



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche



08008



United Nations Industrial Development Organization

Distr.
LIMITED
ID/WG.268/5
4 April 1978
ENGLISH

Second Panel of Industrial Experts on
the Petrochemical Industry

Vienna, 20-23 February 1978

THE GROWTH OF THE PETROCHEMICAL INDUSTRY
IN THE WORLD UP TO THE YEAR 2000

TOPICS SUGGESTED FOR DISCUSSION *

by the UNIDO Secretariat



* This document has been reproduced without formal editing.

id.78-1747

TABLE OF CONTENTS

	Pages
PREFACE	1
I. THE GROWTH OF THE PETROCHEMICAL INDUSTRY IN THE WORLD UP TO THE YEAR 2000	2
II. THE ROLE OF THE MAJOR PARTIES RESPONSIBLE FOR ESTABLISHING NEW PETROCHEMICAL PROJECTS	3
III. INTERNATIONAL CO-OPERATION NEEDED TO DEVELOP THE PETROCHEMICAL INDUSTRY IN DEVELOPING COUNTRIES	4
IV. THE FORM THAT CO-OPERATION AMONGST DEVELOPING COUNTRIES MIGHT TAKE	5
V. MAJOR TRENDS IN TECHNOLOGY THAT WILL AFFECT THE GROWTH OF THE PETROCHEMICAL INDUSTRY	6

PREFACE

1. The purpose of convening the Second Panel of Experts on the Petrochemical Industry is to select topics suitable for discussion at the First Consultation Meeting. The Industrial Development Board, UNIDO's governing body, when it meets in May 1978, will decide whether the Petrochemical Industry should be one of the two additional sectors on which consultations will be initiated in the biennium 1978/1979.

2. The main background document for the Second Panel meeting is the Summary of the Draft World-Wide Study of the Petrochemical Industry prepared by the International Centre for Industrial Studies of UNIDO (document ID/WG.268/4).

3. In addition, the following other background papers have been prepared: The Development and Outlook of the Petrochemical Industry in Mexico by F. Manzanilla (ID/WG.268/3); Japanese Co-operation with Developing Countries for Establishing Petrochemical Industries by Y. Hirakawa (ID/WG.268/1); and Ways and Means in which to develop the Internal Market for Plastics in Developing Countries and the Form which International Co-operation could take by G. A. Brighton (ID/WG.268/2).

4. The main topics to be considered at this Second Panel meeting are:
 - I. The growth of the petrochemical industry in the world up to the year 2000
 - II. The role of the parties concerned responsible for establishing new petrochemical projects
 - III. International co-operation needed to develop the petrochemical industry in developing countries
 - IV. The form that co-operation amongst developing countries might take
 - V. Major trends in technology that will affect the growth of the petrochemical industry

I. THE GROWTH OF THE PETROCHEMICAL INDUSTRY IN THE WORLD UP TO THE YEAR 2000

1. The major part of the output of the petrochemical industry consists of plastics, synthetic fibres, synthetic rubber and synthetic detergents. The draft UNIDO World-wide Study of the Petrochemical Industry (henceforth called 'the UNIDO Study') estimates world demand for these four groups of products in 1975, 1985 and the year 2000 as shown in Annex A.^{1/}
2. The Panel is invited to examine the forecasts of demand for these groups of products up to 1985 and the hypothesis for the year 2000 and indicate whether they are possible. In doing so, they are asked to consider (a) the economic growth rates assumed, (b) the link between demand for petrochemical products and economic growth up to 1985 that has been assumed in the model (discussed in the summary of the UNIDO Study, pages 31 + 32) (c) the resulting pattern of trade in the year 2000.
3. The level of ethylene production forecast for 1985 and the hypothesis suggested for the year 2000 in the UNIDO Study are shown in the last line of Annex A. Is the UNIDO forecast of demand of 73 million tons in 1985 realistic? And which of the two hypotheses for the year 2000 looks the more realistic?
4. The Panel, at its first meeting, suggested that the target for developing countries is to aim at satisfying their own growing demands and exports. The Panel may therefore wish to note that under hypothesis A for the year 2000 the developing countries would produce enough petrochemicals to be net exporters and under hypothesis B they would still be net importers as at present. The following table gives the details.

Production, Demand and Trade Surplus/Defecit in the year 2000

million tons of product

	<u>Developed Countries</u>			<u>Developing Countries</u>		
	<u>Production</u>	<u>Demand</u>	<u>Surplus</u>	<u>Production</u>	<u>Demand</u>	<u>Surplus</u>
Hypothesis A						
Plastics	129.3	130.1	-0.8	63.2	62.4	+0.8
Fibres	22.9	23.9	-1.0	22.7	21.7	+1.0
Rubber	17.6	16.9	+0.7	6.9	7.6	-0.7
Hypothesis B						
Plastics	204.6	196.5	+8.1	39.0	47.1	-8.1
Fibres	36.8	34.2	+2.6	14.3	16.9	-2.6
Rubber	24.7	22.8	+1.9	4.5	6.4	-1.9

^{1/} Only hypotheses A and B and not hypothesis C are considered in this paper.

5. Finally, the Panel may wish to suggest what changes should be made when revising the study as regards alternative hypotheses for ascertaining the level of demand and levels of production in 1985 and 2000. Consultations should be based on realistic estimates and these estimates should throw light on the factors affecting demand growth in the next 25 years. The Panel may consider whether the estimates of demand and production by geographical groups shown in the UNIDO Study are useful or whether greater detail is needed.

6. The Study has not considered separately the output of petrochemical industries in developing countries with oil and gas resources. The potential for developed countries to rely more extensively on petrochemical intermediates imported from those countries in the period 1985 - 2000 may perhaps need to be considered in more detail when the Study is expanded and revised. In this connection, the Panel may wish to consider the impact which the feedstock position and the likely developments in technology will have on the location of new petrochemical plants built in the period 1985 - 2000.

II. THE ROLE OF THE PARTIES CONCERNED RESPONSIBLE FOR ESTABLISHING NEW PETROCHEMICAL PROJECTS

7. The Economist began an article on the outlook of the petrochemical industry with the following paragraph:-

"The World's traditional chemical companies face a pincer movement which will force dramatic structural changes on their industry in the next decade. One arm is the accelerating incursion of oil companies into the production of both base petrochemicals and some end-products. The other is the planned entry into the international market of new petrochemical industries in the oil-rich states of the third world."

8. The Panel is invited to consider how the major parties responsible for establishing new petrochemical projects will respond to the market situation described in Part I of this paper. In the United States oil companies are responsible for many of the new petrochemical projects currently under construction. In Western Europe, joint ventures between oil and chemical companies are becoming more common. In Japan, production advantages which can be achieved by close links with a refinery are facilitated by close corporate ties. The role to be played by oil companies both from developing and developed countries, particularly after 1985, in the development of the petrochemical industry, therefore, needs to be discussed.

9. The oil producing developing countries have both the raw materials and capital to construct petrochemical plants to serve both their own markets and export markets. It is expected that the Arab petroleum exporting companies will be represented at the meeting to explain the role which they expect to play in the expansion of this industry, particularly after 1985.

10. The position of existing petrochemical producers in Western Europe and Japan will be described by participants who speak on their behalf. In the case of Japan, a paper has been circulated (ID/WG.268/1) which describes the likelihood of Japan relying more on petrochemical imports after 1985 rather than new capacities built in Japan.

11. The Panel might consider whether the growth of the petrochemical industry in developing countries will be influenced by the trend towards an increasing proportion of basic or intermediate petrochemicals being produced by oil companies. In this connection, the paper prepared on the development of Mexico's petrochemical industry will be of interest. This shows that from the start, production of "basic petrochemicals" in Mexican terminology has been reserved for PEMEX; down-stream projects have been developed by privately-owned chemical companies.

III. INTERNATIONAL CO-OPERATION NEEDED TO DEVELOP THE PETROCHEMICAL INDUSTRY IN DEVELOPING COUNTRIES

12. The petrochemical industry requires very heavy investment and the UNIDO Study assumes that investment may be needed at a rate equivalent to almost one-third of one per cent of the G.D.P. of developing countries. Furthermore, it must be recognised that the investment required for a petrochemical complex is often of the order of US\$ 1000 million. For all developing countries except the oil producing countries, the mobilisation of sufficient finance may prove to be a problem. The Panel is therefore invited to discuss how international co-operation can ensure that adequate finance is available for establishing petrochemical plants. In this connection, the terms and conditions on which it has been made available so far might be considered; on this basis suggestions for the future might be made.

13. The first Panel meeting emphasized the technical skills required to construct and operate a petrochemical plant. Most developing countries are

conscious of the co-operation they will require to develop such skills. The Panel may therefore consider this point in more detail and suggest how this topic might be approached at the Consultation Meeting.

14. Of the four pre-requisites for establishing a petrochemical plant (raw materials, money, management and markets) the fourth factor, markets, is crucial to the viability of all projects. The first Panel recognized this and placed great stress on developing countries developing their own markets. Ways and means to develop the market, for example, plastics in developing countries is considered in a paper prepared for this meeting (ID/WG.268/2). The Panel might suggest whether this topic should be considered at the Consultation Meeting and if so, what is the type of co-operation which developing countries are seeking. Is it only technical support in finding new applications for plastics, or is there a need for joint ventures in the plastics production and processing?

15. The first Panel meeting did not give such consideration to the question of intergovernmental agreement which would provide the developing countries with an assured market for their exports of petrochemical intermediates. Since that meeting the dialogue between the European Economic Community (EEC) and Arab countries has proceeded further and there may be some results to report to the Panel. However, the mutual interest which both the owner of raw materials and the purchaser of petrochemicals may have in long-term arrangements has perhaps yet to be fully acknowledged.

16. In this connection, it is worth noting the following agreements:

- (1) the Union of Soviet Socialist Republics will provide ammonia to the United States of America in exchange for phosphate and potash;
- (2) the Union of Soviet Socialist Republics will buy phosphate rock from Morocco;
- (3) Japan will buy ethylene dichloride from Iran;

and similar long-term arrangements.

IV. THE FORM WHICH CO-OPERATION AMONG DEVELOPING COUNTRIES SHOULD TAKE IN THE PETROCHEMICAL INDUSTRY

17. There are, perhaps, up to 30 developing countries which either have, or are likely to have, large national markets to absorb the output of a petrochemical complex, using plants of capacities which are considered of

minimum size in developed countries today. Therefore, if some of the other developing countries are to establish this industry, they will either

- (a) have to adapt technology to very much smaller sized plants, or
- (b) combine the markets of groups of developing countries and their capital, human and raw material resources.

18. The Panel is invited to consider the opportunities for developing this industry in the developing countries into small markets and suggest what topics need to be further investigated so that concrete suggestions can be made to the Consultation Meeting. In this connection, they may suggest how the production of basic petrochemicals, intermediates and final products could be distributed among a group of countries so that each has a share in the new employment and wealth created by the establishment of a vertically-integrated petrochemical industry on a co-operative basis.

19. The Panel may also wish to consider whether the larger developing countries who have established a petrochemical industry, can supply smaller developing countries with the basic and intermediate products which they require to produce final products. To facilitate the development of such trade it might be useful if joint ventures were formed to establish the processing industry in the small developing countries.

V. MAJOR TRENDS IN TECHNOLOGY USED IN THE PETROCHEMICAL INDUSTRY

20. The petrochemical industry is characterized by rapid technological change. It is, therefore, important for developing countries, when making new investments, to be aware of major trends in feedstocks technology. One possible development is the production of petrochemicals directly from crude oil without going through the intermediate production of naphtha. Some of the other possible developments within the next 25 years are considered in the draft UNIDO Study. There is also the possibility of using coal, wood fermentation, alcohol and other feedstocks which are an alternative to crude oil or natural gas.

21. The Panel is invited to consider other major technological trends, and indicate whether it would be useful to discuss this topic at the Consultation Meeting itself.

WORLD DEMAND FOR PETROCHEMICAL PRODUCTS 1975, 1985 AND 2000
(million tons)

	DEVELOPED COUNTRIES			DEVELOPING COUNTRIES			WORLD TOTAL			DEVELOPING COUNTRIES SHARE				
	Actual Forecast		Hypothesis	Actual Forecast		Hypothesis	Actual Forecast		Hypothesis	Actual Forecast		Hypothesis		
	1975	1985	2000	1975	1985	2000	1975	1985	2000	1975	1985	2000		
Plastics	34.0	101.3	196.5	130.1	47.1	62.4	38.4	120.3	243.6	192.5	11.5	15.8	19.3	32.4
Synthetic Fibres	5.9	12.6	36.8	23.9	14.3	21.7	7.5	18.6	51.1	45.6	21.8	32.2	28.0	47.6
Synthetic Rubber	6.5	10.1	22.8	16.9	6.4	7.6	7.4	12.8	29.2	24.5	11.9	21.0	21.9	31.0
Synthetic Detergents	8.6	12.7			4.5		10.8	17.2			20.5	26.2		
Ethylene	60.8	111.5	68.8	12.1	25.2	36.8	72.9	136.7	107.4					

Source: Draft UNIDO Study, December 1977 and Summary of the Draft UNIDO Study Annex 15.

Note: Hypothesis B for the year 2000 is based on economic growth rates assumed in **Leontieff's** Study - developed countries 4.5% per annum, developing countries 5.9% per annum.

Hypothesis A for the year 2000 is based on economic growth rates assumed in another UNIDO Study - developed countries 2.9% per annum, developing countries 6.8% per annum.

G - 664



78.11.03