



E/A



UNITED NATIONS
ECONOMIC AND SOCIAL COUNCIL

Distr.
GENERAL
E/ESCWA/13/4/Add.9
5 February 1986
ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA

Thirteenth session
19-24 April 1986
Baghdad

Item 6(a) of the provisional agenda

Received
17 FEB 1986
ECWA 13/4/9

PROGRESS MADE IN THE IMPLEMENTATION OF THE WORK PROGRAMME

**ESTABLISHMENT OF A PERMANENT NETWORK ON NEW AND RENEWABLE
SOURCES OF ENERGY IN THE ESCWA REGION AND ITS PROGRAMME OF ACTION**

Note by the Secretariat

CONTENTS

<u>Chapter</u>	<u>Page</u>
I. INTRODUCTION	1
1. Scope and purpose of the report	1
2. Basis for the present report	1
3. Background and justification	1
II. REGIONAL NEW AND RENEWABLE SOURCES OF ENERGY DEVELOPMENT PROGRAMME	3
1. Introduction	3
2. Development objective of the regional NRSE programme	4
3. Obstacles in research and development, technical and manufacturing activities of NRSE	6
III. THE RATIONALE FOR AN NRSE NETWORK MECHANISM INCLUDING ITS INSTITUTIONAL AND ORGANIZATIONAL STRUCTURE	9
1. The rationale for a network mechanism	9
2. Institutional arrangements supporting the network	10
3. Possible options for participation in the network	11
4. Subject networks for NRSE	12
IV. NETWORK PLAN OF ACTION	15
1. Possible strategies of the network	15
2. Overall objectives of the networks	16
3. Priority areas for NRSE networks	17

I. INTRODUCTION

1. Scope and purpose of the report

The work programme approved by the Economic and Social Commission for Western Asia (ESCWA) as a basis for implementing studies within the scope of the subprogramme on regional co-operation on research, development and demonstration of new and renewable sources of energy (NRSE) calls for the submission of two reports according to the following time-schedule:

(a) First quarter, 1985: Report to the Commission on the establishment of a permanent network and its programme of action;

(b) First quarter, 1986: The role of the regional network in dissemination of information in the areas of NRSE.

The purpose of the present report is to focus attention on the initiatives needed for constituting a regional network on new and renewable sources of energy, which was recommended by the Standing Committee for the Programme in April 1983 as a practical measure to ensure the effective implementation of the Nairobi Programme of Action (NPA) and its regional priorities.

The report also contains information concerning the scope and objectives of the regional network as well as justifications for the options recommended and the guidelines which may be followed while framing the network. It further identifies preparations required for achieving the objectives.

2. Basis for the present report

The basic concept of the regional network approach is the practical applications of renewable sources of energy as described in this report. It is based on conclusions drawn by the ESCWA secretariat to provide some background elements which might assist Governments in ESCWA countries in outlining a network programme in the field of NRSE, and hence seek their participation in its functions.

3. Background and justification

The NPA and ESCWA regional follow-up^{1/} have stressed that the development and utilization of new and renewable sources of energy is basically a national concern and that regional and international efforts should be directed towards supporting national actions and should be of a catalytic nature. The approach that is proposed in this report is principally aimed at bringing the Regional Preparatory Expert Group

^{1/} United Nations Economic and Social Commission for Western Asia, "Regional programme for the new and renewable sources of energy, with special reference to rural applications", Natural Resources Bulletin, vol. I, No. II, Baghdad 1984.

Meeting recommendations^{2/} to the implementation stage. For this purpose, it would be necessary to consider the organizational structure as well as operational mechanisms for the regional programme. A key consideration in this regard is that these should be developed by aiming at the mobilization and strengthening of the existing national and regional capabilities rather than on establishing new institutions. ESCWA's role is seen in terms of promoting this approach, arriving at an appropriate organizational structure based on this approach and facilitating the exchange of information among the regional countries on an organized network structure.

^{2/} The meeting on ECWA Preparation for the United Nations Conference on New and Renewable Sources of Energy took place in Beirut from 12 to 16 January 1981. The recommendations of the meeting are annexed in "Regional programme for the new and renewable sources of energy, with special reference to rural applications", op. cit., p. 144.

II. REGIONAL NEW AND RENEWABLE SOURCES OF ENERGY DEVELOPMENT PROGRAMME

1. Introduction

In August 1981, the United Nations Conference on New and Renewable Sources of Energy (UNERG) adopted the Nairobi Programme of Action, which was the culmination of international efforts aimed at promoting concerted action towards a smooth energy transition. The NPA should also be viewed as an integral part of the international community's move to accelerate the development of developing countries as set forth, inter alia, in the International Development Strategy for the Third United Nations Development Decade, and the relevant declarations and resolutions related to the establishment of the New International Economic Order.

The NPA provided the framework for national action as well as concerted measures at the subregional, regional and global levels in support of national actions. In adopting the Programme of Action, the Nairobi Conference stressed the need for its immediate and vigorous implementation. The emphasis placed on the promotion of regional co-operation in this field prompted the ESCWA secretariat to take certain initiatives aimed at the development of an appropriate regional response to the NPA.

As a follow-up action at the regional level the Executive Secretary in his report to ECWA at its ninth session (E/ECWA/143 dated 27 January 1982) suggested the initiation of the following activities as a regional response to Nairobi Conference and its Programme of Action:

- (i) Preparation of a comprehensive regional programme for new and renewable sources of energy, with special reference to rural applications;
- (ii) The establishment of networks pertaining to new and renewable sources of energy.

Following the Interim Committee on NRSE held at Rome in June 1982, the first session of the Inter-governmental Committee on the Development and Utilization of NRSE was held at United Nations Headquarters in April 1983. The following activities for the implementation of the NPA were discussed.

- (i) Formulation and recommendation of action-oriented plans and programmes in accordance with the priorities identified by the NPA;
- (ii) Promotion of the mobilization of financial resources including guidelines on the preparation and convening of the consultative meeting;
- (iii) Inter-agency co-ordination for the implementation of the NPA.

The Executive Secretary reported on ECWA work in the area of NRSE to the Standing Committee for the Programme at its session held in Baghdad from 22 to 26 April 1984 (document E/ECWA/XI/CP/8 dated 9 April 1984). The report of the

Executive Secretary contained details on the Regional Programme of Action as requested by the Commission at its ninth session. In addition, and in order to increase the effectiveness of the new and renewable sources of energy programme of ECWA, the following recommendations were proposed by the secretariat:

(a) A mechanism, i.e., an ad hoc subsidiary body, should be established to review and adopt measures to be undertaken under each priority area identified in the Nairobi Programme of Action, with particular applicability to the ESCWA region as a whole and to each country.

(b) The national and regional focal points for natural resources, science and technology should meet to consider national and regional implementation of various projects with particular reference to regional co-ordination and allocation of the requisite resources.

(c) ESCWA should assume a regional role as a clearing-house for acquisition and dissemination of information on new and renewable sources of energy.

(d) The co-operation between ESCWA, OAPEC and other energy-specialized organizations in the area of new and renewable energy should be strengthened.

The second session of the Inter-governmental Committee on the Development and Utilization of NRSE was held at United Nations Headquarters in April-May 1984. The Committee emphasized that international effort should be directed more forcefully towards medium- and long-term goals in the implementation of the NPA. The Committee recommended that regional commissions should accelerate their efforts to prepare and convene consultative meetings at the regional level and hold subsequent meetings as necessary.

ECWA's Standing Committee for the Programme in its resolution 2(II) adopted on 26 April 1984 specifically decided to convene an Inter-governmental Technical Meeting on New and Renewable Sources of Energy (First Quarter, 1986) to review and consider reports, studies, projects and priority fields of NRSE for future action.

2. Development objective of the regional NRSE programme

The long-term objective of the regional new and renewable sources of energy development programme is to foster inter-country co-operation among the participating countries in the ESCWA region in the development and utilization of NRSE. As such the objective is to contribute to the efforts of the regional countries to achieve a high and sustainable contribution of energy supplies from NRSE, in a manner which, consistent with the needs and options of individual countries, is socially equitable, economically and technically viable and environmentally sustainable. The promotion of such regional co-operation by means of specific NRSE network activities will provide a broader and better base from which to mobilize and utilize limited resources by precluding unnecessary duplication of efforts in the solution of these problems.

To stimulate the mobilization of additional and adequate financial resources from donor countries, international financial institutions, international and regional organizations to the countries of the ESCWA region for the development of NRSE through projects at the national, subregional and regional levels, the broader objective of the regional NRSE programme are:

(a) To assist regional countries in the assessment of NRSE recognizing the role and potential of NRSE in the remote/rural energy sector and the need to adopt an integrated approach to energy planning and management;

(b) To identify and promote research, development and demonstration (RD&D) activities of relevant NRSE technologies;

(c) To assist countries in the transfer, application and adaptation of mature NRSE technologies;

(d) To contribute to the expansion of indigenous technical and managerial skills through appropriate training programmes;

(e) To promote information flows and exchange of views among the countries.

The programme should stimulate and catalyse priority NRSE activities on an expanded scale in member countries, concerned governmental and non-governmental organizations, United Nations organizations, specialized agencies and other concerned institutions.

As such, the regional NRSE Programme strategy should lead to the establishment of a network mechanism. Although the networks are intended primarily for the purpose of undertaking co-operative RD and D (research, development and demonstration) activities, they also provide an appropriate mechanism for pursuing other subprogramme activities in the following areas: data and resource assessment; transfer, development and application of mature technologies; and information, education and training.

However, the immediate objective of the regional NRSE programme, as proposed by ESCWA in consultation with member countries, is to enhance the utilization and the development of NRSE for national socio-economic development and, in particular, for remote and rural development. More specifically, it should consist of regional projects containing the following activities:

(a) Conducting surveys and studies of existing and potential resources of NRSE;

(b) Carrying out studies on the transfer, adaptation and implementation of mature NRSE technology for urban and rural energy uses;

(c) Assisting least developed countries of the ESCWA region in formulating and executing NRSE projects;

(d) Providing technical advice on development and use of NRSE;

(e) Enhancing the flow of field information by organizing technical meetings, seminars, conferences, study tours and the like on NRSE application and on integrated energy planning;

(f) Mobilizing financial resources for the implementation of these projects.

As such, the regional NRSE development programme should enhance technical and economic co-operation between the participating member States, thereby enhancing their collective self-reliance in various modalities which are in their mutual benefit in areas such as dissemination of information, joint ventures in project development, joint efforts in research, development, demonstration and adaptation of technologies on NRSE.

The regional programme should serve as a framework for the regional NRSE activities and projects, reflecting long-term and immediate needs and priorities of ESCWA countries. The programme should provide guidance for the planning, design and implementation of all regional NRSE projects so as to ensure orderly progress in the NRSE sector and full use of the available resources in fulfilling priority needs of the region. The structure of the programme should also be flexible enough in view of the experience gained in recent years and the uncertainty of the present level and sources of funding and other factors. Hence, the regional programme should be updated at regular intervals to achieve the stated objectives.

3. Obstacles in research and development, technical and manufacturing activities of NRSE

The major obstacles encountered in research and development activities of NRSE in the ESCWA region are of an institutional nature, resulting in the lack of an integrated approach which should encompass sociological, economic, environmental, technological and commercial aspects of NRSE. Institutions, management policies, procedures and regulations compatible with the requirements of largely interdisciplinary research activities have not yet been implemented in sufficient scope in most ESCWA countries.

NRSE technologies encompass an extremely wide range of scientific specialties and the body of knowledge required for their development cuts right across many classical disciplines. Research activities must therefore be broadly interdisciplinary, but unfortunately this interdisciplinary approach has not yet been fully applied in institutional infrastructures.

This new institutional infrastructure is all the more difficult to establish because the disciplines involved are within the competence of many different ministries such as Energy, Industry, Science and Education and Agriculture.

Ongoing research and development is often oriented towards long-term fundamental research to the detriment of application-oriented practical development and field testing. Efforts to link research and development activities to local industries and to end-users in order to prepare the way for local production and real-life utilization of devices are still insufficient and often hampered by bureaucracy.

Allocation of financial resources, manpower and equipment for research and development are insufficient. Mechanisms for the promotion of these activities are complex and slow.

Owing to their relatively recent development and their highly interdisciplinary character, the NRSE technologies have not yet been introduced sufficiently in the educational process. This results in a lack of trained personnel for the various scientific and technological activities.

Furthermore, the production of data and information on the subjects related to the NRSE technologies is extremely prolific, institutionally fractured and contradictory. This fact renders the acquisition and exchange of reliable and sound information extremely difficult within the scientific communities and creates an interdisciplinary and international information gap.

There is an even more severe information gap between scientists, policy-makers and future users of the NRSE technologies. Equipment exporters and manufacturers, for obvious reasons, have often created overoptimistic expectations about the economic viability of their products, which in the long range may have adverse effects on the development of the new technologies.

The information gap between scientists, engineers and policy-makers concerns particularly all questions relating to energy conservation, passive methods of solar energy utilization and the economic/financial viability of the different technologies.

Research and development have been strongly oriented towards those components which are relatively new and those which have special significance for industrialized countries. There is a gap in the development of conventional components matched especially to the requirements of the new technologies and those which will have special importance for ESCWA countries. This is particularly evident for equipment to be powered by photovoltaics (motor, pumps).

Standards and methods for the testing and technical evaluation of the new devices have not been universally accepted. This prevents systematic comparison and rational selection of equipment particularly suited for the ESCWA countries.

Meteorological data on parameters determining solar and wind energy and their variations are insufficient in scope and reliability. This results in "overdimensioning" of components and unnecessary expenses.

There is a severe shortage of qualified personnel for design, installation, operation, and maintenance of systems for practical application in the region. Servicing and maintenance facilities and infrastructure are still almost non-existent in most ESCWA countries.

The rapid changes in NRSE technologies which have occurred in the recent past do not encourage the build-up of manufacturing facilities for series production in ESCWA countries for fear of early technical obsolescence. National research and development institutions which could adapt foreign

technologies to local requirements lack or are engaged in theoretical and basic research. The interaction between national R and D institutes and local manufacturers is often insufficient because of institutional or policy reasons.

In most ESCWA countries, manufacturing expertise and industrial infrastructure is not sufficiently developed. This is aggravated by a strong dependence on imported material. In addition, no viable market for the NRSE technologies exists and potential market changes are not yet clearly perceived. Incentives for establishing pioneering enterprises in this new field are still lacking.

Thus, due to the interdisciplinary character of the NRSE technologies and to the present institutional distribution of responsibilities, activities relating to harnessing NRSE are fragmented even on the national level. Though there is some co-operation between ESCWA countries, as mentioned before, most activities are confined to national or bilateral projects, which may lead to a certain degree of duplication.

The flow of information is still very limited even at national levels, but more so on bilateral and regional levels. The insufficient regional co-ordination leads to duplications or reduces the efficiency of research and development of NRSE on the whole.

Hence, for the effective implementation of the regional programme, it is important that appropriate linkage with national focal points on NRSE be established and that there should be a mechanism whereby the national focal points are involved in shaping the programme and guiding its implementation.

For purposes of liaison and co-ordination, ESCWA is taking the necessary initiatives in developing and in orchestrating the regional programme in the context of a network approach which will be discussed below.

III. THE RATIONALE FOR AN NRSE NETWORK MECHANISM INCLUDING ITS INSTITUTIONAL AND ORGANIZATIONAL STRUCTURES

The network approach primarily aims at mobilizing and strengthening existing capabilities in the regional member countries. It is eminently suited for application in fostering regional co-operation and can be a powerful instrument for stimulating functional collaboration among various institutions dealing with NRSE in the region.

1. The rationale for network mechanism

The rationale for the adoption of a network mechanism stems from the following considerations:

- (i) In many countries in the ESCWA region, there are institutions or programmes concerned with the development and utilization of NRSE, a few of these have qualified and trained personnel and advanced endowments of equipment. There has been little interaction among these institutions except for a few bilateral agreements and some informal communications between individuals. Collective efforts for addressing common problems need to be improved for addressing specific task-oriented problems of utilizing NRSE.
- (ii) Research and development projects are often initiated without concerted efforts. Projects in the same field are often undertaken without one institution being aware of what another is doing or, what is worse, of what has already been done elsewhere. There is thus suboptimal utilization of resources resulting from unnecessary duplication of efforts.
- (iii) Aid agencies, both multilateral and bilateral, are facing financial constraints and finding it difficult to cope with the growing demand for assistance.

There have been serious difficulties in the effective follow-up of aid programmes in that whenever such aid programmes are terminated, it is seldom that the institution that received the assistance is able to continue on its own. There is thus a need for a mechanism that is largely self-supporting and works on a sustainable basis. In such a mechanism, the role of external aid is visualized as playing a catalytic role with national inputs constituting a major share.
- (iv) The absence of mission-oriented programmes is contributing to the loss of qualified personnel. Appropriate means must be found to establish linkages between R,D and D and industry and to create opportunities for employment of qualified personnel from the region, and training of manpower in the fields of NRSE.
- (v) New and renewable sources of energy constitutes an area of emerging technologies and is of great strategic importance to the ESCWA

region. It thus affords opportunities for TCDC (technical co-operation among developing countries) and ECDC (economic co-operation among developing countries) activities.

These considerations have led the ESCWA secretariat to propose that it should assume the leading role to consolidate the existing action taken to promote the establishment of a regional network covering specific fields of NRSE and seek the co-operation of all concerned agencies/organizations within and outside the ESCWA region.

2. Institutional arrangements supporting the network

In order to achieve its development objectives, the networks will implement the relevant regional components of the NPA. The broader objectives of the NRSE networks as initiated by the ESCWA secretariat will be discussed in the following chapter. However, the purpose of the network is obviously not to list exhaustively or to draw up in any way a "catalogue" of the means which could be brought into operation in order to implement a regional NRSE network, but rather to outline briefly various forms of institutional arrangements that Governments of ESCWA countries might feel appropriate to support a concerted effort at the regional level. The following approaches could be used:

(a) Decentralized approach. The minimum course of action, which incidentally would correspond to the least centralized form of an institutional arrangement, would be to entrust a co-ordinating mission to an existing national/regional institution or organization, to give their true worth to the various co-operative actions and projects at present under planning or implementation in the ESCWA countries and to facilitate the evolvement of various NRSE programmes in the direction of the general priorities of the ESCWA region. This course of action would at least make it possible to ensure the co-ordination of co-operative actions such as: meetings, seminars, assessments and investigations, etc., the actual organization of which could be entrusted in turn to countries participating in the project. At a slightly higher level it could also ensure the correct utilization of activities which might have subcontracted to the United Nations Development Programme (UNDP), various bodies in the United Nations system or other international and regional organizations.

(b) Centralized approach. A more elaborate structure corresponding to a higher degree of centralization could be based on the setting up of a network (or networks) of existing institutions. In each country a preliminary co-ordination of the various national institutions participating in the network would be ensured by a national focal point institution nominated by the respective ESCWA countries' Governments. This institution, in its turn, would be linked with a regional co-ordinating body whose task would be, inter alia, to redistribute results to the participating countries. This course would be organized either through a single network covering the entire field of NRSE co-operative actions or through several specialized networks each covering one or more groups of actions of the same nature.

Such mechanisms have been used in similar projects in other regions (such as the United Nations Environment Programme (UNEP) Mediterranean Pollution

Monitoring and Research Programme), and elsewhere (networks of radiometric measurements) and have elicited active participation from the institutions taking part.

(c) Task-oriented specialized approach. From a more centralized point of view and for certain types of action there could be a preference for the joint establishment of regional centres, financed by interested Governments of the ESCWA region and entrusted with a precise mission of regional interest, such as renewable technology transfer, or establishment of a documentation and information Centre.^{3/} More complicated in structure, this approach is nevertheless likely to have certain advantages, particularly higher efficiency, provided the mandate is sufficiently precise and the functioning simple enough to allow countries supporting it to benefit in a concrete and efficient way.

(d) Super-regional approach. Even more centralized is the idea of establishing a single Arab Regional Centre for NRSE, grouping together all or most of the activities that may be taken into consideration and ensuring the co-ordination of other activities. Although equally complicated in structure, this approach nevertheless offers, in comparison with the former, the advantage of grouping together certain common means in one and the same place.^{4/}

Finally, it should be stressed that these various forms are not mutually exclusive and it is very conceivable that use might be made of one alone or of several together simultaneously according to the diversity of the topics decided upon for a network mechanism on the practical applications of NRSE in the ESCWA region.

3. Possible options for participation in the network

The geographic area of the network includes all ESCWA countries, with the possibility of enlarging it to include all Arab countries. However, each country, on becoming a participant in the network, will nominate a national implementing institution, which will in time become an operating member of the Network. At the national level, the implementing institutions should have full powers and responsibilities to execute the research assignments required and to manage the execution of these works and studies as decided by the network.

^{3/} The Regional Preparatory Expert Group Meeting for the United Nations Conference on NRSE (held in Beirut, 12-16 January 1981) recommended that "the ECWA member countries should establish, in consultation with the Economic Commission for Africa (ECA) and the League of Arab States, an Inter-Arab Renewable Energy Technology Transfer Advisory Body to assist interested ESCWA countries, at their request, in negotiating with foreign manufacturing firms for the local manufacture of well-established commercial renewable energy system components. This body should place emphasis on the assessment of the technology, its suitability for local application and the terms of relevant commercial, technical and economic agreements".

^{4/} Toward an Integrated Arab Approach for the Utilization and Development of Renewable Sources of Energy. Paper presented by the ECWA secretariat to the Second Arab Energy Conference (Doha - Qatar, 6-11 March 1982).

The institutions and organizations of countries situated within the geographic area of project implementation within the network, are offered three options for participation in the network:

(a) Observer participation option. Institutions/organizations choosing this option will participate in all activities relating to NRSE education, training information exchange, evaluation and dissemination of test results, special studies as well as the pooling and sharing of expertise, specialized capabilities and facilities available in the countries of the ESCWA region.

(b) Active participation option. This offers active participation through the implementation of test programmes. Countries choosing this option will install and test one or more of the pilot systems suggested by the network, or implemented by national research centres on NRSE, and will participate fully in all activities of the network as enumerated above.

(c) Regional participation option. This option offers the possibility to take over certain regional or subregional support and service functions.

During the execution of any assigned task or project, the participating countries will be offered the possibility to make available to the network such support and service functions as:

- (i) Organizing, in co-operation with the project staff, instruction and training courses, workshops, seminars and regional meetings;
- (ii) Making available to other participating countries, on-the-job training opportunities in ongoing research and development projects, test programmes or in the implementation of pilot projects related to harnessing new and renewable sources of energy;
- (iii) Making available to other participating countries specific specialized expertise for consulting services relating to research, development, equipment production and implementation of technologies for harnessing NRSE;
- (iv) Carrying out computer processing of the test data and information;
- (v) Taking over publication services within the scope of the information exchange.

4. Subject networks for NRSE

Considering the diversity of the possible topics of regional co-operation in the field of NRSE, it would seem difficult to determine from among the usual methods of co-operation the one that would be likely to constitute the most versatile instrument capable of supporting the whole body of Network actions which might be desired by the ESCWA countries. These actions can indeed belong to fields as different as:

(a) Support of resource evaluation, research, development and demonstration, training, energy planning and identification of regional or subregional projects for the development of NRSE (at government level);

(b) Development of such activities in conjunction with the establishment of specialized focal points and/or the strengthening of those existing in the countries of the region which would co-operate in order to achieve a more effective implementation of regional programmes (at the level of national decision-making authorities and specialized bodies);

(c) Strengthening and/or establishment of regional information networks which could connect with international information networks and focus at the regional level on technologies and their applications as well as on the centralization and diffusion of information on equipment, use and limits (at the level of national research and development institutions);

(d) Organization of joint research and development activities related to promising technologies (at the level of national research institutions);

(e) Organization of regional demonstration and pilot projects and installations designed both to test application and to disseminate information on technologies related to NRSE (at the level of national decision-making authorities and specialized bodies);

(f) Development of pre-investment activities designed to provide a basis for the accelerated implementation of technologies for NRSE utilization (at the level of national decision-making authorities and specialized bodies);

(g) Strengthening and support of regional efforts directed at the transfer and diffusion of technologies (at the level of national research and development institutions);

(h) Undertaking of joint industrial activities for the production of renewable energy-related capital goods (at the level of planning and development organizations, firms and industrial enterprises);

(i) Organization of technical meetings, seminars, conferences, study tours and so forth, with a view to facilitating an exchange of information and experience on the utilization of NRSE (at government level and organizations concerned with land use planning, building, agriculture and equipment);

(j) Education and training of personnel.

It is evident that for each of these areas there might be both a level and a method of co-operation which would seem especially suited to the desired co-operative Network approach. It appears therefore pointless to look for one single solution for all the facets of the particular problem.

To be pragmatic and with a concern for efficiency, it seems possible to attempt to determine the possible elements of collaboration and to combine with them the most suitable methods of co-operation. Thus hopefully there would emerge from diversity some common elements capable of helping in the choice of the number and the nature of satisfactory solutions.

This choice belongs, of course, to the Governments of the ESCWA countries wishing to participate and establish a regional network on NRSE, and they

alone are in a position to judge the advantages and drawbacks of such a mode of action from their own point of view. However, it would seem clear that certain common elements could be found in nearly all fields and therefore appear to constitute a minimum structure for any practical development of the network programme.

These considerations have led the ESCWA secretariat to propose that it should take urgent action to define the network approach as a co-ordinating mechanism charged with ensuring the implementation of appropriate operations that are indispensable for the functioning of most of the actions which could be envisaged. Thus, ESCWA, from a broader point of view, might see itself being entrusted with a more responsible vocation regarding the whole, or a part, of the actions undertaken in specific fields of NRSE and seek the co-operation of all concerned institutions/organizations within its constituent member States.

IV. NETWORK PLAN OF ACTION

It may be recalled that the NPA and ESCWA regional programme have identified a number of specific R, D and D activities in each of the NRSE. It is obvious that R, D and D activities will also involve information, training and promotion of applications. Thus, the establishment of networks for covering subject areas of NRSE will provide the necessary framework for fostering co-operation in the implementation of the regional programme on NRSE.

Initiatives have already been taken to establish networks under existing regional programmes. One such initiative concerns the regional network on NRSE information which has been spearheaded by ESCWA. In this case, one expert group meeting has been held and a plan for undertaking specific co-operative activities has been developed. The second meeting for the expert group on New and Renewable Sources of Energy Information Network (NRSEIN) is to decide on the host centre facilities and its terms of reference.

Efforts are also underway to initiate a network on solar and wind energy, hopefully with the support of UNDP or other national/regional organizations. The Intergovernmental Technical Meeting on NRSE (First Quarter, 1986) will consider policy review, technology assessment, project development and co-ordination and other consultancy services. The Meeting is also expected to review national and regional NRSE programmes and the information pertaining to country priorities for regional co-operation.

On a priority basis the ESCWA secretariat could assist in organizing possible network arrangements in the NRSE field not already covered or planned. An important consideration in the operation of the subject Networks is to ensure co-ordination between the networks and with other related regional activities. For example, the Arab League Educational, Cultural and Scientific Organization (ALECSO), the Organization of Arab Petroleum Exporting Countries (OAPEC) and UNESCO have initiated regional information projects as part of their proposed regional and global information network on NRSE. It is clear that the ESCWA secretariat will have to take the necessary initiatives and other related services. Regular and full-co-operation will be necessary between the co-ordinators of the subject Networks and also those responsible for related regional activities.

1. Possible strategies of the network

The core of the regional programme strategy is the establishment of a network mechanism. Although networks are intended for the purpose of undertaking co-operative R, D and D activities, they do in fact provide appropriate mechanisms for pursuing other subprogramme activities in the areas of: data and resource assessment; transfer, development and application of mature technologies; and information education and training. These might involve the following possible strategies for the networks:

(a) The Networks would assist participating ESCWA countries in the organization of flexible mechanisms suitable for TCDC activities at the regional level. Recognizing the fact that a strong institutional base is essential for viable TCDC, the networks would assist participating countries

in strengthening existing national institutions and would be instrumental in the organization of operational regional NRSE projects by sharing work and experience between institutions working on the same problems at various levels of complexity in diverse environments and also by sharing responsibilities for common training activities.

(b) The field testing programme and special studies would assist many participating national institutions in broadening the scope of their activities.

(c) After addressing requirements of participating countries in the technologies, skills, consultancy services and training facilities which can be met most effectively through co-operation with other ESCWA countries, the networks would assist in setting up agreements between participating countries aimed at combining their research efforts within the scope of the project and sharing their results within the framework of regional scientific and technical co-operation, thus linking the participating national institutions (focal points) among each other and preparing linkages through one or more possible future regional and subregional networks.

(d) The networks would assist participating institutions to reinforce their available capacities for data collection and analysis in order to provide engineers, technicians, operators and potential users of NRSE with systematic, updated and reliable information on technical, economic, financial and environmental aspects of the application of these technologies. For this purpose, the regional horizontal information exchange would be strengthened, expanded and intensified. In doing so, the networks would contribute to ensuring effective, speedy and economic pooling and dissemination of technical and other information.

(e) The networks would utilize to the widest extent possible the support of the existing United Nations information systems, and particularly the NRSE information system of UNESCO;

(f) Through field testing of complete pilot systems under realistic application conditions, the networks would contribute to enlarging knowledge about their technical and economic viability. Through a more widespread application in rural areas, where they begin to be economical, the use of NRSE would in the future be broadened to include larger settlements and even semi-urban areas.

(g) Training programmes and workshops as essential components of the networks would contribute to increasing the number of experienced and well-trained engineers and technicians. Demonstration courses would enhance the awareness of engineers, economists, planners and policy-makers with regard to the available potential in harnessing NRSE.

2. Overall objectives of the networks

The possible strategies to promote NRSE have led ESCWA to propose that it should take urgent action to consolidate the existing action taken to promote the establishment of a regional network on NRSE information, and seek the co-operation of all concerned institutions/organizations within and outside

the United Nations system. Reserving the details on the organizational structure, terms of reference and obligations of the participants in NRSEIN to a separate report, the objectives of the NRSE networks are:

(a) To provide a framework for the exchange of ideas concerning technological innovations on NRSE and their potential impact under different socio-economic conditions and to strengthen the technological and operational capabilities in the specific fields;

(b) To develop and share major facilities and expertise needed for improving the effectiveness of R, D and D activities at the national level;

(c) To mobilize resources for undertaking relevant task-oriented co-operative projects within specific deadlines on the development and adaptation of relevant technologies, to promote the applications of NRSE technologies through, inter alia, commercialization, by providing technical advice and backstopping capabilities, and to recommend and/or undertake testing and evaluation of specific technological applications;

(d) To assist in the development of trained manpower in this field;

(e) To provide advisory services on request;

(f) To provide an information exchange mechanism.

3. Priority areas for NRSE networks

The priority areas for NRSE, as envisaged by the ESCWA secretariat, for related activities to be undertaken by networks are:

(a) Data and resource assessment. One priority task is to assess the regional status of data collection, adequacy of location, instrumentation, suitability of data for application purposes, etc. Such an assessment would reveal the inadequacies in the existing body of data; it would also reveal facilities required in each country to obtain useful data, what equipment is needed to strengthen existing facilities, and what are the organizational and financial requirements in establishing national data collection facilities. The network shall address itself to such urgent tasks and to follow-up on the recommendations of the findings to organize regional workshops to discuss and define plans of action at the national level for improving data coverage and standardizing data formats and analysis techniques.

The participating countries in the network may decide further on publishing regularly NRSE assessments based on an improved data collection base. Further outputs could also be decided by the network participants.

(b) Research, development and demonstration. A great deal of emphasis has been given to R, D and D in the NPA. However, it is considered that action on this has to be primarily at the national level. The regional action has to be in support of national action so as to facilitate meaningful co-operation on a regional basis. Research covers a vast array of

basic and applied research in materials, devices and systems. In terms of fostering regional co-operation, the establishment of networks of R and D institutions in each major area of application is envisaged.

Provision has to be made for interaction of research groups and institutions forming the network. This could be in the form of funds for annual meetings of research personnel and fellowships for visits of scientists and technicians over short periods for specific purposes in connection with joint programmes.

Demonstration and field-testing activity could also have a network approach. Accordingly, as a first step, it is envisaged to establish a network of national demonstration projects and to promote exchange of experience and on-site training. Subsequently, establishment of large-scale regional demonstration projects is envisaged.

The network approach may decide on the following co-ordinated R, D and D:

- (i) Mutual sharing of information and facilities, including strengthening of national capabilities;
- (ii) Mission-oriented, research projects within deadlines with agreement on research goals, parameters to be studied, procedure for evaluation, etc. Mutual assistance between participants in project formulation, technology, development and adaptation. Exchange of experience, R and D co-ordination;
- (iii) Wider dissemination of research results, feedback from other regional institutions and individuals;
- (iv) Regional co-operation in creating awareness of technology. Technical and economic parameters under field testing conditions. Social response and need for local conditions. Establishment of base for commercialization;
- (v) Promotion of technical co-operation.

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

Certain technologies have already reached a mature stage of development and have become suitable for widespread use. The problems to be solved by the network are those of market penetration and transfer of technology. Considering the fact that the impact could potentially reach significant levels in the longrun, it seems appropriate that the network should explore ways and means of assisting its participants in technology transfer, adaptation and application. It is proposed to have the network organize a meeting, in co-operation with other agencies and organizations involved in transfer of mature technologies, i.e. government representatives, entrepreneurs or industrialists in a position to offer technology or become users of new technology. Such a network meeting is expected to identify specific bottle-necks in transfer of technologies, and ways and means of removing them. It will also provide an opportunity to determine the nature of

assistance needed by ESCWA countries in negotiations pertaining to trade and transfer of NRSE technologies.

In order to accelerate the widespread use of existing NRSE technologies in ESCWA countries, the network mechanism will elaborate further on policy measures and implementation strategies which need to be identified in the specific situation of each country. The network may propose to commission a study to examine common problems associated with the widespread use of NRSE technologies in order to decide upon (i) policy options; (ii) implementation strategies including schemes for providing incentives and subsidies to users and equipment manufacturers; (iii) ways and means to finance production of hardware; and (iv) strategies for wider dissemination of technical information and creation of public awareness.

(d) Information flows. There is no doubt that there is a great need for an evaluation and the transfer of documentation and information at the regional level. The means by which such co-operative activities could be undertaken are well-known and one of the most easily operational tasks of the network on information.

It is worth stressing that such a network should not be restricted to a library but should also be staffed by experts able to interpret and communicate information to all potential users in the ESCWA region. The network should, in addition, directly or indirectly, undertake the preparation of a Directory of Arab Renewable Sources of Energy Research and Development Institutions. The regular issuing of a bulletin on developments concerned with NRSE in the ESCWA region might also prove useful and could fall within the competence of the network. The following activities could also be decided by the network:

- (i) Compilation and publication of information on actual applications of NRSE under practical conditions;
- (ii) Collection and publication of sources of mature NRSE technologies along with detailed specifications;
- (iii) Updating of information and publication of R, D and D programmes in ESCWA countries;
- (iv) Publication of technical reports/guidebooks on specific NRSE technologies;
- (v) Publication of directives of scientific and technical personnel and institutions engaged in the field of NRSE research and applications;
- (vi) Publication of studies reporting significant NRSE developments in the region, meetings, conferences, etc.

(e) Education and training. This possible area of network participation and co-operation should by no means be considered as an attempt to organize a simple transfer of design of hardware and systems of NRSE from

industrialized to less industrialized countries of the ESCWA region, but rather as a possible means to meet requests made by interested ESCWA Governments and institutions wishing to benefit from the various types of technological innovations related to NRSE. In fact most of these innovations resulted from the experience acquired when conceiving and building prototypes and running fullscale pilot installations either in ESCWA countries or in countries outside the region.

The network on education and training, which should, ideally, be closely associated with an information network, should be staffed with specialists in a position to solve the problems raised by users or at least able to provide them with adequate information for them to solve the problems themselves.

The Network on education and training may also look into the following areas on training of professionals such as:

- (i) Design of hardware and systems of NRSE;
- (ii) Research, development and demonstration personnel;
- (iii) Planners and managers;
- (iv) City planning, building and architecture personnel.

The network should also look into the following training programmes:

- (i) Assessment of manpower and training needs and skill requirements in the countries of the ESCWA region for the manufacture, installation, operations and maintenance of NRSE equipment;
- (ii) Training programmes for technicians, service and maintenance staff, contracting and marketing staff and rural/remote areas extension workers;
- (iii) Support for educational programmes.

The network should further explore areas for training personnel for:

- (i) Designing and planning NRSE programmes;
- (ii) Implementing national NRSE programmes;
- (iii) Manufacture, installation, operation and maintenance of NRSE equipment;
- (iv) Contracting, marketing and extension work in rural/remote areas.

(f) Mobilization of financial resources. There is an urgent need to mobilize additional financial resources for the implementation of the regional NRSE programmes. In accordance with the NPA, it is proposed to:

- (i) To convene regional-level consultative meetings on NRSE (to be held in the last quarter of 1986);

- (ii) To assist the United Nations system in the convening of the global level consultative meetings on NRSE and provide each meeting with regional input;
- (iii) To convene meetings with donor agencies whenever appropriate and assist such meetings towards the mobilization of financial resources for NRSE activities in accordance with the recommendations of the NPA, particularly its regional components.