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SUBSTANTIVE PREPARATIONS FOR THE CONFERENCE

Activities of the relevant organs, organizations
and bodies of the United Nations system in the
field of new and renewable sources of energy

Addendum

Report submitted by the
United Nations Conference on Trade and Development*

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The work of the United Nations Conference on Trade and Development (UNCTAD) is concerned with the policy-related aspects of problems affecting trade and development of developing countries and encompasses a wide range of study programmes on trade in primary commodities and manufactures, finance, monetary system, shipping and transfer of technology. It addresses developmental issues of short, medium and long-term significance.

Within this framework, it was not possible to ignore the impact of developments in the energy sector on the developmental process in the developing countries and, in particular, the role played by the new and renewable sources of energy (NRSE).

For the developing countries as a whole, NRSE are not likely to make a significant impact on their energy mix in the short run. However, depending on the economic development strategy that these countries adopt, and the extent and pattern of development and the diffusion of technologies for these resources in the future, they may prove to be important sources of energy in the medium and longer term.

While UNCTAD does not have a special programme on NRSE as such, its work in a number of the areas mentioned above is related in important ways to the question of energy supply in general, and of NRSE in particular. More specifically, the programmes of work being undertaken in areas of transfer of technology and financing are being carried out in such a way as to make possible UNCTAD's contribution to the United Nations Conference on New and Renewable Sources of Energy.

In the field of technology, in accordance with the mandates given to it in Conference resolutions 39 (III), 87 (IV) and 112 (V), and the decisions of the subsidiary bodies of the Conference,^{1/} UNCTAD is undertaking a study programme to examine the problems of transfer and development of technology in specific sectors of critical importance to developing countries. The principal objective of this programme is to contribute towards the strengthening of national technological capacity and to promote the formulation and implementation of technology policies in developing countries. Within this study programme, special attention has been given to the energy sector in view of the growing role of

^{1/} These include Trade and Development Board decisions 170 (xiv) and 192 (xix), and resolutions 21 and 62 of the Committee on Transfer of Technology.

technology in the changing energy situation and the need to strengthen the energy sector of developing countries in order to cope with this situation. It is in this context that UNCTAD's work in the technology field relates significantly to the questions and issues associated with new and renewable sources of energy.

The UNCTAD secretariat prepared and issued in 1978 a comprehensive report on issues relating to the transfer and development of technology in the energy sector.^{2/} The report examined the structure of the international market for energy technologies and the experience of developing countries in acquiring these technologies, and singled out areas for further investigation with the aim of contributing to the elaboration of appropriate technology policies in this sector for developing countries. In this report, development and diffusion of technology for new and renewable sources of energy, in particular solar and biogas technologies, has received a special focus. In relation to the solar technology, a preliminary analysis of the growing concentration of supply sources in the developed countries was examined, and the relevant developmental experience of both solar and biogas technologies in developing countries was highlighted.

Following this study, further in-depth studies are being undertaken on several energy technology issues with a view to elaborating the main elements of a technology policy for the energy sector in developing countries. One of these studies focuses on the questions of technologies for new and renewable sources of energy in an attempt to shed light on the alternative mechanisms for the transfer of renewable energy technologies with the particular aim of identifying areas for concerted action at the regional and international levels. The final output of this work will be issued as a document.

Preliminary results of this work have been submitted in the form of a note by the UNCTAD secretariat to the Ad Hoc Group of Experts on Research and Development and Transfer of Technology of the United Nations Conference on New and Renewable Sources of Energy (New York, 5-9 January 1981). The UNCTAD secretariat also sent a staff member to assist in the work of the Conference secretariat for three weeks in the fall of 1980 in the latter's work on questions relating to the transfer of technologies for new and renewable sources of energy.

In resolution 112 (V), adopted at the fifth session of UNCTAD in Manila in 1979, the member States of UNCTAD requested the Secretary-

^{2/} Energy supplies for developing countries: issues in transfer and development of technology, study by the UNCTAD secretariat (TD/B/C.6/31/Rev. 1; United Nations publication Sales No. E.80.II.D.3).

General of UNCTAD to convene, subject to the approval of the Trade and Development Board, meetings of groups of experts to identify problems and issues concerning transfer, development and application of technology in three sectors, including energy. The Trade and Development Board, at its twenty-second session, scheduled to meet from 9-20 March 1981, is expected to take a decision on this question. If and when convened, the group of experts meeting will consider the technology questions relating to new and renewable sources of energy along with other energy technology issues.

A brief summary of the findings of UNCTAD's study programme so far relating to technologies for new and renewable sources of energy, particularly the question of development and diffusion of these technologies to developing countries, may be given as follows:

- (i) Renewable energy represents a promising area of energy potential for developing countries because of the variety of sources involved, the multiplicity of end-uses and the existence of vast resources in these countries. For some of these resources such as solar energy and biomass, although the technology has not yet attained competitiveness except in certain limited uses, it has been developing quite rapidly, and R + D work on it is predominantly concentrated in the developed countries. For others such as mini-hydroelectric power and biogas, the technology already exists at reasonable costs, and the problem seems to lie in its diffusion, which is limited for a number of reasons including the problem of social acceptance of innovations.
- (ii) In order to benefit from the new technologies in this area, the developing countries will have to engage themselves in actual process of their development. Since the financial and technical resources at the disposal of each country for undertaking R+D are limited, and also since the pace of the technological development has been considerably quickened with the participation of big firms in the R+D and the increasing funds made available by governments in developed countries, the developing countries may need to pool their resources and undertake R + D jointly in order to keep up with developments in the emerging market.
- (iii) As mentioned in the introductory chapter, the United Nations Conference on New and Renewable Sources of Energy, to be convened in Nairobi in August 1981, will consider, among other things, the question of transfer of technology relevant to such sources of energy, and will elaborate measures for enhancing such transfer.

On the basis of these considerations, the UNCTAD secretariat, in a document prepared and issued for the third session of the Committee on Transfer of Technology,^{1/} suggested the following three issues on which internationally concerted action may be considered:

- (a) A "concentrated" programme of development and diffusion of renewable energy technologies based on co-operation among developing countries;
- (b) Co-operation of developed countries' public R + D institutes for transfer of renewable energy technology to developing countries; and
- (c) Access to new technologies resulting from publicly funded R + D, including the question of their proprietary nature.

In addition to the study programme described above, which has a direct bearing on the technology issues relating to new and renewable sources of energy, UNCTAD has been engaged in the work to establish an international code of conduct on the transfer of technology, which aims at establishing "general and equitable standards on which to base the relationships among parties to transfer of technology transactions and governments concerned, taking into consideration their legitimate interests and giving due recognition to special needs of developing countries for the fulfilment of their economic and social development objectives". A draft international code of conduct on the transfer of technology is currently being negotiated under the auspices of UNCTAD by a United Nations conference convened for this purpose. Although some of the major issues are still outstanding, a few chapters have already been agreed upon, including a chapter on "national regulation of transfer of technology transactions", and a chapter on "special treatment for developing countries". The fourth session of the United Nations conference will take place in Geneva between 23 March and 10 April 1981. Should the negotiations be brought to a successful conclusion by then, the official document will be submitted as a direct input to the Conference.

In the area of financing, UNCTAD is responsible for reviewing the capital needs of developing countries and assessing the adequacy of available financing both in short and medium/long-term. In this context, the secretariat has undertaken an extensive and in-depth analysis of the overall investment and external financing requirements in the energy sector of developing countries. A model has been developed by the "International Research Centre on Environment and Development - CIRED" at the request, and with the co-operation, of the UNCTAD secretariat which establishes a methodology for deriving projections of overall energy

^{1/} Major technology issues in the energy sector of developing countries, report by the UNCTAD secretariat (TD/B/C.6/65).

demand and supply in developing countries from projections of the level and the structure of economic activity. It also computes the required level of investment in this sector. The degree of detail specified makes it possible to separate the new and renewable sources of energy (NRSE) in order to evaluate their contribution to meeting the energy demand of developing countries and to assess the implications of such a contribution for overall investment requirements. The work will be published in the near future.

The basic findings of UNCTAD's work on the investment requirements of the energy sector in developing countries are the following:

1. For an annual GDP growth rate of 6.3 per cent (mining excluded) investment requirements projected in the year 2000 could vary widely depending on the pattern of development and the energy policies adopted. Under the assumption that the economic structure of developing countries will be transformed along lines similar to those followed, in the past, by industrialized countries and that energy policies will place more emphasis on centralized production and thus in particular to the development of network electricity, energy demand would be of the order of 5.2 billion tons of coal equivalent (Gtce) and investment requirements measured in 1973 prices of the order of \$161 billion. On the other hand, if it is assumed that production will be oriented towards satisfying the needs of local population and that energy policies will place more emphasis on energy sources locally available and on energy paths that are better suited to the characteristics of local demand then energy demand would be of the order of 4.0 Gtce and investment requirements \$98 billion (in 1973 prices). In the high investment scenario, requirements in the NRSE might be \$15 billion (in 1973 prices), or 9.6 per cent of total investment in the energy sector, while in the low investment case they may be \$40 billion (in 1973 prices) or 40.7 per cent. The increased requirements for NRSE in the second case should be viewed against an overall reduction of total investment of 63 per cent which, to a great extent, is made possible by the substitution of NRSE for electricity produced in large interconnected systems.
2. Financing of investments in energy will present a major challenge in the years to come since a greater part of the GDP than at present must be devoted to investment in energy (between 4.5 per cent and 7.2 per cent in the year 2000).
3. Pressure on the economies of developing countries will also be coming from two other constraints facing their energy sector. The first concerns the problem of the depletion of fuelwood and the second the foreign exchange requirements for oil imports. Overcoming these constraints would require certain policy response which would lead among others to more intensive exploitation of indigenous resources and the development of NRSE. However, while the implementation of "self-reliant" energy policies by the developing countries may reduce the pressure on the energy sector in the development process, it is not likely to improve the long-term balance in the world petroleum market.

4. With reference to the NRSE, it appears that investment requirements for each individual source would be relatively moderate except for hydro-electric power for which requirements are large in both relative and absolute terms.

In addition, the secretariat has prepared a separate report^{1/} which, on the basis of the findings of the above-mentioned analysis, has attempted to assess the size and to identify the nature of the financial flows specific to the development of the NRSE in developing countries.

In brief, the UNCTAD report points out that "the role of a financing programme for NRSE would be to ensure that the system of financing chosen does not lead to a bias against their development". From the analysis, it follows that "some of the activities related to NRSE raise financing problems similar to those in the case of other energy sources, while others require flows with specific characteristics. Activities related to the latter may include: applied research and demonstration and the development of decentralized systems".

With reference to the development of decentralized systems, it is pointed out that "even when technically and economically proven, the NRSE which are expected to make a sizeable contribution to the energy needs of developing countries within the next 20 years will not be developed unless financing exists for decentralized operations" such as: small local industries producing energy-using or capturing equipment, the installation of community systems (gobar plants etc.), and the installation by families of equipment intended for household production/consumption.

The financing of such systems raises particular difficulties because existing financing mechanisms, domestic and international, are generally not accessible to the segment of population which is most likely to benefit from them (rural population). Furthermore, experience has shown that, aside from rural development projects "it is easier to mobilize international flows, in the form of loans or aid, for a smaller number of large projects, The continuation of this tendency is likely to bias energy development against those NRSE which depend very strongly on decentralized operations".

This report was made available to the secretariat of the Conference on NRSE and to its Ad Hoc Group of Experts on Financing.

On the basis of the work already carried out and which will be done in the context of its work in the areas of transfer of technology and financing, UNCTAD will be ready and willing not only to contribute to the preparatory process for, and the elaborations at the United Nations Conference on New and Renewable Sources of Energy, but also to assist, within its area of competence, in implementing the agreements to be reached at the Conference.

^{1/} Report prepared by the UNCTAD secretariat to be submitted to the Ad Hoc Group of Experts on Finance of the Conference on the New and Renewable Sources of Energy, Geneva, 15-19 December 1980.