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THE COMMISSION'S WORK IN THE AREA OF
Capital Goods Development

Note by the Executive Secretary

84-0214

A. Legislative mandates

1. The programme of capital goods development has been a continuous activity under the regular programme of the joint ECWA/UNIDO Industry Division. Since 1981 the programme has been generously receiving extrabudgetary funds contributed by the Governments of the Netherlands. The legislative authority for this programme is derived from the medium term plan for the period 1984-1989 and more specifically, from General Assembly resolution 3362(S-VII), section IV, paragraph 1, which endorses the Lima Declaration and Plan of Action; and the report and recommendations of the Fifth Conference on Industrial Development for Arab States (Algiers, 16-20 November, 1979).

B. Background and introduction

2. Industrial development remains the motive force behind economic development. However, this motive force requires the development of a balanced and integrated industrial structure with strong forward and backward linkages within the industrial sector as well as with other sectors so that the growth of industry becomes an organic process. The creation of a balanced industrial structure requires the development of a wider range of productive capacities in intermediate and capital goods and engineering industries. An integral part of the balanced industrial structure is the creation of strong technological capabilities, especially in capital goods and engineering industries, with the objective of reducing economic and political dependence.

3. Production capacities and capabilities in capital goods and other products of the engineering industry constitute a major factor and indicator of technological growth of any country. Because the build-up of such capacities requires inputs of twin technologies not only that of the design and production of these goods but also that of the products which these capital goods are meant to produce the capital goods industry acts as catalyst of technological development. Innovation in any technology has to be matched by innovation in capital goods technology and vice versa. The strategic necessity of developing this industry is self-evident.

4. An examination of industrial development in the ECWA region shows the dominant feature to be the increasing imbalance recorded in recent years between the existing pattern, structure and output of the industrial sector in member States, on the one hand, and the structure and pattern of demand for locally-manufactured products, particularly capital goods, on the other hand.

5. The structure of manufacturing output in the region reveals its predominant orientation towards the production of consumer and intermediate goods. This industrial structure consists of a large variety of scattered enterprises with limited linkages between them and little complementarity in their production. More complex and integrated industrial activities in the field of capital goods and engineering industries have only recently been given limited attention by some member States. While the lack of resources and the limitation of the market at the national level may have prevented the establishment of such industries, the absence of a regional outlook in dealing with the problem of industrialization has certainly been an important added factor.

6. The demand for capital goods and engineering products has been growing at an exceptionally high rate owing to the implementation of ambitious development programmes in member States. The limited internal production base and the fragmented nature of the industrial sector, combined with the lack of complementarity in production, has been reflected in the phenomenal increase in imports. Thus, the import of engineering products destined to the region of the Arab League and ECWA increased from \$US 1,351 million and \$US 877 million respectively in 1963 to over \$US 30,000 million and \$US 21,000 million in 1980. In percentage terms the Arab League region imported between 3 and 4.5 per cent of world exports of engineering products during the period 1963-1974, rising to 7 per cent in 1975 and to 10 per cent for the more recent reported year 1980. In terms of production of capital goods, the Arab League countries comprise only 1 per cent of the total world production, while Arab world demand constitute 6 per cent of world production.

7. When imports of engineering products are compared to manufactured value added (MVA) and gross domestic product, (GDP) the figures are more revealing. Thus, while value added in manufacturing in the ECWA region used to equal approximately the value of engineering products imports in 1963, in recent years, the ratio was less than 45 per cent. From 1963 to 1972, the ECWA region annually spent close to 10 per cent of its GDP on imported engineering products; this figure has risen recently to 14 per cent of GDP.

8. It is within this dynamic and expanding market that ECWA's programme on the development of capital goods and engineering industries has been conceived. The formulation of such a programme has taken into account the fact that, at the national level, very few, if any, countries in the ECWA region will, in the foreseeable future, possess the minimum adequate market size and resources, or have an economic structure containing the necessary elements for the realization of such a programme and for creating an efficient and resourceful sector within the economy.

C. Activities under the capital goods programme

9. ECWA's programme in this field aims at promoting the development of an integrated long-term regional pre-investment programme for the development of capital goods and heavy engineering industries with strong linkages to related national industrial facilities. It is envisaged to be of a sufficient "mass" for providing the nucleus needed to develop industrial capacities and technological and managerial capabilities in the field of engineering industries. This would bring the countries concerned to the take-off stage and provide a dynamic and flexible instrument for effecting future changes in this important field.

10. The programme for the development of capital goods industries should be considered primarily as part of an overall strategy for industrial integration basically aiming at building up mutually interlinked industrial capacities for promoting inter-Arab trade in manufactured goods leading ultimately to economic integration. This strategy draws on important concepts in the field of regional industries planning and industrial location. To begin with, division of industrial activity in the region, while calling for individual countries to undertake large-scale production of particular products for the regional market, need not interfere with existing capacities; nor should it militate against the development of an industrial structure with diverse and versatile technological capabilities within each country. One need not think of regional co-ordination in terms of specialization in the strict sense or a country-wise monopoly of industry. An important objective of this programme is that it should achieve a balance in the number and types of projects allotted to various countries for achieving an equitable distribution of benefits to be derived by participating member States.

11. Conscious of limited absorption capacities for technologies in particular and industries in general, one must follow the line of priorities and the dynamics of needs. The ECWA countries can be considered at initial stages of development activity concentrating on infrastructure in telecommunication, electricity generation transport facilities etc. Additionally endogenous development of oil resources has been the priority and all these have led to large-scale construction activity. Imports and consumption of capital goods has concentrated around these areas. First priority in the selection of ECWA's work programme areas has been accorded to telecommunications equipment, electric power generation transmission and distribution equipment, transport and construction equipment and capital goods for chemical industries. After having made substantial progress in these areas, attention will be turned to capital goods for oil-drilling, cement mill machinery and food-processing equipment. This strategy has been formulated

after having analysed the capital goods sector from an integrated overview without losing sight of the objective of achieving immediate tangible results.

12. A set of three primary and three secondary criteria has been used as a guideline for identifying the regional projects under consideration. The first primary criterion relates to the size of the market. Accordingly industries have been considered candidate regional projects when the local demand in most countries taken separately is insufficient in the foreseeable future (15-20 years) to allow for the establishment of economically viable manufacturing facilities. The second criterion considers as potential regional projects those industries with strong forward and backward linkages and having the possibility of attaining a high local content through regional co-operation, rather than through establishing assembly plants within the boundaries of individual countries. The third criterion considers technology-intensive industries as aiming, in the longer run, at the organic development of high technological capabilities in the region. In the short-term, priority has been given to the development of industries with relatively stable technologies and technological skills which can provide a basis for the longer-run objective. The first of the secondary criteria is to select industries with high economies of scale or those industries obtaining economic viability through product mix, the elements of which are technologically interrelated. The second of the secondary criteria for selection are those industries that lend themselves to production split whereby production of certain inputs or components can be decentralized, thus effecting economies of scale and affording even distribution of production capacities among ECWA countries, besides achieving a greater degree of vertical integration in industry. The third criterion relates to industries that have no critical locational factors and whose location is therefore determined with great flexibility.

13. Based on the above criteria, and after examination of present and projected investment programmes in the ECWA region and trends in imports, specific industries have been selected for preparation of prefeasibility and techno-economic studies as detailed here under. A number of regional organizations include projects which are similar to those contained in ECWA programme. Co-ordination is carried out with such organizations in order to avoid duplication of efforts. Towards this end, ECWA participated in review meetings on AIDJ's study on capital goods held in 1983 at London and Algeria.

14. Aside from identification of specific projects and investment opportunities the programme includes:

(a) Promotion of these projects with regional and national investment organizations and the convening of promotional meetings and publications;

(b) Provision of technical assistance in initiating these projects as well as those projects which have been identified by intergovernmental and governmental organizations.

15. The status of the capital goods programme in terms of identification of projects and their promotion is contained in annex I. A synopsis of the findings of each pre-feasibility study is contained in annex II.

D. Co-operation with regional organizations

16. Close co-operation has been developed with the Arab Industrial Investment Company (AIIC) in the field of specific engineering projects. As reflected in annex I, these projects were included in the company's investment programme. The Joint ECWA/UNIDO Industry Division is participating with the Arab Telecommunications Union (ATU) in the preparation of a joint study covering all Arab countries on the manufacturing of telecommunication equipment. This study expands and updates the earlier study prepared by ECWA covering only ECWA member countries. The recently concluded agreement of co-operation between ECWA and AIIC identified capital goods and engineering industries as one important area for close co-operation. A joint committee has been formed to work out details of such co-operation, including joint programmes. It is expected that this programme may be reformulated and expanded to take into account rationalization of resources available to the two organizations.

E. Project promotion with end-users

17. The identified projects have been promoted with member Governments, national industrial and regional organizations, and financial and investment institutions. The experts meetings held on the subject were an important vehicle for promotion of candidate projects since these meetings were attended by experts from member States who were practicing planners as well as end-users for products to be manufactured by this facility (i.e., experts from power authorities). Two projects (foundry project and switchgears) which were originally conceived as national projects by the Pension Fund of Jordan were later developed as regional projects receiving support from AIIC. ECWA extended assistance to the Pension Fund in this respect. Additionally the techno-economic reports prepared under this programme have been sent to member Governments for use by their planning and implementation machinery. It may be noted in this

respect that aside from their usefulness for promoting regional co-operation in the development of capital goods, the studies contain techno-economic data and norms in the respective industries covered in the study for use by industrial planners in member countries. The prefeasibility study on fabricated chemical equipment - (static equipment) was presented to the OAUPEC organized Second Arab Energy Conference held in Doha, March 1982. The Conference supported the establishment of this industry and the Arab Petroleum Investment Corporation (APICORP) has taken steps towards implementation of this as an inter-Arab project. ECWA's studies on heavy electrical equipment were the subject of discussion at the AIDO/Arab Fund for Economic and Social Development Experts Meeting on Development of Electrical Equipment Manufacturing, held at Tunis, November 1983. The meeting supported the findings of the ECWA studies. The meeting recommended that AIDO and the Arab Fund proceed with the establishment of an inter-Arab company for manufacture of heavy electrical equipment and that ECWA's identified project be considered as a candidate inter-Arab project including turbines and generators and large capacity transformers and telephone cables. ECWA identified projects on electronic telephone exchanges and HT power cables had been included in the investment programme of the Arab Industrial Investment Co. (AIIC).

Conclusions and recommendations

18. The secretariat has initiated its capital goods development programme with the identification of regional industrial projects through pre-feasibility studies. On a selective basis, ad hoc advice on and evaluation of these prefeasibility studies were sought by the secretariat through ad hoc expert groups. In the mean time ad hoc promotional activities were undertaken for selected completed pre-feasibility studies with the objective of including the identified projects in the investment programmes financing institutions and in preparation for the full-fledged feasibility studies to follow. The programme emphasis and resource concentration have been on the identification process as is reflected in annex I. The promotion process received less prominence in programme activities. Hence, the secretariat has been carrying on a horizontal programme which tackles many different capital goods areas (pre-feasibility studies) but it has had insufficient resources available for vertical action-oriented activities (i.e. ad hoc advice, evaluation, consultation, promotion, technical assistance) pertaining to the actual establishment of regional industrial projects.

19. In order to increase the effectiveness of ECWA's capital goods programme, the secretariat recommends that:

Recommendation 1: The capital goods programme, in the future work programmes should be formulated in such a manner that hori-

Annex II.

FINDINGS OF THE PRE-FEASIBILITY STUDIES

A. Power cables

- Product:** High (11 kV and above) and medium (2.2 to 6.6 kV) voltage underground power cables with latest XLPE technology.
- Size of market:** Average annual demand is 13.3, 24.0, 24.7 and 38.8 thousand kilometres during 1980-1985, 1986-1990, 1991-1995 and 1996-2000 respectively.
- Viable plant size:** 2,400 kilometres (or two standard lines) annual capacity; fixed capital Gulf countries \$US 35 million; non-Gulf countries \$US 32 million; working capital \$US 18.5 million.
- Suggested plan:** (1) Allowing maximum expansion of existing plants by adding 8 lines each with capacity 1,200 km by 1985 and additional four standard lines during 1985-1990
- (2) A new regional plant with annual capacity of 2,400 km immediately and two regional plants, one with 3,600 km annual capacity and another with 2,400 km annual capacity during 1986-1990.

B. Telephone cables

- Product:** Underground cables for local networks
- Size of market:** Annual average demand is 2.2, 2.5, 4.3 and 5.3 million circuit kilometres during 1976-1980, 1981-1985, 1986-1990 and 1990-2000 respectively.
- Viable plant size:** Gulf Countries: 2 million circuit kilometres annual capacity with fixed capital \$US 58 million and working capital \$US 20 million.
- Non-gulf countries: One million circuit kilometres annual capacity with fixed investment \$US 35 million and working capital \$US 10 million.

- Suggested plan:
- (1) Expansion of existing plants.
 - (2) One new plant in the Gulf with annual capacity 2 million circuit kilometres expandable to 2,5 million circuit kilometres later.
 - (3) One new plant outside the Gulf ready by 1985 with annual capacity of one million circuit kilometres expandable to 1.5 million circuit kilometres later.
- Total fixed capital for new plants \$US 103 million and working capital \$US 30 million.

C. Electric power equipment

Product: Turbines and generators which account for about 40 per cent of the total cost of a generating plant, and transformers whose cost in the power system is about 50 per cent of the cost of turbines and generators.

Size of market: The projected average annual increase in demand for the above equipment and the corresponding investments are shown below:

(a) Turbines and generators

	<u>1986-1990</u>	<u>1991-1995</u>	<u>1996-2000</u>
Average annual increase in demand (MW)	4 763	5 029	7 679
Corresponding total investment (millions of US \$)	448	473	722

(b) Transformers

Average annual increase in demand (MVA)	26 206	27 312	41 431
Correspon-			

ding total investment (millions of US \$)	231	241	366
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Viabie plant size: (a) Turbines and generators: 5,000 MW annual production output, fixed capital about \$US 500 million and working capital about \$US 100 million.

(b) Transformers: Distribution (0.25 - 1.25 MVA) transformers: 6,000 MVA annual production output, fixed capital about \$US 40 million and working capital about \$US 14 million. Medium power (6-40 MVA) transformers: 6,000 MVA annual production output, Fixed capital about \$US 50 million and working capital about \$US 11 million.

Large power (75 - 200 MVA) transformers: 10,000 MVA annual production output, fixed capital about \$US 70 million and working capital about \$US 13 million.

Suggested plan:

(a) Turbines and generators: The factory can be located in any part of the ECWA region without significantly affecting the unit cost of production which is greatly influenced by material cost. Other types of turbines and generators (for industrial, marine, and other applications) can be manufactured in the same factory and will have a positive influence in smoothing the work load peaking which is traditionally experienced in heavy-power-equipment factories.

(b) Transformers: In order to promote balanced industrialization within the region while taking into account the impact of the location factor on the cost of production, medium and large power transformer factories may be located in non-Gulf countries, while distribution transformer factory may be located in the Gulf countries.

D. Power boilers

Product:

Unit sizes of 100, 150 and 300 MW capacity in the initial years, possibly later also 500 MW units.

- Size of market:** Average annual increase in installed capacity (in MW) for steam generators is estimated to be 1,440 during 1981-1985, 2,644 during 1986-1990, 3,447 during 1991-1995 and 5,419 during 1996-2000, corresponding to 36 steam units in the range 100-300 MW during 1981-1985, 76 units during 1986-1990, 84 units during 1991-1995 and 95 units during 1996-2000.
- Viable plant size:** 3,000 MW annual capacity. Fixed capital \$US 374 million for Gulf countries and \$US 337 million for non-Gulf countries; working capital \$US 81 and 78 million respectively.
- Suggested plan:** To establish one new regional plant with an annual capacity of 3,000 MW. This should start with initially producing 100 MW units and gradually increasing to unit sizes to include 150 and 300 MW respectively.

E. Switchgear equipment

- Product:** Circuit breakers with voltage rating ranging from 420 kV down to 24 kV, thus covering transmission and distribution needs.
- Size of market:** The average annual demand for circuit breakers covering above voltage range is about 11,000 units during 1981-1985, 21,000 units during 1986-1990, 23,000 units during 1991-1995, and 34,000 units during 1996-2000.
- Viable plant size:** The study was based on production of 1,300 units, all 3-phase, rated between 72.5 kV and 420 kV in addition to 5000 circuit breakers rated at 24 kV. The results indicate that such a plant will not be viable in the Gulf countries, and will be modestly viable in other countries. The corresponding fixed capital will be \$US 425 million and the working capital \$US 43 million.

F. Telecommunication equipment

- Products:** Telephone exchange and telephone instruments, accounting respectively for about 25 per

cent and 5 per cent of the total equipment cost in the telecommunication network.

Size of market: The projected average annual increase in demand for the above equipment and the corresponding investments are shown below:

	<u>1986-1990</u>	<u>1991-1995</u>
<u>(a) Telephone exchanges</u>		
Average annual increase in demand (lines)	796,000	981,000
Corresponding total investment (millions of US \$)	318	392
<u>(b) Telephone instruments</u>		
Average annual increase in demand (units)	1035,000	1275,000
Corresponding total investment (millions of US \$)	41	51

Viable plant size: (a) Telephone exchanges: 250,000 lines annual production output, fixed capital about \$US 85 million, and working capital about \$US 24 million.

(b) Telephone instruments: 150,000 units annual production output, fixed capital about \$US 4 million and working capital about \$US 1 million.

Telecommunication equipment

Suggested plan: (a) Telephone exchanges: The ECWA region can have as many as four factories by 1995. The factories may be located in different parts

of the region, thus enhancing balanced industrial development within the region without adversely affecting production cost significantly.

(b) Telephone instruments: The manufacture of this product on a regional rather than on a country basis can only be justified if major components are manufactured within the region. Thus, specialized plants may be set-up for producing components while others, including existing factories, assembly-produce the final product.

G. Fabricated chemical equipment

- Product:** Pressure vessels, heat exchanges, furnaces, storage vessels accounting for 37 per cent of the value of the equipment in chemical industries.
- Size of market:** The petro-based and fertilizer industries alone need about 85 thousand tons of the above products values at about \$US 350 million annually between 1986-2000.
- Viable plant size:** Gulf region: 30,000 tons annual capacity; Fixed capital \$US 125 million and working capital \$US 30 million.
- Non-Gulf region: 30,000 tons annual capacity; fixed capital \$US 75 million, and working capital \$US 20 million.
- Suggested plan:** One plant 30,000 tons annual capacity on Gulf coast and one Mediterranean coast - 20,000 tons capacity. Total fixed capital 200 million and working capital \$US 50 million.

zontal subject coverage is reduced (i.e. a reduced number of pre-feasibility studies) and project promotional activities are increased and that resource allocations to the programme should be accordingly affected.

Recommendation 2: At an early stage of project identification consultation with financing and investment organizations is imperative so as to select appropriate subject areas for study;

Recommendation 3: Prefeasibility studies should be jointly undertaken by Arab regional industrial development institutions and ECWA;

Recommendation 4: In order to involve ECWA member States more closely with the industrial development programme of the Commission, biennial ad hoc meetings on industrial development should be convened by the Committee. The convening of ad hoc subject-oriented meetings on industrial development is provided for under the terms of reference of the Committee as adopted in resolution 114(IX) operative paragraph 5. Having taken note of the momentum, the secretariat believes that in the past few years this programme has considerably increased its relevance, effectiveness and impact. The Committee will, at the same time, be in a position to evaluate, after a number of ad hoc meetings on industrial development, whether the ad hoc meetings should be continued or replaced by a more permanent subsidiary organ of the Commission or Committee;

Recommendation 5: The co-operation between UNIDO and ECWA in the area of capital goods development should be strengthened.