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PROGRAMME IMPLEMENTATION

EVALUATION AND RELATED MEASURES FOR IMPROVING  
THE QUALITY OF TECHNICAL CO-OPERATION

SUMMARY OF STUDY ON NEW AND RENEWABLE SOURCES OF ENERGY

Report of the Administrator

Summary

In 1979, UNDP undertook an examination of the situation in developing countries with respect to conventional energy, non-conventional energy and energy conservation, and an assessment of the stage of development of technologies for the exploitation of new and renewable energy sources. This report summarizes the main recommendations of the study.

## I. BACKGROUND

1. As reported to the Governing Council at its twenty-sixth session 1/, a study on new and renewable sources of energy was included in the evaluation programme in order to provide data as a basis for programming strengthened UNDP-assisted activities in this area, including opportunities for research and development under the global programme. The study was accordingly funded from the Global IPF in accordance with the authorization given to the Administrator by the Governing Council at its twenty-fifth session to incur expenditure on preparatory work for global programmes in a given field without recourse to the Governing Council on a case-by-case basis 2/. The study was also consonant with recommendations of the General Assembly and other intergovernmental bodies to the effect that the United Nations system increase assistance in the energy sector. The results are expected as well to be of assistance to Governments of developing countries in preparing for the United Nations Conference on New and Renewable Sources of Energy to be held in 1981 3/.

## II. THE ENERGY STUDY

2. The study was initiated in 1979 in order to assess the current situation in developing countries with regard to conventional energy, non-conventional energy and energy conservation, and to examine as well institutional arrangements, energy planning, research activities and TCDC possibilities. A detailed questionnaire was circulated to Governments through Resident Representatives: 110 responses were received.

3. The study also made an assessment of the "state of the art" of new and renewable energy sources and identified roughly 30 new non-conventional energy technologies 4/, classifying them according to whether they were capable of implementation in the near term, would require additional research and development to become viable during the 1980s, or were still at the conceptual stage and would need considerable research and development. The examination also broke down the technologies in terms of such end uses as heating, drying, cooling, cooking, pumping, desalination and transport.

4. The study identified three factors which may constrain the use of all the new technologies: (a) technical availability; (b) cost-effectiveness of alternative technologies in relation to those of conventional forms of energy; and (c) availability of skilled personnel. A considerable number of the technologies have possibilities for current application; and, by 1990, 25 of them are expected to be ready for commercial use. As a consequence, the immediate requirement is not so much further initiatives to develop new technologies, but rather (a) co-ordinated promotion to widen the appropriate use of the existing technologies; and (b) the appropriate mix of local materials and labour skilled in the production, installation, operation and maintenance of renewable energy systems. A related area of importance

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1/ See DP/363/Add.2

2/ See Governing Council decision 25/3

3/ See General Assembly resolution 34/190

4/ These technologies and their uses are listed in the annex to this document

is the need for demonstration and evaluation of alternative technologies at the local level.

5. Most developing countries participating in the survey were principally concerned with energy supply and price as components of economic and industrial growth and attached only secondary importance to the issue of efficient use of energy and conservation which preoccupy more industrialized countries. They were concerned also with distributing energy resources both in rural and urban industrial areas. As a group they gave highest priority to the development of conventional energy, principally hydroelectric power and fossil fuels. Nonetheless over 25 per cent had carried out an assessment on possibilities for use of non-conventional energy and more than 40 per cent planned to develop at least one resource.

6. The predominant issue which emerged was the need for developing comprehensive national energy plans which included both conventional and non-conventional energy. Over-all energy studies were also needed to provide the information necessary for planning and for application of new energy sources. One result of this lack of planning was that activities in non-conventional energy were undertaken with little co-ordination and without regard for the long-term energy balance in and among developing countries. The study concluded that a co-ordinated total approach to energy should be formulated in developing countries.

### III. RECOMMENDATIONS OF THE STUDY

7. The study recommended that the following measures be undertaken, with the assistance of UNDP as necessary:

- (a) Comprehensive assistance should be provided in energy planning, encompassing conventional and non-conventional energy sources and energy conservation;
- (b) An expert working group should draft guidelines for national energy planning;
- (c) Advice in establishing non-conventional energy programmes should be provided to national energy ministries;
- (d) Basic data on climate, wind regimes, and insolation should be collected and analysed, and more complete inventories of other natural resources (e.g., forests, peat, etc.) should be compiled on national, regional and global bases;
- (e) Rural innovations should be developed with the collaboration of the affected population groups, which in many cases are women, so as to improve social acceptance;
- (f) Extension officers within ministries of energy, forestry, agriculture, and community development should be trained in appropriate technologies (e.g., improved cook stoves);
- (g) Fellowships should be provided for training in appropriate energy technology and a significant proportion of these should be specifically allocated to women, who account for the major portion of energy consumption in most rural areas;

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- (h) Rural electrification projects should be evaluated in comparison with renewable energy systems as well as in terms of traditional criteria;
- (i) Vocational training institutions should build up a cadre of human resources trained in monitoring demonstration projects and maintaining renewable energy systems;
- (j) In the area of applied technology, demonstration projects should be undertaken, including identifying sites coupled with practical training in preparing implementation plans for installation;
- (k) Trade shows should sponsor new technologies/systems in non-conventional energy;
- (l) Regional or physical planning activities should include energy conservation whenever appropriate;
- (m) The economic feasibility of promoting energy conservation should be examined in existing structures and industries;
- (n) In geographic locations which have significant potential for developing such technologies as wind, wave or solar power, their use should be emphasized;
- (o) Forestry projects should encourage, and demonstration projects should include, development of fast-growing fuel-wood species;
- (p) Alternative energy technologies should be evaluated and compared from the standpoint of end-use and data for these comparisons should include information collected by social scientists researching at the village level;
- (q) Consideration should be given to the development of standards for local indigenous manufacturing plants; and
- (r) Finally, assistance should include, as relevant, any or all of these: technical reference libraries, regional or subregional technical meetings and symposia, and fiscal incentives devised, for example, by expert group meetings.

#### IV. FUTURE ACTIVITIES

8. Although the findings of the study are not new, they do underscore that the limited volume of activities financed by UNDP are correctly oriented. However, the number of such projects is small and there is great need to expand the activities to meet Governments' indicated concern for developing new energy sources. Accordingly the Administrator has taken the following actions:

- (a) UNDP will participate in the 1981 Conference on New and Renewable Sources of Energy to ensure the greatest possible cross-fertilization between the experience of UNDP in these areas and the information elicited from all sources during the Conference;

(b) An Energy Policy Group, chaired by the Deputy Administrator, has been established within UNDP, which is responsible for policy and co-ordination in financing and execution of energy-related projects;

(c) The findings of the study and other information on projects in energy-related fields, including information available through the Institutional Memory being developed under ISIP, are being made more widely available to Resident Representatives, Governments and Agencies in order to raise awareness of the possibilities of developing new and renewable sources of energy; and

(d) Programming missions, requested by Governments as follow-up to the survey, will be fielded as required.

ANNEX

CURRENT, NEAR- AND LONG-TERM USES OF NON-CONVENTIONAL ENERGY TECHNOLOGIES TO THE YEAR 2000

DP/437  
Annex  
English

ENERGY USE TECHNOLOGIES	MECHANICAL	THERMAL		ELECTRIC				LIQUID FUELS	
		Low Temp 18°-70°C	High Temp 70° C.	Communi- cations	Other Dispersed Application	Local Power System	Central Power System	Transport	Heating Oil
Draught Animals	C								
BIOMASS									
- Direct Combustion		C	C		C	C	C		
- Biochemical conversion: Anaerobic digestion/fermentation		C			C	N		C	
- Thermochemical conversion: gasification/direct liquefaction					N	L		N	L
- Hydrocarbon fuels from plants					L				L
- Biological membranes: biophotolysis/bioelectricity/purple membrane				L	L	L			
PASSIVE SOLAR									
- Architecture/ Water Bags Greenhouses/ Trombo Wall		C							
ACTIVE SOLAR									
- Non-tracking solar thermal collectors: flat plate/solar ponds/Water Bag/simple concentrating		C			C	N			
- Tracking solar thermal collectors (distributed systems)				N	N	N	L		
- Helionics - central receiver systems				L		L	L		
- Photovoltaic: silicon/flat plate					C	C	N	L	
- Photovoltaic: thin film/high concentration		N			N	N	L	L	
- Photoelectrolysis					L	L	L		
WIND									
- Small electric/mechanical	C	N	N	C	C	C	N		
- Intermediate 100-1000kW				N	N	N	N		
- Large >1MW			N		N	N	N		
OCEAN SYSTEMS									
- Tidal							C		
- Wave	N				N	N	L		
- Ocean thermal grad.					L	N	N		
- Ocean current							L		
- Natural salinity gradient						L	L		
HYDRO									
- Mechanical	C								
- Micro-hydro					C	C			
GEOTHERMAL									
- Hydrothermal		C	C			C	C		
- Geopressurized						L	L		
- Hot-dry Rock						L	L		
FOSSIL FUELS									
- Oil Shale					N	N	N	N	
- Tar sands					N	N	N	N	
- Heavy crude					N	N	N	N	
- Peat		C							

C - Currently available.

N - Near-term commercial availability, 1980-1990.

L - Long-term potential commercial availability, 1990-2000.

Blank - Not applicable or low probability of utilization.