries: three in Africa; two in Latin America; and one in Asia. Such short-term site evaluation missions are available to developing countries that convey their interest to the Department.

^{3/} See also paras. 65-67 below.

19. In addition to these activities, the Department seeks to promote the exchange of experience among developing countries in new and renewable energy sources and endeavours to promote co-operation among them. In this regard, it may be noted, that the Department is organizing, in co-operation with the United Nations Industrial Development Programme, a study tour to China in the spring of 1981, in order that some 20 representatives of developing countries may benefit from the experience of China in small-scale hydropower development. This follows a similar tour on biogas which was undertaken in September 1979. It should also be noted that the Department's joint execution with the Economic Commission for Latin America (ECLA) of the Central American Energy Programme, a project financed by UNDP and the OPEC Special Fund, contains several components relating to new and renewable sources of energy. As the primary objective of the project is to reduce the dependence of the Central American isthmus on external energy sources by replacing them with indigenous energy resources derived from the participating countries, the Department has promoted the strengthening of co-operation among the countries of the region. For example, the experience of El Salvador in geothermal energy has been shared with other Central American countries through the training of personnel. Similarly, the experience of Brazil has been drawn upon in the preparation of a pre-feasibility study for the production and use of gasohol in Guatemala.

20. While the Department is ready to assist interested developing countries in the survey, assessment and development of their new and renewable energy potential, including the provision of support for rural village demonstration projects which examine the feasibility of utilizing a variety of locally available renewable energy sources in a systematic way to meet village needs, it also recognized the need to integrate new and renewable energy options into sound national energy planning processes. The Department, in this connexion, will convene an International Workshop on Energy Planning in Developing Countries at Stockholm in September/October 1981, in co-operation with the Government of Sweden. The Department also supports a number of energy-planning projects in developing countries and is prepared to offer assistance in this field to countries that request it.

21. In addition to the technical co-operation activities cited above, the Department, as part of its contribution to the Conference, expects to co-operate with the Government of Finland in convening in June 1981 an International Peat Workshop/Study Tour for participants from some 25 developing countries.

2. Department of International Economic and Social Affairs

22. In the context of its broad mandate to study trends in the world economy and problems of development, the Department of International Economic and Social Affairs pays particular attention to the supply and demand for all sources of energy and to their interrelationships with other economic factors. During the period preceding the Conference, the Department intends to circulate the following documentation which may be useful in providing a general framework for consideration of the question of new and renewable sources of energy:

(a) A report on energy in the 1980s

The report will provide an over-all view of the energy demand/supply balance during the present decade. Dealing mainly with petroleum, with emphasis on the developing countries, it will include a brief preliminary assessment of the role that non-conventional liquid fuels from among the list of new and renewable sources of energy might play in the over-all petroleum demand/supply balance. It will take into account the various economic and technological factors that will determine the practical impact of such non-conventional liquid fuel energy sources as tar sands, oil shale and biomass, and will review the problem of financing energy investment in energy-importing developing countries. Further, it will attempt to evaluate the feasibility, in terms of securing the requisite financing, of a rapid expansion of petroleum production in the developing countries importing energy during the 1980s. Particular attention will be paid to the financing of local oil development, and practical consideration will be given to the financing of non-conventional liquid fuels from among the new and renewable energy sources. The review will provide estimates of the levels of investment requirements of the petroleum sector of the energy-importing developing countries and of the volumes of external financing that might be available. Any gaps between required investments and financial resources will be pinpointed and suggestions for filling such gaps will be considered.

(b) World Energy Supplies

The latest edition of the annual statistical publication, World Energy Supplies, is expected to contain additional information, on a country and global basis, relating to the production and, in appropriate cases, the reserves of geothermal energy and hydroelectricity, fuelwood and charcoal, peat, and tar sands and oil shale.

3. Economic Commission for Europe (ECE)

23. The Economic Commission for Europe has undertaken, since January 1980, and foresees undertaking before the 1981 Conference, a number of activities as direct contributions to the preparatory work. These activities are financed from within the existing resources of the Commission and by an additional \$18,000 which was provided by the Conference secretariat to the Commission, for consultancies.

24. The ECE Seminar on Technologies related to New Energy Sources, which is being convened as a contribution to the preparations for the Conference, will take place at the Jülich Nuclear Research Centre in the Federal Republic of Germany, from 8 to 12 December 1980. The Seminar will consider solar, wind, and geothermal energy as well as problems associated with the integration of new energy sources into existing power systems. It will also comprise a study tour of the different institutes and facilities of the Centre. The Conference secretariat has been invited to participate.

25. An informal ad hoc meeting to evaluate the hydroelectric potential in ECE member countries was held at Geneva on 19 May 1980. Copies of the report of the

meeting have been forwarded to the Conference secretariat; the annex contains basic substance for future evaluations.

26. An ad hoc meeting on the utilization of low-calorific-value fuels will be held at Sofia, Bulgaria, from 27 to 30 April 1981.

27. The following reports have been completed by the Commission or by consultants:

(a) Biomass energy

A note on forest biomass as a source of energy

Biomass as derived from agricultural waste in the European member countries of the Food and Agriculture Organization of the United Nations (FAO)

Municipal and agricultural solid and liquid wastes

(b) Geothermal energy

Geothermal energy. A note on heat extraction technologies, applications and economics of geothermal power utilization.

A note on low- and medium-temperature geothermal resources of the Panonian basin in Hungary and adjacent countries. It includes quantitative information on the production of low-enthalpy geothermal fluids.

(c) Hydropower

Trends and prospects of hydro-electric schemes in the new energy situation

Long-distance electric power transmission

(d) Solar energy

Comparative economic assessment of decentralized and centralized solar energy conversion technologies in the ECE region

Prospects and possibilities for the utilization of new energy sources in ECE member countries: solar energy

Chemical and biological methods for solar energy conversion.

4. Economic and Social Commission for Asia and the Pacific (ESCAP)

28. The Commission revised its programme of work in the energy field shortly after the first oil price increase in late 1973. One of the main elements of the programme is designed to foster the development and use of non-conventional sources of energy in developing countries, with emphasis on rural areas. The results of past activities in the areas of biogas, solar energy, wind energy,

mini-hydroelectricity, rural electrification and rural energy will help countries in the assessment and development of new and renewable sources of energy, and thus help them in their preparations for the Conference, particularly with regard to the supply of information required in national papers.

29. There are, in addition, continuing activities in these areas and also new activities in the current ESCAP programme of work for 1980-1981, which are scheduled to be completed before August 1981 and which will contribute to assisting member States prior to the holding of the Conference, as follows:

(a) The Working Group Meeting on Energy in the South Pacific, funded by UNDP, which was held at Apia, Samoa, from 17 to 23 June 1980, explored new technologies for the development and use of energy in the Pacific, mainly those of non-conventional types of energy. It also contributed to an exchange of information among the countries.

(b) A seminar on geothermal energy will be held at Auckland, New Zealand, from 28 October to 3 November 1980, with financial and technical assistance from New Zealand. A symposium on solar science and technology which will be held in co-operation with the United Nations Educational, Scientific and Cultural Organization (UNESCO), UNIDO, the United Nations Conference on Trade and Development (UNCTAD), UNEP, FAO, the World Intellectual Property Organization (WIPO), the Asian Institute of Technology, the International Solar Energy Society, and the Regional Centre for the Transfer of Technology, at Bangkok, Thailand, from 25 November to 4 December 1980. Both these meetings are expected to contribute to technology transfer.

(c) A regional preparatory meeting for the United Nations Conference on New and Renewable Sources of Energy will be held at Bangkok, Thailand, from 10 to 15 December 1980. It will review the progress in research and development achieved by individual countries, based on the recommendations of previous ESCAP technical meetings. It will also identify problems encountered and endeavour to find solutions, and will directly help countries to prepare their national papers. The report of the meeting will be submitted to the Conference in August 1981 as a comprehensive report at the regional level (ESCAP).

(d) A regional adviser on solar energy, who will visit countries to give advice concerning the use of solar energy, for a one year period during 1980 and 1981, has been provided by Australia. His services will be useful to countries in preparing national programmes on solar energy.

(e) An expert group meeting on fuelwood and charcoal will be held, in co-operation with FAO and most likely with UNEP, at Bangkok, from 13 to 19 January 1981. It will contribute to the transfer of technology to developing countries and the exchange of experience among them.

(f) A seminar on planning management and economics of energy for rural areas, scheduled for the second quarter of 1981, will be useful to countries in energy planning management and will also assist them in completing national papers for the Conference.

(g) A guidebook on biogas development will be distributed in late 1980 or early 1981. The information contained in it will be useful to those who wish to build small-scale biogas plants, and to the extension service officers of Governments.

(h) Directories giving details on institutions and experts in the ESCAP region involved with research and development in solar energy, wind energy, mini-hydro-electricity and biogas are being prepared. Those that will be completed before August 1981 will be useful to the Conference and member countries.

30. Funds for some of these meetings are being sought from donor countries and various agencies.

31. The Commission is also co-operating actively with the Conference secretariat in preparatory work at the regional level, as indicated in the Secretary-General's report (A/35/321).

5. Economic Commission for Latin America (ECLA)

32. The Commission is working in close co-operation with the Latin American Energy Organization (OLADE). At the Tenth Meeting of Latin American Energy Ministers (Panama, December 1979), OLADE was asked to advise Governments in preparing for the Conference; it has been very active in the development of new and renewable sources of energy at the regional level.

33. The Commission has organized missions to virtually all countries in its region to create awareness of the Conference's objectives and preparatory process, to promote the designation of national focal points and the establishment of interinstitutional preparatory working groups, to identify technical assistance needs and to discuss arrangements for subregional and regional preparations. Information on the Conference was also provided at international meetings, such as the ECLA informal interagency consultation (Santiago, February 1980), the fifth session of the Caribbean Development and Co-operation Committee (Kingston, June 1980), the Latin American Institute for Social Research/Latin American Faculty for Social Sciences/Latin American Energy Organization Joint Programming Meeting on Non-conventional Energy (Quito, July/August 1980).

34. A Latin American project on firewood and charcoal, proposed at the Joint Programming Meeting at Quito, will be promoted by OLADE along with FAO and other agencies and will contribute to the transfer of technology.

35. As proposed at the same meeting, OLADE - together with ECLA, UNIDO, development banks and other agencies - will promote the formulation of a manual for socio-economic environmental evaluation of projects on new and renewable sources of energy. The UNDP experience on studies of potential demand for new and renewable sources of energy is expected to be disseminated through a special manual prepared by the authors of the UNDP study (Fundación Bariloche, Argentina) as a means of meeting technical assistance requests by Peru and expressions of interest by Chile, Colombia, Guatemala, Dominican Republic, Haiti and Ecuador.

Two technical meetings are to be organized later in 1980; the subject-matter for them is being discussed in consultation with Governments. Proposals received so far concern the state of application of new and renewable sources of energy in the region, techno-economic evaluation of technologies for new and renewable sources of energy, biomass/fuelwood/charcoal, industrial issues in the development of new and renewable sources of energy.

36. An intergovernmental meeting is to be organized jointly with OLADE in early 1981. A subregional preparatory meeting is under discussion with secretariats of the Andean group, Central America and the Caribbean.

37. The Commission is also assisting Governments in the region in the formulation of technical assistance requests and has received offers of support for technical assistance missions from several countries.

6. Economic Commission for Africa (ECA)

38. The Commission has been active in the field of energy, including new and renewable sources, for a number of years. It has undertaken, for example, technical assistance missions, the preparation of studies, proposals for long-term strategies and recommendations for short-term programmes for the development and utilization of new and renewable sources of energy and the publication of documents and pamphlets. The Commission has also organized and participated in meetings and seminars and has prepared and implemented training programmes.

39. There is a close relationship between the activities foreseen in the Commission's work programme and the Commission's activities in preparation for the 1981 Conference. The activities described below have been implemented since January 1980.

(a) Technical assistance

40. In Ethiopia, the established focal point was briefed on the scope of the Conference, and assistance was offered for the preparation of a national paper, as decided at the second session of the Preparatory Committee. In addition, ECA offered technical assistance to Ethiopia for the implementation of a project for the development and utilization of wind and biomass energy in the south-eastern part of the country. In Egypt, the national focal point was briefed on the scope of the Conference and assistance was offered for the preparation of a national paper.

(b) Meetings and related activities

41. A meeting of African experts on energy, jointly sponsored by the Organization of African Unity (OAU) and ECA, was held from 25 to 28 March 1980 in Addis Ababa. The meeting appraised the present energy situation in Africa, including the prospects for new and renewable sources of energy, broadly defined short- and long-term policies for development and utilization of energy resources in Africa, and provided technical background for the energy chapter of the Plan of Action

for the Implementation of the Monrovia Strategy for Africa Development, as recommended by the ECA Conference of Ministers at its sixth meeting (Addis Ababa, 9-12 April 1980) and endorsed by the first Economic Summit of the Assembly of Heads of State and Government of the OAU (Lagos, 28-29 April 1980).

42. With the help of its temporary staff especially recruited for Conference preparations, the ECA secretariat is at present engaged in the preparation of three regional technical panels of experts, namely, on hydropower, geothermal and biomass, including fuelwood and charcoal in Africa.

43. The ECA secretariat popularized its activities in the field of new and renewable sources of energy and its preparatory activities for the Conference through the Information Services Unit and through its participation in related meetings, seminars etc.

44. The ECA assisted African experts involved in activities relating to new and renewable sources of energy to establish the African Solar Energy Society by participating in the elaboration of its draft constitution and its programme of activities.

45. Since January 1980, ECA has secured nine fellowships for African technicians/engineers to be trained in the field of solar energy in France.

46. The Commission is also engaged in the establishment of the African Solar Energy Centre; its constitution, which will enter into effect with seven member States adhering, has already been signed by five of them.

47. A permanent demonstration centre for solar energy equipment has been established at ECA headquarters and is being expanded. The Commission has also created a specialized library in the area of new and renewable sources of energy.

48. Between September 1980 and August 1981, the Commission envisages an intensified programme of visits to member States in order to expedite the designation of national focal points, assist in the preparation of national papers in the identification of requests for more in-depth assistance in national preparations for the Conference. The Commission will provide technical assistance, on request, to member States in their preparation for the Conference.

49. Three technical panels of experts - on hydropower, geothermal energy and biomass, including charcoal and fuelwood in Africa - will meet from 20 to 25 October 1980. The reports of the panels, together with an up-dated paper on the status of solar/wind energy in Africa, will be submitted to the Conference secretariat in December 1980. Reports on the ECA preparatory activities for the United Nations Conference will be submitted to the Conference secretariat periodically.

50. An intergovernmental meeting on new and renewable sources of energy in Africa will be organized in January 1981 at Addis Ababa. It will analyse the reports of the technical panels of experts, the status of new and renewable sources of energy in Africa, elaborate a programme of priorities and a strategy for its

implementation, elaborate specific measures for concrete action to promote the development, exploitation and utilization of new and renewable sources of energy in Africa and prepare a common African policy for the United Nations Conference. A regional paper, based on the results of all regional activities for the preparation of the Conference, will be submitted to the Conference secretariat in February 1981, as requested by the Preparatory Committee at its second session.

7. Economic Commission for Western Asia (ECWA)

51. Within the framework of assistance to its member States, ECWA has so far undertaken technical assistance visits to seven countries. In addition to promoting the designation of national focal points, the visits also covered the promotion and formulation of national policies on energy, including new and renewable sources of energy, the review and assessment of present and potential energy demand and supply by different sources and sectors, and a review of the state of technology, both indigenous and imported.

52. The Commission plans to carry out the following activities before the Conference:

- (a) Technical assistance visits, to cover all countries of the region;
- (b) Assistance in formulating policies and drafting national papers, as required;
- (c) Holding of a regional expert group meeting, 12-16 January 1981.

53. In addition, subject to the availability of adequate funds, the possibility of organizing national and/or regional exhibitions on new and renewable sources of energy is being considered. These activities are aimed at assisting member States, prior to the Conference, in the areas mentioned in paragraph 11 of Assembly resolution 34/190.

8. United Nations Conference on Trade and Development (UNCTAD)

54. With reference to transfer of technology, UNCTAD has prepared a document entitled "Major energy technology issues in the energy sector of developing countries" (TD/B/C.6/65) for submission to the UNCTAD Committee on Transfer of Technology (Geneva, 17-28 November 1980), in which an attempt is made to identify areas for internationally concerted action in the transfer and development of energy technology in developing countries, including the area of new and renewable energy resources.

55. The Conference is also undertaking an in-depth study focusing especially on the development and diffusion of renewable energy technology, to examine problems faced by developing countries in this area and to propose possible solutions.

56. As concerns the issue of finance, the work undertaken by UNCTAD on the assessment of investment requirements of the energy sector in developing countries is being completed. The secretariat is now preparing a report which, drawing on information provided in this study, attempts to assess the size and identify the nature of financial flows especially involved in the development of new and renewable sources of energy in these countries.

57. These studies will provide information which member States, and the Conference secretariat, may find useful in the preparatory process of the Conference.

9. United Nations Industrial Development Organization (UNIDO)

58. In line with the targets established at the second General Conference of UNIDO (Lima, 1975) and with subsequent decisions of the third General Conference and of the Industrial Development Board, which assigned high priority to activities relating to the energy/industry interface, the Executive Director of UNIDO has established within the secretariat a Special Advisory Group on Energy, to co-ordinate the organization's effort to strengthen its energy-related programme of work and to prepare its contribution to the forthcoming Conference.

59. In this context, UNIDO will give special consideration to three essential aspects of the energy/industry interaction, with particular attention to the use of new and renewable sources of energy:

(a) The "energy for industry" aspect, i.e., the development of an appropriate industrial pattern of processes and products on the basis of the pattern of locally available energy, especially from new and renewable sources;

(b) The "industry for energy" aspect, i.e., the development of a local technological and industrial capability to do research, design, fabrication and servicing of the capital goods needed for development of the energy sector;

(c) The "energy management" aspect, i.e., the optimization of energy use in industry through "conservation", substitution and diversification as a means to increase the energy self-sufficiency of developing countries, especially through use of new and renewable energy sources.

60. Accordingly, UNIDO will provide technical assistance in the following areas:

(a) Enhancement of the planning capabilities of developing countries, with identification of energy strategies appropriate to their industrial sectors;

(b) Promotion of research into energy-related industrial technologies to stimulate the development of novel processes and products best suited to the requirements and resources of developing countries;

(c) Establishment or expansion of local capabilities to produce the capital goods needed for the energy sector;

(d) Efficient utilization of energy in industry encompassing effective energy management at the national, sectoral and plant levels;

(e) Expansion or establishment of technological institutions and related training schemes in order to develop the technical and managerial capabilities essential to the optimum utilization of energy in industry and to the production of related equipment;

(f) Industrial production of fuels and feed-stocks derived from biomass and hitherto unutilized raw materials such as shale and tar sands.

61. These technical assistance activities will be complemented by the conduct of studies on specific aspects of the energy/industry relationship. Particular attention will be devoted during the next biennia to the analysis of newly emerging patterns of industrial energy supply and to the projection of industrial demand for energy, in terms of types and quantities, so that the developing countries may have at their disposal the information they need to adapt to far-reaching changes in the pattern and pace of energy availability. These will also serve as a basis for the developing countries to seize the opportunity to establish or expand their industrial capacities with use of their great potential in new and/or renewable sources of energy.

62. The organization has already published a number of guides to information sources, reports on industrial technology for various energy sources and is preparing a manual for mini-hydropower engineering. It has also organized technical consultations among developing countries on large-scale biogas technology and study tours in the field of operation, manufacture and maintenance of medium- and small-scale power plants. A number of technical assistance projects in the field of new and renewable sources of energy are under implementation by UNIDO. Technical consultation and study tours are being organized at the interregional level.

63. As for pipeline activities, UNIDO is considering implementation of a series of projects dealing with production of specialized equipment for and with the promotion of utilization of new and renewable sources of energy.

64. In accordance with the UNIDO terms of reference, the organization will intensify its co-operation with United Nations agencies and national and

international organizations in energy-related industrial problems and opportunities, especially in the areas of biomass, hydropower and other sources of new and renewable energy.

10. United Nations Environment Programme (UNEP)

65. One of the main objectives of the UNEP energy programme has been to increase the awareness of policy makers in developing countries of the importance of harnessing renewable sources of energy, particularly in relation to rural development. In this respect, UNEP has carried out the following:

(a) Co-sponsorship of a number of workshops - for example, the African Solar Workshop convened at Atlanta in 1979 and the East African Workshop on Energy and Environment convened at Nairobi in 1979 - to help experts exchange experience and information on different problems encountered in programmes on renewable sources of energy;

(b) Review of the environmental impacts of renewable sources of energy, with the aim of identifying inadequacies in our knowledge that require further research and development. For this purpose an international panel of experts was convened in 1980 at Bangkok, and a comprehensive report has been recently published.

(c) Studies on energy supply/demand in rural areas of developing countries and how the energy needs of rural areas can be met by an environmentally sound renewable energy "mix". These studies will be reviewed at an International Workshop on Energy for Rural Development, to be convened at Bangkok early in 1981.

(d) Co-sponsorship of the Workshop on Firewood and Charcoal in the ESCAP region, with particular emphasis on the associated environmental aspects and how these can be mitigated.

66. On the practical side, UNEP has provided assistance to Sri Lanka, the Philippines, Senegal, Indonesia and Somalia to study the feasibility of harnessing locally available renewable sources of energy. Experimental rural energy centres are established or being established in rural areas in Sri Lanka and Senegal, using solar energy, wind and biogas. In the Philippines, wind energy and biogas are being harnessed in one remote island and small hydropower in another. In Indonesia and Somalia, experiments will be conducted on biogas, solar energy and on technologies to increase the efficiency of use of firewood and charcoal.

67. The Programme also intends to support, in 1981, within available financial resources, research programmes aimed at studying the environmental aspects of some renewable sources of energy - for example, the production of alcohol from crops, biogas production, the question of energy farms, and technologies for the conversion of fuel wood into charcoal.

11. United Nations Centre for Human Settlements (HABITAT)

68. The work programme of the Centre for Human Settlements for the biennium 1980-1981, as approved by the Commission on Human Settlements at its second session and as further refined at the third session, contains two specific elements, under subprogramme 3, which are relevant to the preparations for the United Nations Conference on New and Renewable Sources of Energy, namely, shelter, infrastructure and services.

69. Programme element 3.4, "Appropriate standards and technologies for infrastructure and services", includes a project on energy requirements of rural settlements and urban poor. Under this project, studies are being carried out on qualitative and quantitative information on the use of energy (including such energy sources as fuelwood, charcoal, vegetable and animal wastes) by the urban poor and in rural settlements and a review of energy supply alternatives based on existing information and innovative methods or devices. The ultimate objective of the project is to devise appropriate measures for the transfer of relevant technology to the domestic sector of the urban poor and rural settlements of the developing countries.

70. Under the same programme element, another project, on energy conservation in buildings, deals with the potential for energy conservation in buildings as well as criteria to be used in building design, taking into account the function, operations, maintenance, and efficiency of the facility, and the energy required to manufacture the components and building materials. The focus of this study will be on the potential applications of new and renewable sources of energy for water-heating, for domestic use, solar-heating and air-conditioning etc. Research and exchange of information on new developments and experiences in the practical application of new and renewable sources of energy will be one of the important aspects of the project.

71. In addition, two educational film packages are being produced on domestic energy requirements of rural settlements and conservation which will be widely distributed as a part of the Human Settlements Information Programme of the Centre.

72. The Centre's technical co-operation programme is a world-wide undertaking which, at present, comprises about 147 field projects in over 74 developing countries. The Centre's objective is to expand the programme and make better services available to countries requesting assistance. The areas in which technical co-operation is provided encompass the entire range of the subjects with a bearing on human settlements development, including policies, planning, shelter infrastructure and services, public participation and institutions and management.

73. Specific activities within the Centre's technical co-operation programme include such features as the spatial aspects of national development and urban/metropolitan development planning. The action-oriented programmes within the area of development planning include site-and-services schemes, urban development projects, environmental protection, programmes for disaster prevention and reconstruction and energy considerations and conservation in human settlements.

Some of the projects and project proposals which are now being undertaken by the Centre relate to the application of new and renewable sources of energy, as indicated below.

74. Biogas programmes and biogas plants owned by individuals have proved successful in several countries. But it is now realized that individual biogas plants help only a small section of the population, and large sections of rural settlements are still left with no reliable supply of energy for domestic purposes. In such cases, establishment of a community-type of biogas plant in small rural settlements would benefit a large section of the rural population. The Centre and the Government of Kenya are now studying the possibilities of establishing a community biogas plant in a small rural community to supply biogas for cooking needs on an experimental basis. The main objective of the project is to test the technology of community biogas plants, train local people to run the plant, and to gather social and cultural data on the acceptability of the community plants by the rural community.

75. In addition to the testing and training project on biogas technology, the technical co-operation activities of the Centre in Africa, Latin America and Asia contain elements relevant to energy considerations in human settlements. In a project on housing technology in Argentina the feasibility and application of passive solar building design is being investigated. In the United Republic of Tanzania, the Centre sub-contractors are helping to design the National Capital Centre in Dodoma, where one of the elements of the project is to study the application of solar energy to provide domestic energy needs and to assess the domestic energy requirements of the impact area of Dodoma. The Centre is providing experts in solar energy and domestic energy planning to the Government.

76. In addition to these specific projects, several technical co-operation activities, such as integrated housing development, rural housing development, slum upgrading, housing and human settlements development in urban and rural areas, regional planning, and technical assistance for co-operative housing, contain energy considerations. In all these projects, the potential role of new and renewable sources of energy is being examined with a view to developing energy-efficient settlement patterns and supplying domestic energy needs in urban and rural settlements.

12. United Nations Development Programme (UNDP)

77. The Programme is the principal source of funding within the United Nations development system for pre-investment and technical co-operation programmes and projects, including those activities in the area of new and renewable sources of energy. Most of these projects are executed on behalf of UNDP by the competent specialized agencies and organizations of the United Nations system, including the World Bank. These organizations will be reporting separately on their activities carried out on behalf of UNDP in so far as they are not included in the cross-organizational programme analysis. In addition, the operational management of the United Nations Capital Development Fund, the United Nations Revolving Fund for Natural Resources Exploration and the United Nations Interim Fund for Science and Technology has been assigned, by the General Assembly, to the Administrator of UNDP. The Programme's technical role in these projects is concerned with the

initial identification and appraisal of the projects in co-operation with the recipient Government and relevant specialized agency, periodic monitoring of execution at the field level through resident representatives, and evaluation and follow-up of the results of the project with a view to facilitating the necessary investment.

78. Below are cited examples of some of the more important measures currently taking place with UNDP funding and active UNDP involvement, under the categories identified in Assembly resolution 34/190.

(a) Concrete measures for the transfer of technology to developing countries

The UNDP Global and Interregional Programme has funded a study to examine the current situation in developing countries with respect to the development of conventional energy, energy conservation and new and renewable sources of energy. A summary of the report (DP/437) was presented to the twenty-seventh session of the UNDP Governing Council, held in June 1980. The full report, together with background supporting documentation, has been made available to the Conference secretariat, and arrangements are being made to have the report distributed to Governments.

The World Bank is executing a global research project on behalf of UNDP in which different, small-scale solar-powered pumping systems are subjected to field trials in three developing countries.

The World Bank has agreed to act as executing agency for an interregional project concerned with the preparation of country assessments of energy potential in some 60 developing countries and of the related requirements for technical assistance and investment.

The Administrator has agreed to fund an interregional project dealing with training for integrated national energy planning so as to strengthen the capabilities of developing countries in this area.

Two important projects, one in the field of energy planning, management, development and utilization in the region of Asia and the Pacific and one in the field of new and renewable energy resources development in the South Pacific, are under active consideration for execution by ESCAP.

In co-operation with the Government of New Zealand, UNDP has assisted in the funding, under its Interregional Programme, of a post-graduate training centre at the University of Auckland where annually some 20 engineers and scientists from developing countries are trained in the exploration and exploitation of geothermal resources. An extension of the project has been approved through to 1981.

- (b) Exchange of research and information on the latest developments and experience in the practical application of new and renewable sources of energy

The Programme has agreed to co-manage with the United Nations Institute for Training and Research (UNITAR) an international information centre for heavy crudes and tar sands, to be established in New York, to provide data and other information to developing countries in the production of heavy crudes and tar sands.

The Programme has supported the attendance of interested persons from developing countries at UNITAR conferences dealing with small-scale mining, heavy crudes and tar sands, and new and renewable sources of energy. It has also agreed, in principle, to finance similar attendance at a forthcoming conference on small energy sources from national indicative planning figures.

- (c) Provision of appropriate technical assistance, as necessary, to the designated national focal points in the preparations for the Conference

The material gathered in the study of the energy situation in developing countries, mentioned in paragraph 78 (a) above, as well as the questionnaire methodology utilized, should be helpful to national focal points in their preparations for the Conference.

The offices of UNDP resident representatives will also be available to assist both the Conference secretariat and the national focal points, not only in providing logistical support but also in facilitating substantive discussions on the energy situation and requirements for international co-operation.

- (d) Provisions of financial assistance to the measures listed above

In 1979, the total amount of expenditures by UNDP on projects having a significant component of new and renewable sources of energy was \$4,466,736, of which \$3,899,658 was executed by the executing agencies of UNDP and \$765,078 by UNDP itself acting as executing agency. The funds are derived from the country, regional, interregional and global indicative planning figures and the United Nations Capital Development Fund, and support a wide variety of projects in geothermal, wood fuel, solar, wind, hydro and other forms of new and renewable energy. As noted above, most of these projects are executed on behalf of UNDP by the specialized agencies. The examples cited in paragraphs 78 (a), (b) and (c) above are or will be executed by UNDP, the World Bank and ESCAP. The financial requirements for technical assistance are expected to increase in the coming years, as developing countries become aware of the potential of new and renewable sources of energy as a means of diversification of their energy mix.

At its twenty-seventh session, the Governing Council approved the establishment of an energy account within UNDP for energy exploration and pre-investment surveys. It further authorized the Administrator to seek and accept voluntary contributions and to undertake specific pre-investment projects

in the energy sector. The Administrator has made further contacts with potential donors with a view to securing finance for the energy account and some has already been obtained. The energy account will augment the UNDP capacity to respond to the urgent needs of developing countries in the energy sector, including new and renewable sources of energy, beyond the financial limits and competing priorities of the indicative planning figures and other funding sources.

A further source of finance is the Interim Fund for Science and Technology for Development, where scientific and technological aspects of energy, including new and renewable sources, are among the areas of concentration, particularly aspects relating to research, training, development, adaptation and transfer of technology. The Interim Fund is currently appraising a large number of projects in these areas.

The United Nations Capital Development Fund has funded three projects involving investments totalling \$6,276,000 for the implementation of new and renewable energy technologies.

Assembly resolution 1762 (LIX) stipulates that the mandate of the United Nations Revolving Fund for Natural Resources Exploration includes exploration for mineral, water and energy resources. In practice, and pending the receipt of adequate financial resources, operations have been limited to exploration for solid minerals. An intergovernmental group of experts will review, in accordance with Economic and Social Council resolution 1979/65, the operations and functions of the Fund, including the possibility of activating its original mandate to cover energy resources including new and renewable sources of energy, and will report its findings in 1981 to the Economic and Social Council through the Governing Council of UNDP.

13. United Nations University

79. The United Nations University is undertaking in the period from 1 January 1980 to 31 August 1981 a number of projects in the field of new and renewable sources of energy, some of which will provide contributions to the United Nations Conference on New and Renewable Sources of Energy.

80. With the Tanzania National Scientific Research Council, the University is undertaking the establishment of a Rural Energy Research Centre in Dodoma, the new capital of the United Republic of Tanzania. The Centre will form the focal point for the developing, testing and introduction of renewable energy-based technologies to supply the energy needs of six villages in the vicinity of the capital. The technologies involved will be based on solar, wind and biogas energy. A study to determine rural energy consumption patterns in the area is already nearing completion.

81. With the Sri A.M.M. Murugappa Chettiar Research Center in Madras, India, the University is undertaking a project to introduce an integrated rural energy and food production system into two villages along the south-east Indian coast. The technologies introduced include biogas digesters, algae ponds, fish ponds,

bio-dynamic gardening, solar dryers, and all-wooden windmills. This project is also focusing on the dissemination of information on this system to other villages using locally available and motivated skills.

82. The United Nations University envisages the establishment of a training course in renewable energy at the Indian Institute of Technology, at New Delhi, India. The course will commence in January 1981 with approximately six University Fellows. The course will cover solar energy, wind energy and, to a lesser extent, bioconversion energy as well as an overview of rural energy needs and integrated energy systems.

83. The United Nations University is preparing three publications in the field of new and renewable sources of energy: Biogas Technology in China, Photovoltaic Applications by Developing Countries, and Natural Energy and Vernacular Architecture.

84. The University is planning to use ASSET (Abstracts of Selected Solar Energy Technology) as the official newsletter of the Conference. In addition to the substantive information on important publications and reports already included in ASSET issues, a special section will be devoted to news of importance to persons interested in the Conference preparations.

85. The University has commissioned a paper on the scope, nature and type of information essential for promoting the development and use of new and renewable sources of energy, with special emphasis on information availability and need in developing countries. This study will be executed by the Tata Energy Research Institute at Bombay, India, and will be a direct in-put for the Ad Hoc Expert Group on Information Flows for the Conference. An additional background paper will be prepared for this Expert Group, reviewing the experience and considering the prospects of the United Nations University renewable energy information network based on ASSET.

86. The University is preparing a background paper on integrated rural energy systems which will be presented to the Ad Hoc expert group dealing with rural energy, including utilization in agriculture. The paper will be supplemented by a survey, prepared by a consultant of projects of substantial size at the village level, which will include technical information, an evaluation of the effectiveness of the project by the implementors, and financial considerations. Following the meeting of the Group, the United Nations University will prepare a symposium on integrated rural energy systems which will form the basis for papers to be contributed to the Conference and a subsequent book.

B. Specialized agencies

1. International Labour Organisation (ILO)

87. Among the ILO activities already described in the cross-organizational programme analysis, the following appear to be of particular interest to the United Nations Conference on New and Renewable Sources of Energy:

(a) Utilization of solar energy to replace wood fuel and to improve working conditions of workers in rural areas of the Sahel: testing of a solar cooker;

(b) Follow-up and dissemination of an ILO training manual for improved techniques of charcoal making (Charcoal-Making for Small-Scale Enterprises, Geneva, 1975);

(c) Technical support of projects dealing with reforestation and with the creation of village wood lots through labour training;

(d) Support and advisory services for improved utilization of charcoal and fuelwood by introducing efficient stoves made by rural artisans.

88. In addition, within the context of the ILO World Employment Programme, a programme of research has been launched concerning the social implications of alternative energy policies in developing countries. This programme of research will examine, in particular, the different energy policies which may be pursued, both in the urban industrial sector and in rural areas, in the coming decades.

89. The ILO is also at present preparing a number of technical co-operation project proposals in the above-mentioned fields of the energy area which will be submitted to various donors over the next 12 months. Funding of these proposals will enable the ILO significantly to expand its technical co-operation in the energy area.

2. Food and Agriculture Organization of the United Nations (FAO)

(a) Concrete measures for the transfer of relevant technology to developing countries

90. Measures for the transfer of relevant technology by FAO to developing countries are taken mainly in the framework of its field programmes.

91. In the agricultural sector technical assistance is provided to a number of countries in the following fields: organic recycling and biogas technology; application of solar pumps for irrigation; effective use of fertilizers; applications of biological nitrogen fixation; development of low-energy rice farming technology; improved production and utilization of draught animal power; use of waste heat from power plants; biological pest control to reduce the need for chemical pesticides.

92. In the field of forestry FAO is executing 40 national or regional field projects concerned with fuelwood or charcoal. These projects deal with the various phases of fuelwood production and utilization such as fuelwood plantations, charcoal production, utilization surveys, improvement of wood-burning stoves, industrial energy production and general forest-sector planning with due regard to energy aspects. Major components of most projects also deal with sociological and environmental issues.

93. In the field of fisheries FAO is providing assistance on the use of solar energy for fish drying; the application of wind and solar energy for ice production and cold storage; fuel savings through increased use of propeller nozzles, particularly for trawlers; the use of alternative propulsion systems, including sail, for small craft; replacement of petrol outboard motors by low-powered diesel engines; development and demonstration of energy-saving fishing gear.

(b) Exchange of research and information on the latest developments and experience in the practical application of new and renewable sources of energy

94. Exchange of research and information takes place concurrently with the transfer of relevant technology in the field activities listed above and also through special programmes designed specifically for exchanges of information and experience. The regional project in Asia and the Pacific, "Improving soil fertility through organic recycling", includes an important component of exchange of experience and transfer of information on relevant technology. This project lends itself especially well to the promotion of technical co-operation among developing countries. Training courses on organic recycling are also being organized in Africa, the Near East and Latin America.

95. Two regional projects and a training centre are in preparation for Africa on fuelwood and charcoal production. The FAO gives special attention to the dissemination of national production and trade data on fuelwood and charcoal. Information is provided on fast-growing species appropriate for energy production. Preparation or revision is under way on guidelines on charcoal production, wood-based power installations, logging and transport equipment.

96. In the field of fisheries, appropriate energy conservation technologies are being monitored and catalogued and results of experience with more energy-efficient fishing are being compiled for dissemination to member countries.

97. A number of publications devoted to energy matters have been issued by FAO, namely:

Energy and Agriculture

Energy for World Agriculture

Utilization of Solar Energy in Rural Areas

Directory of Institutions and Compendium of Technologies Related to Agricultural By-product Utilization

Rice Husk as an Energy Source

China: Recycling of Organic Wastes in Agriculture

China: Azolla Propagation and Small-scale Biogas Technology

Organic Recycling in Africa

98. An expert consultation on energy-cropping versus food production was recently organized. This consultation drew particular attention to the technical possibilities and implications of large-scale energy cropping. The conclusions of this consultation will be published.

(c) Provision of appropriate technical assistance, as necessary, to the designated national focal points in preparation for the Conference

99. The FAO is providing assistance to member countries in preparation for the Conference through its co-operation with the Conference secretariat. It has responsibility for the organization of the technical panel on fuelwood and charcoal, which includes the provision of technical information, the study of results on the subject and the preparation of a subject-matter paper. It will actively participate in the group dealing with rural energy, for which it will prepare a background paper.

100. Along with other agencies, FAO is co-sponsoring the ESCAP-organized Symposium on Solar Science and Technology, to be held in late 1980 at Bangkok. The matter of energy-cropping versus agricultural production has been discussed by member Governments on the occasion of the FAO Regional Conference for Latin America held in August 1980 in Cuba. The results of both these conferences will provide material for the United Nations Conference.

101. Studies are being undertaken aimed at identifying energy requirements of fisheries in different regions and for varying levels of exploitation. The results of such studies will assist member countries to plan the rational exploitation of fish resources in their exclusive economic zones. A consultant on draught animal power, contracted by FAO, will prepare a paper on this subject for the Conference.

102. Within FAO the Inter-Departmental Working Group on Natural Resources and the Human Environment has been entrusted with the liaison between FAO and the secretariat of the Conference. This Inter-Departmental Working Group is co-ordinating the inputs from the various units within the FAO.

(d) Provision of financial assistance for the measures listed above

103. The FAO programmes devoted to energy issues in 1978-1979 amount to about \$20 million. Of this amount about \$5 million are contributed under the Regular Programme, of which \$US 2 million are for the Technical Co-operation Programme. Activities funded from extra-budgetary resources, up to \$15 million have been entrusted to FAO for execution by UNDP, UNEP, the World Food Programme (WFP) and various government co-operative programmes.

3. United Nations Educational, Scientific and Cultural Organization (UNESCO)

104. Since the holding of the United Nations Conference on New and Renewable Sources

of Energy was still under discussion at the time of the twentieth General Conference of UNESCO in October-November 1978, it was not possible then to make a specific budget allocation for Conference preparation. However, assistance to member States in the area of new and renewable sources of energy is being provided under a number of themes within the regular programme, notably under themes 4.3/09, "Promotion of research and experimental development aiming at rational utilization of conventional and non-conventional sources of energy", and 10.1/04, "Contribution to the development of specialized information systems in the field of education, culture and communication, and the natural and social sciences".

(a) Concrete measures for the transfer of relevant technology to developing countries

105. The UNESCO has organized and is planning a series of workshops, meetings and training courses on various aspects of new and renewable sources of energy which are designed to improve transfer of technology to and between developing countries. These include:

Workshop on Solar Drying, Barbados, July 1980

Workshop on Solar Pumping, India, October 1980

Seminar/Workshop on Solar Applications in the Tropics, Singapore, October 1980

Symposium on Biofuels, Nigeria, August 1980.

106. In addition, UNESCO sponsors a number of training programmes, for specialists from developing countries, which promote transfer of technology. These include post-graduate level courses at Perpignan, France; Niamey, Niger; Pisa, Italy; and Bangkok, Thailand; and courses for technicians at Perpignan, France; and Albany, New York, United States.

107. Among the most effective mechanisms for transferring technology are the establishment of regional linkages to promote exchange of information and personnel, co-operative research programmes, and technical co-operation among developing countries. The UNESCO has provided stimulus and support for the establishment of two such groups - the Asian Solar Energy Network and the Solar Energy Society for Africa.

108. Within its regular programme, UNESCO is also providing support for a number of demonstration projects at which models of new sources of energy are constructed and displayed. In most cases these demonstration projects are linked with other related activities.

109. Recognizing that the supply of skilled manpower is one of the critical elements in the transfer of technology, and that relatively little is known about the training needs and potential in the field of new and renewable sources of energy, UNESCO is currently carrying out a survey and analysis of programmes, facilities and needs in the field of education and training related to new and renewable sources of energy. The study will include information on the following: the ways in which new and renewable sources of energy are dealt with currently in university curricula; special training courses and programmes which have been

developed at all levels; facilities and possibilities for the training of technicians; some assessment of manpower needs in the various areas of science, engineering and technology; and suggestions for programmes which can help to meet these needs better.

110. The study will be based on responses to a questionnaire which was circulated in April to over 400 institutions, organizations and government offices and agencies, plus a series of interviews with specialists in the subject field. To date some 200 replies have been received, and the analysis of those replies is under way. It might be noted that relatively little information has been provided in the sections of the questionnaire dealing with research and manpower needs, and a more intensive study may have to be undertaken in order to obtain meaningful data in those areas.

111. In addition to its regular programme activities, UNESCO implements a number of energy programmes, financed from extra-budgetary sources such as UNDP and Funds-in-Trust, which are directly related to transfer of technology. Several UNDP projects on solar energy are currently being implemented in Mexico and Algeria, and there are energy components in a number of other projects. A feasibility study for the establishment of a regional solar energy centre at Bamako, Mali, to serve the countries belonging to the Communauté économique de l'Afrique de l'ouest (CEAO) has been completed. If approved, this will become a major project with widespread impact and implications.

(b) Exchange of research and information on the latest developments and experiences in the practical application of new and renewable sources of energy

112. The regional linkages described above are one effective mechanism for exchange of research and information on developments and experience. However, it is recognized that a major need is a more structured system of collecting and disseminating information on new and renewable sources of energy, particularly as it applies to developing countries. As a step towards meeting this need, the UNESCO secretariat has recently completed a study for an international information system for new and renewable sources of energy which will be submitted to the General Conference at Belgrade in September/October 1980. The study, which involved some 20 consultants in an intensive review including visits to over 50 countries and contacts with major agencies and programmes working in related fields, examined user needs, present facilities for meeting those needs, and planned programmes designed to improve the present situation. It presents proposals for an international information system for new and renewable sources of energy, based in large part on the integration and harmonizing of existing information systems. The study is already with the Conference secretariat, and the final report, along with the recommendations of the UNESCO General Conference, will be made available to the Ad Hoc Group of Experts on Information Flows.

113. The UNESCO publishes a series of books in different areas of technology, including energy technology. These include An Approach to Solar Electricity, published in 1979 and now going into a second and revised edition. Three

manuscripts, "Harnessing ocean energy", "New energy sources for developing countries", and "Energy perspectives", will be published in 1980/81. These are distributed through normal commercial channels.

(c) Provision of appropriate technical assistance, as necessary, to the designated national focal points in preparation for the Conference

114. Again, it must be pointed out that UNESCO does not have the capacity to provide any direct assistance, but it has been able to provide indirect assistance to a number of member States which would be related to the Conference preparations. These include consultant services, fellowships and study tours, and support for research and development, much of this coming under the participation programme within which UNESCO responds directly to requests from member States for specific assistance.

115. Staff members of UNESCO, particularly specialists attached to the regional offices, are able to provide technical assistance to member States, and in a number of cases, specialists with experience in one or more of the fields of new and renewable sources of energy are available.

(d) Provision of financial assistance for the measures listed above

116. Financial assistance can be broken down into three main categories: regular programme, allocated to specific activities; regular programme, allocated to participation in the activities of member States; and extrabudgetary resources.

117. Under the regular programme (theme 4.3/09 detailed above) some \$902,600 have been allocated in the present biennium. Support available for activities related to new and renewable sources of energy under other themes in the science programme is on the order of \$200,000, and support available for the study of an international information system is also on the order of \$200,000.

118. Participation programme support to member States in the field of new and renewable sources of energy amounts to about \$170,000, and extrabudgetary resources include some \$592,000 in UNDP projects. The budget for the project sponsored by the Communauté économique de l'Afrique de l'ouest in West Africa has not yet been approved but is expected to involve some tens of millions of dollars. Other extrabudgetary sources are difficult to estimate. At this stage they are not large, although there is the possibility of significant increases.

4. World Bank

119. Current policy of the World Bank in energy is outlined in its publication entitled Energy in the Developing Countries, which was distributed in August 1980. Based on a country-by-country review of investment requirements and opportunities, the policy underscores the need to accelerate energy production, and reduce the burden of imported energy in the oil-importing developing countries. Because of the key role which the Bank at present plays in the energy sector of developing countries and the large-scale investments required, a further expansion of the Bank's programme in this vital sector is considered both feasible and desirable. The current energy programme planned for the fiscal years 1981-1985 calls for lending \$13.2 billion to support investment mainly in oil and gas development and electric power generation. Implementation of an expanded programme totalling \$25 billion, for which a new energy affiliate is being considered, would enable the Bank to increase substantially its lending for fuel wood, to expand work in alcohol production from biomass, and to begin to assist members to make better adjustments to the changing energy situation. In addition to projects in these areas, others will undoubtedly be identified in the next several years as developing countries improve their energy planning and analysis of their future energy prospects, as conservation receives the emphasis it deserved, and as technologies for renewable energy continue to evolve.

120. Bank Group analysis of the energy situation in developing countries, viewed as technical assistance pending the holding of the United Nations Conference on New and Renewable Sources of Energy, provided an opportunity for individual countries to collaborate with the Bank in an in-depth review of their energy potential; to examine policy options in the energy sector; and to formulate appropriate strategies for long-term energy development. Such an analysis underscored the need to integrate energy into over-all national economic programming; in particular, it indicated that in many developing countries, policy is hampered by inadequate information about resources and uses. Also, most developing countries lack experience in commercial fuel production, and the large majority have not yet tapped their own resources to any considerable degree. At the same time, it is evident that in designing policies to help resolve its energy problems, every country faces a unique set of conditions, including its level of income and degree of industrialization, its energy resource endowment, the relative importance of commercial and traditional fuels, and its degree of dependence on oil imports.

121. Bank Group assistance in the renewable energy field must be considered in the light of the potential of renewable energy for meeting developing country energy requirements in the traditional and modern sectors; the 'readiness' of the various renewable energy technologies for practical application in developing countries; and the need to strengthen the ability of developing countries to plan and manage renewable energy programmes. While the conditions in many developing countries may be favourable to the development of the sources and uses of renewable energy, the pace at which they can develop their renewable energy potential will be determined by their ability to develop adequate data

on sources and uses of renewable energy; enhance their technical capabilities; design systems that can deliver renewable technologies in socially and culturally acceptable forms to large numbers of energy users; and strengthen institutions for energy planning and programming.

122. World Bank involvement in renewable energy has largely been limited to lending for hydroelectric power and its growing fuel wood forestry operations. Current Bank policy suggests concentration on projects based on fuel wood and alcohol production which address the most urgent developing country needs, and for which the Bank is presently best equipped on the basis of experience and expertise. Sector work, institution-building and co-ordination with the international agencies in the financing of projects and in research can both assist developing countries directly and lay the foundations for expanded Bank activities in the future. The Bank's approach to other types of renewable energy production will need to emphasize gaining operational experience with the most promising technologies and applications, and building local capacity to plan, design and implement future programmes. While present plans call for incorporating 'other' renewable technologies in only a small number of Bank-financed projects, it is recognized that increasing opportunities exist for doing so. Power projects, particularly rural electrification, can in some cases include wood-fueled and small hydro plans. Agriculture, industry, education, health and other projects can draw their energy requirements from a variety of renewable sources. Rural and urban development projects can include stove improvement, biogas, solar-water heating and wind-pumping components. Small industry projects can promote the local manufacture of renewable energy equipment. Since the technologies in question are relatively new, a demonstration approach may sometimes be in order.

123. Taking into account resource potential, available technology and economic feasibility, it seems clear that efforts to develop renewable energy in the developing countries must concentrate on biomass. Bank emphasis on biomass, particularly fuelwood, takes account of the fact that results are likely to be achieved more quickly and economically where new programmes can be built on existing foundations. The expansion of lending for fuelwood has involved the broadening of country knowledge, accumulation of practical experience in project design and implementation, and the build-up of a substantial project pipeline; other traditional biomass fuels have received increasing attention in the Bank's sector work. For other renewable energy sources, it is only possible at this time to suggest the strengthening of the Bank's expertise and the identification of suitable investment opportunities as specific technologies evolve. Incorporating these technologies on a pilot basis in projects is a way for the countries and the Bank to gain experience with them and promote their development. Energy sector work and assistance in institution-building also will assist developing countries directly and lay the foundations for expanded Bank Group activities.

5. World Meteorological Organization (WMO)

124. The Eighth World Meteorological Congress (Geneva, 1980) considered that work related to energy problems warranted very high priority. The Congress decided

to amplify some of the projects proposed by the Secretary-General for the next financial period in order to enable the organization to give support to the United Nations Conference on New and Renewable Sources of Energy.

125. The framework for the relevant activities is the WMO Plan of Action in the field of energy problems, established in 1976, in which special attention is paid to the subject areas of energy production, energy transportation, conservation and consumption, and utilization of wind and solar energy and other new energy sources.

126. The Plan of Action will be revised after a meeting of experts in November 1980, in order to respond to the new developments in the field of energy and the pertinent needs in developing countries. The two WMO technical notes which will be part of the WMO contribution to the Conference - one on meteorological aspects of the utilization of solar radiation as an energy source, and the second one on the meteorological aspects of the utilization of wind as an energy source - will serve in these fields as a basis for the activities of WMO experts going on mission to developing countries as well as for training and education activities devoted to meteorologists.

(a) Concrete measures for the transfer of relevant technology to developing countries

127. The WMO has planned for 1981 to give assistance to developing countries through expert missions on applications of meteorology to energy problems and on other special applications. The assistance will be given, in particular, in preparation of climatological information for applied purposes and in the preparation of inventories of climatological station and catalogues of climatological data.

(b) Exchange of research and information

128. One of the WMO contributions for the Conference includes manuscripts of world climate maps related to the world distribution of solar energy potential, prepared for WMO by The Meteorological Service of Hungary.

129. The meteorological aspects of new and renewable sources are continuously considered by rapporteurs and working groups within the commissions of WMO, especially by the Commission for Climatology and Applications of Meteorology and its working group on applications of meteorology and climatology to energy problems.

(c) Other activities

130. The WHO is planning to continue its activities within the Plan of Action in the field of energy problems and in this connexion to hold a WMO Conference on Meteorology and Energy at Mexico City in the autumn of 1981, two to three months after the United Nations Conference.

131. The WMO was represented at both sessions of the Preparatory Committee for the Conference and took part in the technical panels on solar and wind energy. The latter panel was hosted by WMO at its headquarters at Geneva.

6. World Intellectual Property Organization (WIPO)

132. Bearing in mind the high value of patent documents as sources of information on usually technically advanced solutions and on the possibilities of their practical implication, WIPO devotes about 20 per cent of its total budget to activities aimed at improving the transparency of patent documentation and the access to technological and scientific information contained in patent documents, including - but not limited to - information on technologies relating to new and renewable sources of energy.

133. Activities of WIPO in this field are not restricted to methodological, planning and co-ordination work but include also direct technical assistance, by providing, free of charge, to users in developing countries, documentary search reports on the existing "state of the art" with regard to technical problems specified by the user, as reflected in patent office search files. The searches are carried out, on the basis of agreements concluded by WIPO with the national patent offices of several industrialized countries, by competent specialists of those offices. The cost of the search reports itself is financed outside the WIPO budget by voluntary contributions, whereas WIPO covers the necessary staff costs for the preparatory and monitoring work, those costs being about one third of the total costs of the programme.

134. The percentage of incoming search requests dealing with new and renewable sources of energy is increasing and is, at present, about 10 per cent of the total. Since 1 January 1980, corresponding search reports in the following fields have either been completed or are under preparation:

(a) Biomass and fuel-wood energy

Alcohol, acetone and butanol production from molasses

Production of ethyl and methyl alcohols from cellulose

Technologies applicable for the production of fuel alcohol from tropical woods

Production of weak wood-gas for steam-generating and heating purposes

(b) Solar energy:

Solar heat collecting and storing devices (in general)

Solar heat boilers

Survey on solar power production and conversion into electrical power

Solar equipment for room climatization and hot-water supply

Solar energy heating of residential buildings

Classes of chemical reactions usable in heat-storing devices for solar power stations

Selective coatings for concentrator-type solar energy collectors resistant up to temperatures of 400°F

Solar energy driven water pumps

Water distilling apparatus using solar energy

(c) Oil shales:

Latest developments in in situ retorting of bituminous shale and factors determining the applicability of those techniques

Techniques for direct combustion of poor-quality bituminous shale

(d) Wind energy:

Wind motors combined with electric power generation systems and control systems limiting the variation of power output

135. The search reports identify the key patents representing the different solutions known in the field, according to a detailed search request drawn up by the user. Copies of the documents referred to in the search reports are provided with the report. Details of the search request and the intended use of its results are treated as confidential.

136. The WIPO could provide assistance to Governments in their preparations for the Conference by bringing this search programme directly to the attention of national focal points; however, this would require funding at a higher level than has been pledged so far for 1980 and 1981.

137. In addition to the activities referred to above, WIPO has discussed with several national patent offices the possibilities of providing comprehensive evaluation studies on the technological developments and trends as reflected in patent office search files with regard to new and renewable sources of energy. As a result of these discussions, corresponding monographs have been offered on wind energy, geothermal energy and ocean energy. The monograph on wind energy was requested by the technical panel concerned, and has already been commissioned; it will be paid for from Conference funds. The monographs could be used as input not only to the technical panels but also to one or more expert groups.

IV. SYSTEM-WIDE CO-ORDINATION

138. The report of the Secretary-General on preparations for the Conference (A/35/321) provides, in paragraphs 6-11, information on the steps taken to ensure

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system-wide co-ordination in the preparatory work for the Conference, through the Co-ordinating Committee composed of senior officials at United Nations Headquarters, and through interagency meetings. Consultations and co-ordination of activities with the concerned organs, organizations and specialized agencies, including the regional commissions, were continued, at informal meetings with their representatives during the second session of the Preparatory Committee and through contact with the focal points designated to ensure co-operation with the Conference secretariat.

139. In this context, the response of the United Nations system to paragraph 11 of Assembly resolution 34/190 was discussed, as indicated in the introduction to the present report, as were other aspects of interagency co-operation. Further consultations took place at the interagency meeting held at Geneva from 8 to 10 October 1980. In particular, arrangements were made for the implementation of the resolutions and decisions of the Preparatory Committee at its second session and specific tasks to be undertaken by the various organizations. On that occasion, organs, organizations and agencies also indicated ways in which they could contribute to activities of technical assistance to interested developing countries, in response to paragraph 12 of Assembly resolution 34/190 and decision 7 (II) of the Preparatory Committee.

140. Annex I to the report of the Secretary-General (A/35/321) contains information on the provision of technical assistance to interested developing countries. An addendum to that report will indicate the practical arrangements made by the Conference secretariat and within the United Nations system to ensure the best possible response to technical assistance requests that have been or will be received from interested Governments. The regional commissions and the UNDP resident representatives as well as those organizations experienced in technical assistance in the area of new and renewable sources of energy will have an important role in assisting the Conference secretariat in this respect.

141. Interagency co-ordination will be continued and intensified throughout the preparatory process for the Conference, so as to ensure that the activities indicated in chapter II above have a positive impact.

V. CONCLUSIONS

142. The Committee for Programme and Co-ordination indicates in its report that there would seem to be a need "to strengthen the activities of the United Nations system in the area of energy in order to make them more responsive to the needs of Member States" (A/35/38, para. 357). The Committee also emphasized that closer interorganizational co-operation in the field of energy was needed.

143. The ad hoc arrangements for interagency co-operation in preparation for the Conference are providing an opportunity for the organizations concerned to ensure better co-ordination of their activities in the area of new and renewable sources of energy, including technical assistance activities.

144. The decisions of the United Nations Conference on New and Renewable Sources of Energy and subsequently those of the General Assembly will result in a better determination of the objectives and priorities of the United Nations system in this area. This should lead to improved co-ordination of resultant activities undertaken in follow-up by the system, including more effective response to the needs and requirements of the developing countries in particular.
