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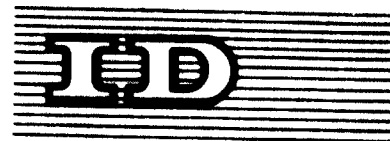
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THE PRESENT STATUS AND FUTURE PLANS
FOR DEVELOPMENT OF THE PLASTICS INDUSTRY
IN THE LIBYAN ARAB REPUBLIC 1/

by

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1. Introduction

Plastics and synthetic resins represent one of the most dynamic sectors of the petrochemical industry. The wide range of plastic materials that exist today, their versatility and low cost, the large number of ways in which they can be formulated and the almost inexhaustible supply of raw materials, have contributed to the growing demand for them throughout the world.

At present the production and consumption of plastics have surpassed that of basic non-ferrous metals such as zinc, copper, and aluminium, and as a group they represent the biggest outlet of the petrochemical industry after nitrogenous fertilizer.

In the developing countries plastics have already found a large number of end uses, particularly in the form of consumer goods, and they have also been used in conjunction with other materials in such areas as the building industry and in packaging.

In most cases the plastic processing industries of the developing countries need to import the petroleum based resins they use as raw materials from the more industrialized countries, and this involves the expenditure of important amounts of foreign exchange. As a result, some important industrial and construction applications of plastics have not yet been developed in these countries.

The Libyan Arab Republic as one of the developing countries has a few plastic industries which are based on the import of raw materials from various countries which are advanced in this field. But after the glorious revolution 1st September 1969, the Libyan Arab Republic went ahead earnestly with an industrial revolution in all respects of industry and amongst them the important petrochemical industry, which is considered as a basis for any plastic industry.

It is well known that the Libyan Arab Republic is one of the largest producers of crude oil and natural gas, and these raw materials are sources for establishing petrochemical industries and also plastic industries.

These steps and the following show scientifically possible ways , but should not be understood to be always commercially feasible.

Raw materials from petroleum (oil) for the plastic industry
Crude petroleum :

- | | |
|------------|---------------|
| 1) Methane | 5) Aromatic |
| 2) Ethane | Hydrocarbons |
| Ethylene | 6) Naphthanes |
| 3) Propane | |
| Propylene | |
| 4) Butanes | |
| Butylenes | |

PRODUCTS

- 1) Methane : Methyl alcohol
Formaldehyde
(Acetylene)
- 2) Ethylene : Ethyl benzene-styrene
Polyethylene
Ethylene dichloride-
vinyl chloride
Ethylene oxide-glycol
Acetaldehyde-acetic acid-
acetic anhydride
- Ethylene : Vinyl chloride
Vinyl acetate
Vinyl alcohol
Vinyl ethers
Vinyl acetylene-chloroprene-
neoprene
- 3) Propylene : isoPropylalcohol- Acetone
methylacrylates
Diphenylalpropane
Allylchloride - Epichlorhydrin
epoxides
- Glycerol
- Allylalcohol
Acrolein - Acrylonitrile
- Acrylates
- 4) Butylenes : n-Butylene Butadiene
iso-Butylene Poly-iso-butylene.

2. Imports of plastic materials into the Libyan Arab Republic during the year 1971.

Source : External Trade Statistics, 1971
Ministry of Planning
Census & Statistical Department

During the year 1971, the Libyan Arab Republic imported plastic materials at a total value of

Libyan Dinars 564,974

these imports were recorded c.i.f. Imported duties, internal taxes and the like were not included in the c.i.f. value.

Plastic materials (S.I.T.C. 581.000) were imported from various countries, the large majority however from Italy and the United Kingdom. Imports in decreasing order of value were as follows:

	Libyan Dinars
Italy	220,547
United Kingdom	109,153
Norway	76,207
West Germany	56,940
France	22,171
Greece	12,649
Japan	10,156
Marocco	9,926
Holland	8,078
U. S. A	6,067

	Libyan Dinars
People's Republic of China	5,618
Yugoslavia	5,191
Lebanon	4,863
Denmark	3,473
Belgium	3,081
Other countries	10,854

Total	564,974

3. Present status of plastic industries in the Libyan Arab Republic.

Presently there are four factories for the manufacture of plastic materials such as electrical installation pipes, household wares and other important items useful in our daily lives.

However most of the raw materials used in the industry such as polyethylene and P.V.C. are imported into the country.

Most of the factories are equipped with modern machinery and others are in the process of expansion and increase of production and diversification to satisfy the requirements of the local market.

Summary on the present plastic industries in the
Libyan Arab Republic

	Arab company for manufacturing plastic	Betamer factories for manufacturing plastic
1. Raw materials		
Polyethylene	213675 Kgs.	----
P.V.C	6850 Kgs.	----
2. Capacity during 1972		
	154000 Kgs. of polyethylene sacks	1200000 meter of electrical pipes
	632250 meter of electrical pipes	
3. Working shifts		
	3 shifts daily, each 8 hours.	Production stopped in 1970 for technical reasons and start again production in 1973
4. Type of production		
	Polyethylene sacks electrical pipes	electrical pipes
	Naser Edin Kafala Factory	Libyan Comp. for manufacturing plastic
1. Raw materials		
Polyethylene	40 tons	----
P.V.C	----	----
2. Capacity during 1972		
	1000 pails of plastic daily	2160 of dishes & cups of different sizes daily
3. Working shifts		
	1 shift daily each 8 hours.	one shift 8 hours daily
4. Type of production		
	pails of plastic	dishes & cups of diffe- rent sizes 5, 10, 25 liter

4. Raw material situation for plastics manufacture in the Libyan Arab Republic

Crude oil and natural gas are the essential raw materials for the petrochemical industries and in turn for the plastic industries, which are important to us in this report :

It is therefore very important to state some of the available information and data selected on this subject, to enable us to estimate the availability of the amount of the raw materials in the Libyan Arab Republic.

The total number of wells which have been drilled since the starting of the oil exploration, (since 13 years ago) are 2606 wells, of which 157 wells deliver oil.

The costs of exploration and drilling amounted to approximately Libyan Dinar 400 million up to 1969. These results were encouraging as the production of wells in all the oil field in the L.A.R reached 3.5 million barrels per day and the Libyan Arab Republic became competitive with other oil exporting countries.

The total amount of crude oil produced since the discovery of oil in the L.A.R from 1961 until 1969 was approximately 0.2 billion barrels of crude oil.

Daily production of crude oil January 1961 till 1969 in
the Libyan Arab Republic

Year	Daily Production in thousand barrels
1961	46,246
1962	179,482
1963	459,000
1964	862,000
1965	1,223,000
1966	1,504,000
1967	1,744,000
1968	2,600,000
1969	3,118,000

Natural gas Reserves Until end of 1972

1) Gas fields (non-associated gas)

These fields are found under preferential agreement No. (6), Total amount of available reserves until end of 1972 are equivalent to 4014.2 billion cubic feet of natural gas.

2) Field selected to preferential agreement 32/11

The total amount of available reserves until end of 1972 are equivalent to 784.5 billion cubic feet of gas.

3) Field related to preferential agreement No.-100

The total amount of available reserves until end of 1972 are equivalent to 3066.2 billion cubic feet of gas (non-associated gas)

4) Fields related to preferential agreement No.59.

The total amount of available reserves until end of 1972 are equivalent to 1023.2 billion cubic feet of associated gas.

5) Fields related to preferential agreement No.65.

The total amount of available associated gas reserves until end of 1972 are equivalent to 779 billion cubic feet of gas.

Summary of the project under the National Oil Organization in the field of petrochemicals.

Manufacture of natural gas.

First stage:

The first stage represents the direct conversion of natural gas into:

1. Ammonia Industry 1000 ton/day.
2. Methanal Industry 1000 ton/day.

Plans are being finalized to carry out this stage.

Second stage :

This stage represents the conversion of the products from the last first stage which are:

1. Fertilizer Industry.
2. Plastic Industry.
3. Synthetic fibers.

This stage is still under study and development.

Manufacture of Crude Oil

First stage

The aim of this stage is to produce the petrochemical materials in addition to other petroleum products which are:

1. Ethylene
2. Propylene.
3. Butadiene
4. Styrene.
5. Other raw materials which enter into secondary industries such as , insecticide, detergents, and dyes etc.

Second stage

Establishing of units for the manufacture of plastic and synthetic rubber from the raw materials of first stage.

The first stage and second stage are under study and development.

Fields of Plastic Industry

The National Oil Organization is undertaking the possibility for the manufacture of formaldehyde from methanol, where by it will be possible to produce the following plastic materials.

1. Phenolic plastic
2. Amino plastic
3. Acrylic plastic (esters)

Worthwhile to note that there is an important relation in the first stage of the manufacture of natural gas and the above types of plastics.

In the case of thermoplastics the National Oil Organization in the Libyan Arab Republic is looking for the production of the following:

1. Polyethylene.
2. Polypropylene.
3. Polyvinyl chloride.
4. Poly styrene.

It is worthwhile to note that there is an important relation in the first stage of crude oil production and above types of plastics.

5. The Libyan Government's policy in respect of the implementation of industrial projects.

The Revolutionary Government of the Libyan Arab Republic has set objectives for industrial development.

These principles for industrial development are:

- The national economy should depend on public ownership of the Libyan people and the private ownership of its individuals.
- Public and private sectors should co-operate towards economic development.

The public sector is being served by an Industrial Research Centre and a National Organization for Industrialization in order to assist in implementing industrial development. The function of the Industrial Research Centre is to render technical and economic services to all bodies which are interested in industry whether governmental or private. These services include investment, quantity and quality of production, productivity and expert advice in respect of the realisation of the targets of industrial development. The Centre also undertakes laboratory analysis, routine and special tests and applied research and experimental work in connection with the industrial production and its development.

The National Organization for Industrialization is considered the principal organ for implementing the development plan in this field and takes necessary measures to approve the projects, and then undertakes their implementation either by itself or jointly with others. The Organization will also provide the necessary management for industrial projects in the form of either independent units or companies.

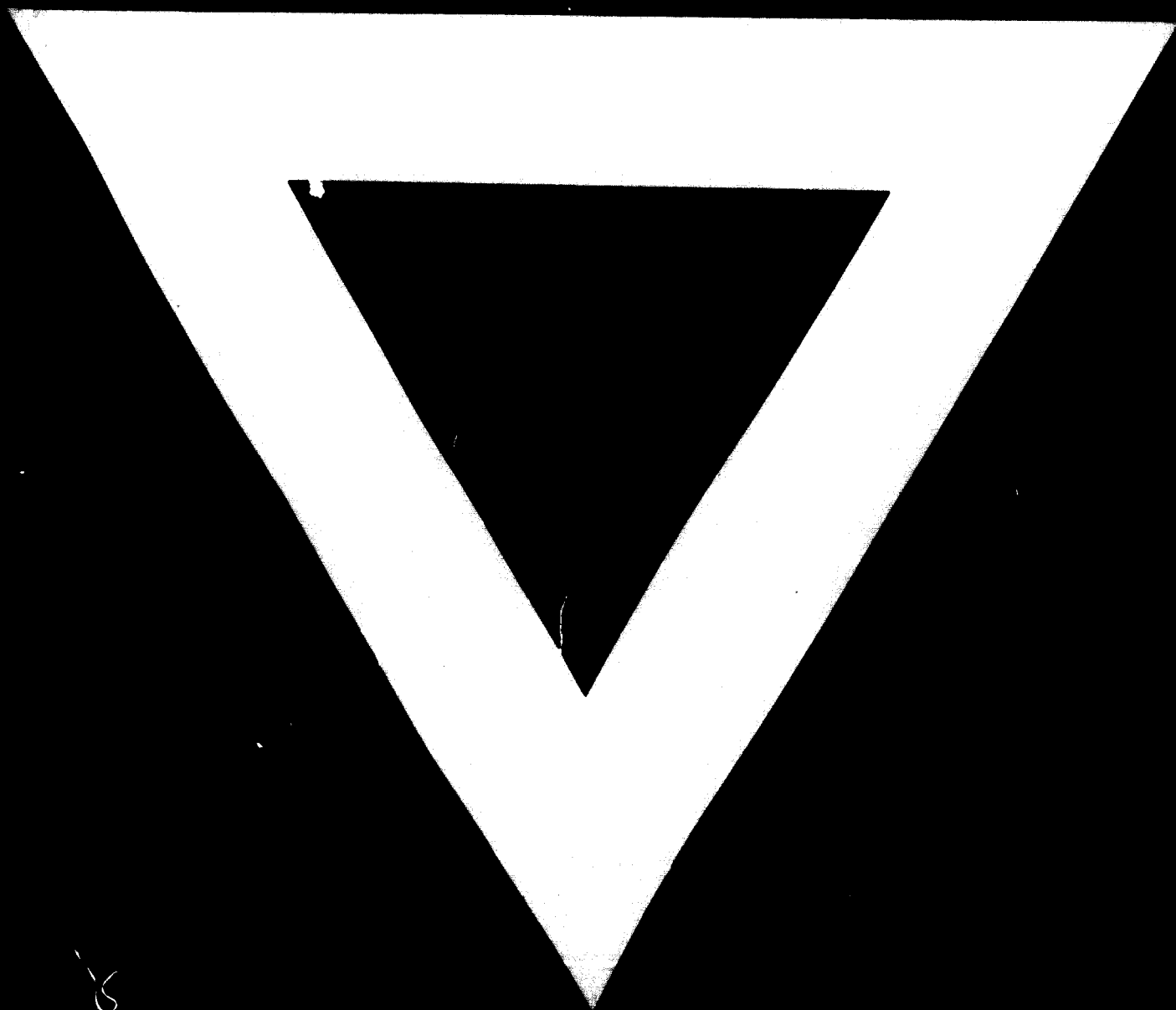
The participation of foreign capital in industrial projects will be allowed so long as it provides benefits to the Libyan Arab Republic. This participation is especially sought in projects of a complex technological nature which require maintaining good contacts with its mother industry in a developed country. It also applies for projects whose production exceeds the local consumption. In such cases

the participation of foreign capital assures the continuing provision of the local industry with modern developments, and offers the opportunity for co-operation with the specialized foreign companies in exporting the excess production to foreign markets.

A major problem in rapid industrial development is the shortage of skilled manpower. The Government of the Libyan Arab Republic, being aware of the importance of the human element for realizing the industrial progress, will give special attention to the recruitment and training of the manpower necessary for industrial projects. The Ministry of Industry will collaborate with the Ministry of Labour and Social Affairs in recruiting the necessary Libyan labour force and in its training.

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