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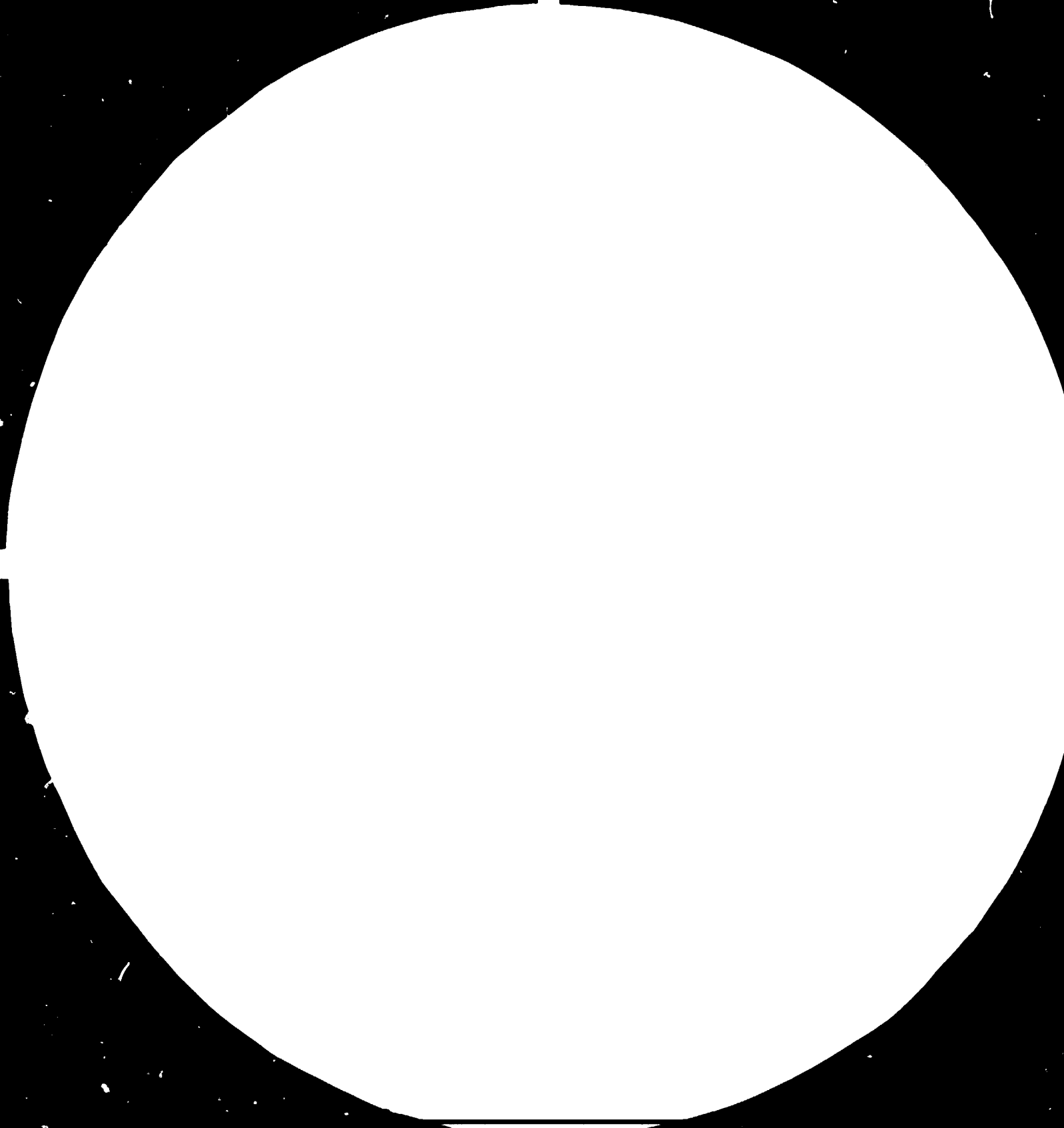
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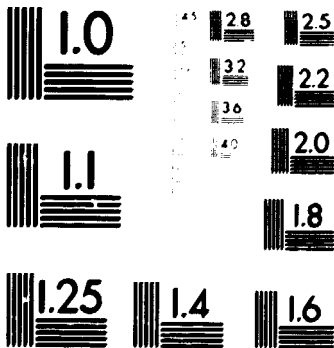
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Expert Group Meeting on the
Electric Power Equipment Industry
Vienna, Austria, 12-14 November 1984

14/66

REPORT *

(Meeting on electric power-equipment
industry).

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I. INTRODUCTION

1. The Expert Group Meeting on the Electric Power Equipment Industry was convened at Vienna from 12 to 14 November 1984 as part of the preparations for the Second Consultation on the Capital Goods Industry with Special Emphasis on the Energy-related Technology and Equipment which will be held at Stockholm, Sweden, from 10 to 14 June 1985. The Expert Group Meeting was attended by 16 participants from 12 countries, representatives from United Nations bodies, non-governmental organizations and observers (see annex I).

2. The First Consultation on the Capital Goods Industry was convened at Brussels, Belgium in September 1981^{1/}. The Industrial Development Board of UNIDO (IDB), at its sixteenth session, took note of the conclusions and recommendations of the First Consultation and decided at its seventeenth session^{2/} that a consultation on the capital goods industry with special emphasis on energy-related technology and equipment be held during the biennium 1984-1985.

3. The preparatory work for the Second Consultation has been planned in line with the recommendations of the First Consultation and the above-mentioned decision of the IDB.

4. The wide scope of energy-related technologies and equipment made it necessary to review the subject to identify the limited number of areas which could be discussed at the Second Consultation. This review was made at the Expert Group Meeting which was held at Vienna, Austria, from 10 to 12 October 1983. That meeting, after considering several alternatives, recommended that the electric power equipment industry should be selected for further study. Furthermore, the Meeting observed the lack of information on the electric power equipment sector in developing countries and recommended that a set of country case studies should be carried out by UNIDO^{3/}.

1/ Report of the First Consultation on the Capital Goods Industry, UNIDO/ID/276, 1981.

2/ Report of the IDB on its seventeenth session, UNIDO/ID/B/308, 1983.

3/ Selection of case study countries was made according to a preliminary typology of developing countries which was based on some macroeconomic indicators.

5. It was also agreed at that Expert Group Meeting that the preparatory work would consist of the following activities:

- a) Development of a typology of developing countries, which would aim at defining groups of countries homogenous enough to make strategy recommendations with regard to the development of electric power equipment industry possible;
- b) Carrying-out a set of country case studies and their synthesis;
- c) Surveying the major manufacturers of electric power equipment and assessing their strategies for various forms of co-operation with developing countries;
- d) Formulation of a set of strategies for the development of electric power equipment industry in developing countries (based on the outcome of studies referred to in a, b and c above);
- e) Identification of possible areas of co-operation between developed and developing countries and among developing countries themselves.

6. The important developmental issues of electric power and power equipment sectors and the terms of reference of the country case studies were discussed at the Expert Group Meeting which met at Vienna, Austria, from 19 to 21 December 1983^{4/}.

7. In line with the recommendations of the above mentioned expert group meetings in October and December 1983, UNIDO carried out the following activities in preparation for this Meeting from 12 to 14 November 1984:

- a) A typology of developing countries has been developed^{5/};

^{4/} Report of the meeting, UNIDO/PC.87, 5 January 1984.

^{5/} Document: The production of electric power equipment in the developing countries: A typology of the developing countries and elements of a strategy.

b) Eleven country case studies were carried-out for UNIDO by the experts from the following countries^{6/}:

- | | |
|-------------|-----------------------|
| 1. Algeria | 7. Indonesia |
| 2. Bolivia | 8. Mexico |
| 3. Cameroon | 9. Pakistan |
| 4. Columbia | 10. Republic of Korea |
| 5. Egypt | 11. Tanzania |
| 6. India | |

c) A synthesis of the country case studies was made^{7/};

d) A questionnaire for the survey of major equipment manufacturers was prepared and a test run has been made among French manufacturers^{8/};

e) Sets of strategies aimed at the development of the electric power equipment sector were formulated separately for each group of developing countries identified in the typology study^{9/};

f) A study has been initiated on the assessment of possibilities of technology exports from developing countries and increased co-operation among developing countries in the field of electric power equipment^{10/}.

6/ The case studies are available upon request in original languages and in draft English translation wherever applicable.

7/ Document: Analysis of the electric power equipment sector in developing countries (based on UNIDO country case studies).

8/ Documents available upon request:

- Analysis of the strategies of actors involved in the electric power equipment industry: Problems and survey questionnaire for manufacturers.
- Survey on French companies producing electric power equipment.

9/ Op. cit. 5/, Part II.

10/ This study is expected to be completed in early 1985.

II. AGREED CONCLUSIONS AND RECOMMENDATIONS

Introduction

8. The Expert Group Meeting took note of the documentation prepared by the UNIDO secretariat (see annex II) and endorsed them in general. During the course of discussions, however, some improvements in the typology and strategies were suggested by the participants. The UNIDO secretariat was requested to consider those points while preparing the final version of the documents to be presented at the Second Consultation on the Capital Goods Industry with Special Emphasis on the Energy-related Technology and Equipment.

Conclusions

Context for the development of electric power equipment sector

9. The Expert Group Meeting concluded that:

- a) The development of the electric power equipment industry included the manufacture of all related equipment for the generation, transmission and distribution of electrical energy;
- b) The equipment and services for generation, transmission and distribution of electricity covered a wide spectrum of equipment of varying complexity from the simple wooden distribution pole to the very complex gas turbine. This wide scope made it possible for developing countries to enter into the sector at a complexity level which was compatible with their development stage;
- c) The electrification programmes claimed one of the largest shares of public investment in most developing countries. Very large investment costs constituted a major constraint and, at the same time, increased the importance of the role played by the multilateral financing organizations;

d) The relative importance of the electric power equipment market in the developing countries, which consisted of approximately US\$ 20 billion per year of imports, mostly from the industrialized countries, was greatly increased by the current decline in the world market. It was the general opinion that this situation should permit closer commercial and technical co-operation between developed and developing countries.

National policies and strategies

10. The Meeting concluded that the role of the State in the developing countries was determinant for the development of the electric power equipment sector, particularly through the formulation of national policies and strategies and integrated intersectoral planning. It was further concluded that planning for the electric power equipment sector should be carried out as a component of overall industrial development planning in general, and energy planning in particular.

11. The Meeting concluded that the purchasing power of public utility companies played an important role in establishing and/or developing the manufacture of electric power equipment.

12. It was concluded by the Meeting that the constraints such as market size, technology, investment costs, financing, training, standardization at national, regional and international level, etc. hindered the development of electric power equipment industry in different developing countries. To overcome these obstacles there were various strategies which could be followed. A favoured approach was the unbundling of the technology package. The unpackaging policies and strategies were dependent on the stage of development of the individual countries. It was concluded by the Meeting, however, that the first step toward technology unpackaging should be the establishment of national engineering and consultancy services. This requirement, in turn, made manpower training one of the top priority issues.

13. The Meeting concluded that the technology unpackaging policies and strategies should also focus on, among others, civil engineering and

construction, assembly, repair and maintenance of installations and should be complemented by the policies and strategies for the manufacture of capital goods in general and manufacture of electric power equipment in particular.

14. The meeting concluded that the rural electrification was one of the most important contributors to rural development. It was stressed that, in many developing countries, there was room for local industries and skills to participate in rural electrification programmes. In particular, the experience with the micro- and mini-hydroelectric projects has proven this point.

15. It was concluded that the development of a viable electric power equipment sector was a long-term undertaking. Furthermore, the long-term development patterns depended upon the adopted policies and strategies in different countries. The development of the electric power equipment industry in Argentina, Brazil, India and the Republic of Korea, for example, has occurred in different ways in accordance with selected approaches.

Co-operation

16. The Meeting concluded that the development of strategies conducive to enhanced co-operation among developing countries was highly important. There was room for co-operation in the technology areas and sharing of regional markets. It was also concluded that, considering the present world market situation, opportunities for co-operation between developed and developing countries have increased. There was also scope for co-operation between small and medium-scale companies from industrialized countries and firms from developing countries, especially for less complex equipment and services.

Recommendations

17. The Expert Group Meeting recommended that UNIDO in co-operation with other United Nations bodies and international organizations should:

- a) Assist developing countries to develop a methodology for integrated energy/industry planning;
- b) Assist developing countries to develop a methodology for planning of the capital goods sector in general, and the electric power equipment industry in particular;
- c) Assist developing countries to prepare feasibility studies, to evaluate investment proposals and to identify financing possibilities;
- d) Provide assistance to developing countries to promote national consultancy services and to train required manpower;
- e) Establish a framework of information required by developing countries to unpackage, negotiate and develop electric power projects and systems;
- f) Foster international co-operation between developed and developing countries and international and regional co-operation among developing countries;
- g) Analyze the regional markets, technical and technological capabilities, constraints and identify the possible areas of regional co-operation in different regions;
- h) Organize regional consultations to promote exchange of experience among developing countries;
- i) Assist developing countries in implementing rural electrification programmes in general, and micro- and mini-hydro schemes in particular.

III. ORGANIZATION OF THE MEETING

Opening of the Meeting

18. The Meeting was opened by the representative of the Head of the Negotiations Branch of UNIDO who explained the origin and scope of the System of Consultations^{11/}. He indicated that the purpose of the Meeting was to advise UNIDO on the priority issues proposed by the Secretariat that might be discussed at the Second Consultation. He further explained that the country case studies and other preparatory work carried out by the UNIDO Secretariat have indicated the pivotal role played by the technology unpacking in the electric power sector. He stressed that one important consideration which permeated all country experiences was that the relevant government action had to be based on clearly stated and concretely implemented political decisions and on the leverage the public utilities held as the purchasers of electric power systems.

19. The Meeting was also addressed by the Special Assistant to the Executive Director and Co-ordinator of UNIDO's Energy Programme who explained the Energy Programme and the following decisions of the Fourth General Conference of UNIDO on the subject^{12/}:

- a) To develop integrated industry/energy plans and policies at the national level;
- b) To develop and widen the developing countries' energy resource base by exploring all indigenous sources of energy in order to increase their self-sufficiency in energy and thus sustain their industrialization process;
- c) To improve the industrial energy efficiency through measures aimed at a rational use of energy taking into account the particular conditions of developing countries and their needs for a sustained industrialization process;

^{11/} Rules of procedure for the System of Consultations, UNIDO/PI.84.

^{12/} Report of the Fourth General Conference of UNIDO, ID/CONF.5/46.

- d) To enhance capital goods manufacture in support of the energy sector where technically and economically feasible and in accordance to plans and priorities defined by the developing countries themselves;
- e) To extend the life and improve the performance of the energy-related capital equipment through adequate repair and maintenance activities.

20. It was also pointed out that in addition to the consultations on the capital goods industry and other industrial sectors, the UNIDO programme included a spectrum of other efforts which contributed toward the same overall objective. These included, among others, technology transfer, training, technical assistance activities, and an investment promotion service.

Adoption of the Agenda

21. The following agenda was adopted:

- 1. Opening of the Meeting
- 2. Election of officers
- 3. Adoption of the agenda and organization of the work
- 4. Presentation by the UNIDO Secretariat
- 5. Discussions and exchange of experiences and information
- 6. Drawing up of conclusions and recommendations of the Meeting
- 7. Other

Election of officers

22. Mr. J.M. Seber (Brazil) was elected Chairman; Mr. A. Danes (Czechoslovakia) and Mr. O. Canbäck (Sweden) were elected Vice-chairmen.

Documentation

23. The documents issued for the Meeting are listed in annex II.

Adoption of the Report

24. The report was adopted by the Meeting on 14 November 1984.

IV. SUMMARY OF DISCUSSIONS

25. The discussion paper which was based on two background documents^{13/} and on the other studies carried out by the UNIDO Secretariat was presented at the Meeting. While commenting on the paper, the participants generally endorsed the Secretariat's preparatory work. The following points, however, were made:

- a) Although the typology of developing countries made it possible to formulate policies and strategies applicable to different groups, the common problems such as availability of and access to technology, training, financing, etc. could be dealt with separately and in more detail. Furthermore, it was suggested that the quantitative and qualitative level of industrial manpower could also be taken into account as an indicator in classifying the developing countries;
- b) The role and strategies of different actors involved in the electric power sector such as the government, utility, national industry and services in the developing countries and suppliers of equipment and services from industrialized countries and international financing organizations should be treated in more detail;
- c) Rural electrification in general, and micro- and mini-hydroelectric generation in particular should be given more coverage since their size and nature could permit the participation of local industries and skills in developing countries.

26. The participants drew attention to the coverage of the electric power sector. The hardware and software activities involved in the generation, transmission and distribution of electricity (such as engineering and consultancy services, civil engineering and construction, equipment, assembly, operation, repair and maintenance, research and development, etc.) were of varying complexity levels and provided a wide range of opportunities to developing countries of different development stages to enter and/or develop their electric power equipment sector.

^{13/} Op. cit. ^{5/} and ^{7/}.

27. There was consensus on the following diagnosis of the present world situation in the electric power equipment sector:

- a) There was a significant underutilization of capacity in the developed countries;
- b) The concentration of the electric power equipment industry in the developed countries was increasing with an ever decreasing number of firms in manufacturing;
- c) Overhead costs in general, R+D costs in particular were soaring;
- d) All factors mentioned above could increase the possibilities of co-operation for the transfer of technology between developed and developing countries;
- e) As a response to the changing market conditions, not only the Transnational Corporations (TNCs) but also the Small- and Medium-sized Enterprises (SMEs) from developed countries were changing their attitudes toward transfer of technology to the developing countries;
- f) The capacity utilization of the existing facilities in the developing countries was very low.
- g) For the less complex equipment there could be room in the world market for manufacturers from the Newly Industrializing Countries (NICs);

28. Most of the participants stressed the need for planning the development of the electric power equipment sector. It was also said that such a plan should be a component part of an integrated energy/industry plan in general, and a capital goods industry development plan in particular.

29. The participants agreed that the public utility company should play a crucial role in the development of electric power equipment industry in developing countries. Some participants drew attention to the historical

impact of utilities on the industry in industrialized countries which enabled their development. It was also stressed that although the utility should be the central authority to implement indigenization strategies; government encouragement to the utility would be needed to start the process.

30. Some participants drew attention to the fact that conditions of financing to utilities in the developing countries by the multilateral and bilateral funding organizations generally promoted the purchase of equipment and services from well established suppliers. On this point, participants invited the international financing institutions to establish lines of credit for local acquisition of goods and services.

31. Most of the participants identified the technology unpackaging as the favoured approach for the indigenization of the electric power sector in the developing countries. It was added, however, that unpackaging was not an easy task; it required concerted action of government, utility, domestic industry and foreign suppliers and financiers. The first step toward unpackaging was identified by the participants as the establishment of national engineering and consultancy services and training of high level personnel for these services.

32. Some participants drew attention to the fact that companies from industrialized countries also had to unbundle the technology package themselves and utilize subcontractors. One participant stressed, referring to his experience, that when local industry and services in developing countries were utilized as subcontractors, difficulties such as delivery delays, financing of local operations, guarantees and penalties in connection with quality and timing, etc. could arise.

33. Several participants commented on the successful attempts to unpackage the electric power sector technology in NICs. Based on these discussions, the following alternatives could be identified:

- a) In one developing country, the heavy electrical industry was established through state enterprises and with the aim to attain complete self-sufficiency. In line with this target basic engineering

capabilities were created and technology transfer was realized through a limited number of licences. The domestic market was protected and every effort was made to indigenize the inputs required for production.

- b) In another developing country, technology unpackaging was mainly made by using the purchasing power of the utility. The country drew up clear indigenization policies and strategies and obtained technology through licenses bought by the national enterprises wholly or partly owned by the utility. The private firms in the sector were also active, but direct involvement of foreign capital did not exist. The required inputs of production were imported freely at the beginning and indigenized progressively as they became available within the country. The utility in this country played the central role and was involved in every aspect of the development of the sector.
- c) In the third route, the developing country promoted the rapid expansion of the sector through joint ventures with and/or through subsidiaries of the transnational corporations. The involvement of subsidiaries in engineering and consultancy services was reduced in time by indirect legislation promoting national firms. In this route, technology updating was rapid in the form of intrafirm transfers.

34. It was argued by the participants that the cost of development of the electric power sector could greatly vary in each of the alternative routes mentioned above. It was felt that analysis of costs and risks involved in each case could be carried out to assist the decision makers in developing countries.

35. Several participants from developing countries referred to their experience and said that the negotiation position of their countries vis-à-vis the suppliers from developed countries and international financing organizations increased through the technology unpackaging process in general, and establishment of national engineering and consultancy services in particular.

36. It was expressed as a general opinion that the prevailing conditions in

the world market for electric power equipment could provide better possibilities for co-operation between major suppliers from developed countries and utilities and manufacturers in the developing countries. It was felt, however, by some participants that such co-operation arrangements should be of long-term basis, contrary to the present practice which was on a project-by-project basis.

37. Equipment and services for the rural electrification schemes were identified by participants as a possible area for co-operation among developing countries. It was stressed that the complexity level of such equipment and services were within the technological capability of a large number of developing countries.

38. Participants requested UNIDO to identify the possible areas of regional co-operation. It was stressed that this work should be based on a comparative analysis of the markets and capabilities for the manufacture of the electric power equipment and software services.

39. Several participants suggested that UNIDO could play an important role in promoting regional co-operation among developing countries. They drew attention to the lack of information and felt that regional consultation meetings could be convened to provide a forum for exchange of experiences and information among the countries of the region.

Annex I

LIST OF PARTICIPANTS

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Annex II

LIST OF DOCUMENTS

1. Information documents

- a) Information for participants and provisional agenda
- b) Provisional list of participants

2. Discussion document

Discussion paper of the Meeting

3. Background documents

- a) Analysis of the electric power equipment sector in developing countries (based on UNIDO country case studies)
- b) The production of electric power equipment in the developing countries: A typology of the developing countries and elements of a strategy

