CHAPTER - V
PETROCHEMICAL INDUSTRY IN KUWAIT

Primarily the wasteful flaring of associated natural gas and then upsurging influx of oil revenues emerged as problems to be solved prudently. In response, the Kuwaiti government evinced keen interest by evolving the strategy of diversifying and upgrading the value-added components of hydrocarbons. Refining of petroleum became the obvious initial start towards converting crude oil to value-added products. The large increase in the oil refinery capacity indicated a considerable increase in the availability of liquid feedstocks which in turn helped oil-based industrial strategy and, thus, gave an impetus to the development of petrochemical and other derivative industries. The following chapter encompasses the origin, development and a wide range of petrochemical industry. It has particularly pinpointed what efforts have been made by Kuwait in this direction.

The refinery products are either used directly to move machines, propellers and engines or some of the
chemicals and compounds produced in a refinery are destined for further processing as raw material feedstocks for the rapidly growing petrochemical industry, which is another more important and wide-ranging downstream operation of oil industry. A petrochemical industry is entirely based on petroleum products and natural gas. In other words, hydrocarbons from petroleum and natural gas account for most of the chemicals produced today. A petrochemical is, thus, a chemical compound which is obtained from petroleum or natural gas or derived from petroleum or natural gas hydrocarbons and utilized in chemical markets.

5.1 Emergence

Historically, petroleum industry received its chief impetus in 1913 from the development of thermal treating process by which crude oil was refined. The process yielded gaseous by-products that were first used only as illuminating gases or as fuel, but were

found useful as chemical raw materials in the 1920s and 1930s. The introduction of catalytic cracking in 1937 and increased supplies of natural gas brought further expansion of the industry. It developed parallel with the oil industry and has rapidly expanded since the 1940s, with the oil refining industry providing plentiful cheap raw materials. Since 1950s the petrochemical industry came up at a faster pace as its products are not only competing but also outperforming traditional materials, generally used in various sectors of the economy. The history of petrochemicals unfolds the records of migration of their production across the geographical locations. Though, the production of petrochemicals can be traced from the United States of America, migrated firstly to Western Europe then Japan and presently to the Centrally Planned Economies (CPEs), but nothing could


3. OPEC: *Basic Oil Industry Information, Vienna (Austria), 1983, p.33.*
preclude its shifting to the West Asian region. The countries of the region, particularly of Arabian Gulf, have not only provided the petrochemical industry a "natural-abode" but the cost advantage as well. The capital cost of the products in the region is very high, however, it can be levelled up by the low variable cost of production. The petrochemical industries were located in Western Europe, Japan, United States and the CPEs as the technological innovations took place but the overcapacity of production and the economic inefficiency and vulnerability of the projects gave way to the petrochemical industries to be relocated in the states of Arabian Gulf. The Arab Gulf states have very little experience with the production of petrochemical products since there is wide gap between the production of crude oil and the development of


5. Ibid; p.49.
petrochemical industries in the region. Kuwait's successful efforts to establish the petrochemical industry by using its associated natural gas is unprecedented in the entire region. Kuwait began its industry by producing fertilizers in 1966 followed by Saudi Arabia where it set out in 1970 and the subsequent installations of projects in other Gulf states.\textsuperscript{6}

5.2 Classification

The petrochemical production is highly technological, automated and typically using large scale continuous process. Although it is difficult to classify the whole range of petrochemicals but to indentify the basic products, the production can be analysed by putting it into three broad catagories which further based on their derivatives as\textsuperscript{7}:

\textsuperscript{6} Ibid; pp.49-50.

\textsuperscript{7} Ibid; p.48.
I - Olefins:
- Ethylene
- Propylene
- Butene/Butadiene

II - Aromatics:
- Benzene
- Toluene
- Xylene

III - Methanol:

IV - Ammonia and Urea:

Although the petrochemical industry produces a variety of products which are thousands in number but it is difficult rather impossible to produce all the products despite their utmost usefulness as substitutes for steel, aluminium, wood, paper, natural fibers and rubber etc. The country enjoys as much profits as that expands its industry to cover a larger range of

products. The basic petrochemical products and their derivatives have to pass through the three main processing plants to be used for final consumption; they are - Steam Cracker for olefins, Catalytic Reformer for aromatics, and the Steam Reformer for methanol and ammonia. The refinery products used in synthesizing basic petrochemicals are - ethan, liquified petroleum gas, condensate, and gasoline for olefins through steam cracking, neptha for processing aromatics through catalytic reforming and synthesizing olefins through steam cracking, and methane or any other hydrocarbon for methanol and ammonia through steam refining. The processing chains from basic to final products are innumerable and complex. However, a few chains dominate and are used for final consumption as follows:

10. Ibid; p.48.
I - Olefin and its derivatives are important in the making of plastics, resins, polyester fibers, paints, varnishes, pharmaceuticals, insecticides, solvents and chemical reagents and polyethylene for films and many other productions.

II - Aromatics: refer to only three- benzene, toluene and xylene that is why the processing units designed to produce aromatics are often referred to as "BTX" units. Aromatics, unlike the olefins, are not manufactured but rather extracted from various product steams in a refinery. The aromatics are seperately significant to produce many final products as:

i - Benzene: is important in the manufacturing of many chemical reagents, in dyes, insecticides, detergents, styrofoams, polyurethanes, and synthetic fibers.

ii - Toluene: is needed to produce glues, explosives, plastics, and pharmaceuticals.

iii - Xylenes: are generally used in plastics, resins, and synthetic fibers.
## STRUCTURE OF PETROCHEMICAL INDUSTRY

<table>
<thead>
<tr>
<th>Feedstock</th>
<th>Process Plant</th>
<th>Primary Product</th>
<th>Final Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane</td>
<td>LPG (\rightarrow) Steam Cracker (\rightarrow)</td>
<td>OLEFINs</td>
<td>Plastics</td>
</tr>
<tr>
<td>LPG</td>
<td>Propylene</td>
<td>Paints/Varishes</td>
<td>Fibres/Textiles</td>
</tr>
<tr>
<td>Condensate</td>
<td>Butene/Butadien</td>
<td>Rasins</td>
<td>Pharmaceuticals</td>
</tr>
<tr>
<td>Gas Oil</td>
<td></td>
<td>Insecticides</td>
<td></td>
</tr>
<tr>
<td>Naptha</td>
<td>Catalytic Reformer</td>
<td>AROMATICS (BTX)</td>
<td>Plastics</td>
</tr>
<tr>
<td></td>
<td>Toluene</td>
<td>Benzene</td>
<td>Paints</td>
</tr>
<tr>
<td></td>
<td>Xylene</td>
<td></td>
<td>Detergents</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Styrofoams</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Synthetic Fibres</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pharmaceuticals</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pesticides</td>
</tr>
<tr>
<td>Methane</td>
<td>METHANOL</td>
<td>Ammonia</td>
<td>Plastics</td>
</tr>
<tr>
<td>or any</td>
<td></td>
<td>Urea</td>
<td>Fibres</td>
</tr>
<tr>
<td>Hydrocarbon and Shift</td>
<td></td>
<td></td>
<td>Fuels</td>
</tr>
</tbody>
</table>

III- Methanol: is either directly produced by catalytic treatment of methane, or by hydrogenation of carbon monoxide in a synthesis gas section. It is the simplest form of alcohols. It is primarily used in the making of formaldehyde to further manufacture the adhesives.

IV - Ammonia and Urea: Apart from these, ammonia and urea are the basic agricultural chemicals. Ammonia is also consumed in the production of a wide variety of nitrogen containing petrochemicals whereas urea is the basic product of urea-formaldehyde and other plastic materials. Ammonia is generally produced from steam-reforming of methane whereas urea is manufactured by reacting ammonia with carbon-dioxide.

Although, the detailed explanation of the entire process is scientific and out of the scope of the study but a clear picture is discernible from the structure.

5.3 Development Impetus

Prior to the year 1973, there was no integrated
petrochemical industry in terms of economic production in the Arab Gulf states to produce simple forms of plastic and rubber products from imported petrochemicals. But a rapid expansion in the construction of petrochemical projects and complexes during 1970s and early 1980s took place in the region. During this period, the petrochemical industry enjoyed higher profits (with higher prices) even when crude oil prices were rising. The installed production capacity of ethylene, the most important basic petrochemical, increased in the region from zero to 2.5 million tons per year by 1985, and the installed production capacity of methanol rose to more than 2 million tons in the same year as compared to zero in 1976. The petrochemical industries in USA, Europe and Japan suffered heavy losses due to massive over-capacity at a time of the falling demand, during the recession following the 1977-80 oil price adjustment. This opened up the opportunities for the Gulf states as well.

as for Canada who embarked on expansion programme\textsuperscript{13}. Developments in the region are based on steam-cracking of ethane to ethylene and the production of ethylene derivatives. There were no propylene or higher olefin projects nor any aromatic project by 1986 as a reason that these products require propane, butane, naptha or heavier feedstocks from the refinery/gas plants. All these heavier feedstocks have an alternative value since they can be put on a ship and sold overseas. But in contrary, the light components, i.e., methane and ethane, can not be readily shipped out so there is an incentive to use them domestically. As a result major investments have occurred in methane to methanol and ammonia/urea in almost all the Arab Gulf states\textsuperscript{14}.

Therefore, Kuwait made tremendous efforts in the direction of petrochemicals as it increased the capacity of its industry. The huge inflow of revenues, accruing to Kuwait and other West Asian countries as a

\textsuperscript{13} OPEC Bulletin (Vienna); Vol.18, No.9, Nov.1987, p.10.

\textsuperscript{14} Ibid; p.12.
result of skyrocketing of oil prices in the 1970s, induced them to make heavy investments for the establishment and development of petrochemical industries. Kuwait and other states of the region endowed with abundant oil and associated natural gas resources preferred to construct this gas-based industry owing to the low cost of feedstock output of their national refineries and the easy access to the matured technology available in the market for their products. The beginning of the industry in Kuwait and other nations was nothing but their realization of profusely flaring of their associated natural gas. The growing concern for this wasteful flaring and increasing awareness about the chemical and fuel importance of natural gas, after the upsurge in oil and consequently gas prices in the early seventies, Kuwait and other nations realized the value of their indigenous resources and it led them to make optimum use of natural gas by converting it into manufacturing

value added. The adoption of oil conservation policy in 1972, thus, proved fruitful not merely in keeping the oil reserves but associated natural gas reserves too in their original reservoirs beneath the earth. Moreover, this reduced the wasteful flaring of gas in Kuwait. The establishment and development of petrochemical industry in Kuwait proved to be a rational choice of its government since production of many petrochemical products within the country had the comparative cost advantage on the following factors:

i - Kuwait is endowed with abundant cheap raw materials to feed the plants and cheap fuel to run them.

ii - profundity of available capital at a low rate of interest which is considered one of the important factors to be employed in building up a large petrochemical complex that exceeds a billion dollars.

iii - Kuwait's ability to install a large scale

petrochemical complex in order to maximize the profits inherent in the large scale production. It is also substantiated from the fact that in business economics, doubling the capacity of a plant does not mean the same of its cost. The parameter is that generally 40 per cent of the total cost of the plant may be saved in case its production capacity is doubled. Moreover, the petrochemical industry is low labour intensive that matched favourably. Kuwaiti government's decision of undertaking such a venture which requires enormous funds but does not absorb more workers that Kuwait might look for expatriates. In addition, Kuwait could, thus, enlarge the chain of value added in its resource oriented products, by processing its indigenous raw materials, and diversify the channels of distribution.

The petrochemical industry in Kuwait is managed and controlled by the Petrochemical Industries Company

17. Ibid; p.132.
(PIC), presently a subsidiary of Kuwait Petroleum Corporation. It was founded in July 18, 1963 with a capital of KD 32 millions of which 89.5 per cent was contributed by the state, 5 per cent by Kuwait National Petroleum Company, and remaining 5.5 per cent by the private sector. This company created the Kuwait chemical Fertilizer Company (KCFC) on March 18, 1964 and retained a 60 per cent of its shares itself while the rest of the shares were equally and jointly owned by the Gulf Oil Corporation and British Petroleum respectively. The KCFC was assigned the responsibility of construction and operations of a nitrogenous fertilizer plant (Plant-A) at Shuaiba. Comprising four units of urea, ammonia, ammonium sulfate and sulfuric acid, the plant went on stream in 1966 as the beginning of petrochemical production in Kuwait. In 1973, the KCFC's shares retained by the Gulf Oil and B.P. were purchased by and merged with PIC. The government, in

18. F.M.A. Arab World File, (Beirut); No. 2568, March 26, 1986.

19. Ibid;
October 1974, divided PIC into three main following departments for the administrative and operation efficiency.

i. Head Office,

ii. Fertilizer Unit, and

iii. Salt and Chlorine Unit.

The Kuwaiti government increased its share in the ownership of PIC to 94.6 per cent in 1975 but gained full control (100% including 5% holding of KNPC) as it was nationalized on 18 March, 1976. Its assets were, in January 1980, transferred to KPC.

5.4 Objectives

The objectives of PIC were set as the establishment of petrochemical industry which would use associated natural gas, oil products and salt in the production of ammonia, acetylene, chlorine, urea, PVC, caustic soda and its derivatives and other petrochemicals. Since the entire upstream and

20. Ibid;

21. Ibid;
downstream operations of hydrocarbon industry came under complete government's control in 1975, Kuwait's endeavour in the direction of petrochemicals went on worth commendable as truly reflected by the views of Mr. Mohammad Madwah, the Assistant Under Secretary of the Ministry of Commerce and Industry of Kuwait as:

"It is Kuwait's destiny to concentrate on petrochemical industries because they are highly profitable and are capital rather than labour intensive." 22

Hence, in order to fulfill the ambitions the state has stressed upon the expansion of the capacity of various plants. The increase in the production and the capacity of various petrochemical plants and also the development in export are discernible from the table-5.1.

5.5 Production

It is evident from the table that the production of certain basic petrochemicals, in which Kuwait took-

22. MEES; Vol.XIX, No.36, June 28, 1976, p.3.
Table 5.1

Production and Export of Petrochemical Products
(In Million Tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Urea</th>
<th>Ammonia</th>
<th>Sulphuric Acid</th>
<th>Ammonium Sulphate</th>
<th>Urea</th>
<th>Ammonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>182.2</td>
<td>160.9</td>
<td>55.4</td>
<td>71.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1972</td>
<td>514.0</td>
<td>387.0</td>
<td>79.0</td>
<td>92.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1973</td>
<td>580.0</td>
<td>482.0</td>
<td>103.0</td>
<td>119.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1974</td>
<td>542.0</td>
<td>508.0</td>
<td>99.0</td>
<td>109.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1975</td>
<td>554.3</td>
<td>522.7</td>
<td>85.0</td>
<td>98.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1976</td>
<td>520.0</td>
<td>510.0</td>
<td>5.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1977</td>
<td>550.1</td>
<td>487.9</td>
<td>0.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1978</td>
<td>668.2</td>
<td>522.9</td>
<td>-</td>
<td>-</td>
<td>690.9</td>
<td>132.5</td>
</tr>
<tr>
<td>1979</td>
<td>674.1</td>
<td>502.0</td>
<td>17.8</td>
<td>-</td>
<td>626.1</td>
<td>106.3</td>
</tr>
<tr>
<td>1980</td>
<td>486.0</td>
<td>395.8</td>
<td>5.3</td>
<td>-</td>
<td>514.1</td>
<td>56.0</td>
</tr>
<tr>
<td>1981</td>
<td>436.2</td>
<td>414.3</td>
<td>9.0</td>
<td>-</td>
<td>451.1</td>
<td>148.0</td>
</tr>
<tr>
<td>1982</td>
<td>441.7</td>
<td>355.0</td>
<td>3.6</td>
<td>-</td>
<td>471.6</td>
<td>81.0</td>
</tr>
<tr>
<td>1983</td>
<td>548.9</td>
<td>356.8</td>
<td>3.5</td>
<td>-</td>
<td>540.7</td>
<td>58.0</td>
</tr>
<tr>
<td>1984</td>
<td>595.1</td>
<td>416.4</td>
<td>4.6</td>
<td>-</td>
<td>580.2</td>
<td>71.0</td>
</tr>
</tbody>
</table>

Source: (i) Central Bank of Kuwait: Economic Report for 1979
(ii) F.M.A. Arab World File: Beirut (Lebanon), 26 March 1986
No. 2568/Kwt-1808/1.
off, has gone up from its level of 1971. The production of urea, ammonium sulphate and sulfuric acid increased by 218.3 per cent, 67.3 per cent and 85.9 per cent respectively in 1973 as compared with 1971, but declined in 1974 due to some operating difficulties whereas the production of ammonia continued rising from its 1971 level of 160.9 million tons\textsuperscript{23}. The output of urea, ammonium sulphate and sulfuric acid recovered in 1975 and the production of ammonia continued rising further as well. But in the following year, the aggregate production including ammonia declined as a result of over supply on account of certain factors such as—temporary shut down of the urea plant for increasing its daily production capacity, closing-down of most production units during April owing to the bad weather conditions and sand storms, the slackening world demand for fertilizers following the world economic recession, and the new fertilizer plant set up in several other countries\textsuperscript{24}. The increase in


\textsuperscript{24} Ibid; p. 41.
production in the 1970s was noticed as a result of the establishment of second fertilizer plant (plant-B) at Shuaiba which comprises two units of 640 tons per day capacity, and two ammonia units of 800 tons per day capacity. All these units were designed and built by Danish and Italian companies by March 1972. The output of urea, ammonia and sulfuric acid kept rising by 1979 but slight variations occurred meanwhile following the modernization of plants. The temporary suspension of oil and products supplies due to the outbreak of Iran-Iraq war coincided with prevailing recessionary trend in the industrial world pushed the demand for petrochemicals downward during 1979-80. Since the PIC petrochemical plant's (Plant-A) ammonia unit was to become obsolete by 1981, it added another ammonia unit of 1000 tons a day capacity in 'Plant B'. This unit was designed by the Danish company for the cost of KD 30 million and went on stream in 1982. Though, since 1980, PIC increased the number of fertilizer units but these

units operated well below their respective installed capacities (averaging 60 per cent) on account of a drop in Kuwait's production of natural gas, which is used as a main raw material in these plants, during 1980-85. Moreover, the ammonium sulphate unit was closed down due to the drop in the world prices for this product.26.

The small quantities of urea say 12000 tons and 23000 tons in 1983-84 and 1984-85 respectively delivered to the melamine plants and the rest of the total output exported to mainly the Asian countries. Similarly the very limited quantity of ammonia also exported to the Asian countries. A part from these, PIC also has the plants to produce salt, chlorine, and caustic soda of which output increased from 34000 tons in 1978 to 41000 tons in 1984-85 and the sales, mostly in the domestic markets, reached to 22700 tons in the same year.27.

26. Ibid;

27. Ibid;
5.6 Operating Plants

The entire chain of petrochemicals in Kuwait depends on two major plants which comprise the various units to produce different fertilizer products. The table-5.2 illustrates the current respective capacities of units and the division of plants as has also shown in the figure 5.1. This is discernible from the table that most of the petrochemical units are based on two plants, Plant-A and Plant-B. The total current production capacity of both the plants is 6350 tons per day which is an indication of progress in the field of petrochemicals. In addition, there are salt and chlorine plants in Kuwait which are also undertaken by PIC. Two units of salt and Chlorine were first incorporated to Shwaikh Plant by PIC in 1974 followed by inclusion of 30 tons per day capacity caustic soda production unit. Thus, the annual production capacity of the plant rose to 18600 tons of salt, 9800 tons of chlorine and 11050 tons of caustic soda. But PIC further expanded its capacity by contracting a Japanese firm to build more units of production of these
Table - 5.2

Petrochemical Products, Units and their Capacity in 1988

<table>
<thead>
<tr>
<th>Product</th>
<th>Capacity</th>
<th>No. of</th>
<th>Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>2000</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>Ammonia</td>
<td>1000</td>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>Urea</td>
<td>1400</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>Urea</td>
<td>1000</td>
<td>1</td>
<td>B</td>
</tr>
<tr>
<td>Sulphuric Acid</td>
<td>400</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>Ammonium Sulfate</td>
<td>550</td>
<td>1</td>
<td>A</td>
</tr>
</tbody>
</table>

Source: (1) *F.M.A. Arab World File*, Beirut, (Lebnon), 26 March 1986, No.2568/Kwt-1808/1.


Figure 5.1

Capacity of Petrochemical Units in Kuwait

Tons Per Day

Value in % Term
petrochemicals at the costs of KD 3.6 million and KD 3 million respectively. This resulted into a new factory consisting units of chlorine, caustic soda and salt production and increase in total capacity to 75 tons, 84 tons, and 150 tons per day respectively.\textsuperscript{28}

The PIC has also spent KD 10 million in 1977 for building a melamine and ammonia dioxide plant of 15000 tons and 37000 ton per year respective capacities which went on stream in 1980. This factory, which has been constructed by Eurotecnica (Italy) using an allied chemical (USA) process, receiving technical assistance and project management from Seret (France), is owned by Kuwait Melamine Industries Company in which PIC holds 40 per cent and Kuwaiti private sector 60 per cent shares. This plant can use 50000 tons per year of urea supplied by the PIC when at its full capacity.\textsuperscript{29}

Apart from these ventures, the PIC in 1985, contracted C.F.Braun, a subsidiary of Santa Fe International which

\textsuperscript{28} Ibid;
\textsuperscript{29} Ibid;
is itself owned by KPC, for two projects one for production 60,000 tons per year of Propylene and another for 32,000 tons per year of Polystyrene for the total costs of $8 million and $38 million respectively. Both the plants were proposed to be built at Shuaiba and scheduled to be completed in 1988. Moreover, a synthetic resin plant has also been proposed to be built at Shuaiba for the production of 11,500 tons per year of synthetic resins which would further be used as a feed stock in the domestic paint and glass factories.

5.7 Overseas Holdings

Kuwait, apart from making huge sums of investments at home, has a number of joint ventures abroad as well. The plants held abroad by the PIC are as following:

i - Mediterranean Fertilizer Industries Company: in which PIC holds 47.25 per cent shares while the

rests are held by Turkey, was founded at Mersin (Turkey) in 1967 and went on stream in 1972. It has the capacity to produce 600 tons a day of diammonium phosphate (DAP), 215 tons a day of phosphoric acid, 600 tons a day of sulfuric acid, 1,100 tons a day of nitric acid and 1,800 tons a day of calcic ammonium nitrate. In 1985, company’s profits had gone up to $6 million, an increase of 34.6 per cent over the preceding year’s figure.\(^{31}\)

**ii - Gulf Petrochemical Industries Company (GPIC):** It is a $159 million (BD 60 million) joint venture between PIC (Kuwait), Banoco (Bahrain) and Sabic (Saudi Arabia), in which each company holds 1/3 of the total capital was established at Sitra (Bahrain) in May 1980. The plant comprising two units of methanol and ammonia each of 1,000 tons a day production capacity began operating in July 1985.\(^{32}\)

**iii - Phosphate and Fertilizer Plant in Tunisia:** this

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31. Ibid;

32. Ibid;
plant was commissioned in 1986 to produce 173,000 metric tons of diammonium phosphate (DAP), 37,000 metric tons of compound fertilizers (NPK), and 13,000 metric tons of nonammonium phosphate (NAP) fertilizers.

iv - Turkish Arab Fertilizer Company (TAGS): in which the PIC hold 25 per cent shares in a $70 million project, was established at Mersin (Turkey) in January 1986. The plant comprises three units of a total capacity of 4100 tons a day, to produce 1500 tons a day of ammonium nitrate, 1400 tons a day of diammonium phosphate (DAP) and 1200 tons a day of nitric acid. This fertilizer plant uses ammonia and phosphoric acid supplied by the PIC and Tunisia respectively.

v - The Sino Arab Chemical Fertilizer Company (SACF): The PIC has 30 per cent shares in a $15 million project, was created in 1985. The fertilizer

complex was built in China to produce 480,000 tons per year of diammonium phosphate (DAP), and 600,000 tons per year of NPK compound fertilizers, using phosphoric acid supplied by Kuwait-Tunisian Company. The project was due to be completed by the year 1988. 

Besides these, the contracts are still proceeding between the PIC and the Chinese and Korean companies to build a plant of 500,000 tons a year capacity to produce ammonia using the natural gas at Hainan Island in South China.

Although, the work is going on with rapid strides in order to enlarge the chain of petrochemicals but, the production of ammonia, ethylene and methanol has greatly been emphasised due to the high methane and ethane contents of associated natural gas and also to the relatively simple technology required. During 1970-85, a number of petrochemical projects were undertaken in

35. Ibid;
order to boost up the production capacity of the various units to meet the huge world demand. These units have provided the host nations of the Arab Gulf a competitive position, as regard to the cost and quality of the products in Europe and Japan. The emergence of the petrochemical industry in Kuwait and other West Asian states was soundly based, capitalizing new avenues provided by the low cost raw materials, fuel and abundant associated natural gas besides the favourable market condition. It not only opened a pocket to absorb the country’s present potential reserves but also founded a basis for the future developments. Kuwait’s efforts in this direction truly reflect the views of its Oil Minister H.E. Sheikh Ali Al-Khalifa al-Sabah:

"Country’s petrochemical industry 'is mainly designed to produce basic building blocks....in order to encourage Kuwaiti industrialists to go into the intermediate and final petrochemical industries..... Manufacturing of final products, would ‘satisfy the
expanding domestic market and thereby provide an outlet, small though it may be, for part of our production of petrochemical building blocks".

The government's plans in this regard are, thus, looking to be proved. The petrochemical industry, if is unlike other industries which absorb a substantial part of manpower, provides avenues to the oil refining and natural gas industries to come up and its development proves to be influential for the progress of the oil industries as a whole. The rapidity of development of this industry can be well matched with the progress of natural gas industry. It is discernible from the table-5.3 that the wasteful flaring of associated natural gas in Kuwait has been reduced tremendously which indicates the increase in the level of its utilization, thus, the comparative cost advantage to the Kuwaiti petrochemical industry is also obvious.

Therefore, the petrochemical industry was Kuwait's rational choice as to fulfil its economic planning in

order to develop its pre-established oil industry that a future base for its present and comming generations may be built up. By establishing the petrochemical industry Kuwait, thus, not only made a precedence in this direction but also opened up the avenues for future cooperation and development amongst the countries of the region and therefore linked it with other developed and developing countries of the world.

This is an undeniable fact that crude oil by itself, due to being an unrefined form of hydrocarbons, does not have direct application. It was initially confined to serve a very few purposes but its usefulness proved greatly with the introduction of combustion engine. The value of crude oil is realized only after its processing and catalysis in refining and petrochemical industries which add its value by cracking its various components and process them with different chemicals and thus produce numerous end-products. Kuwait like other Gulf oil states endowed with abundant crude oil and associated natural gas
Table 5.3

Production and Utilization of Natural Gas
(In Million Cubic Meters)

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Utilization</th>
<th>Utilization as % of Prod</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>643710</td>
<td>227503</td>
<td>35.3</td>
</tr>
<tr>
<td>1972</td>
<td>647812</td>
<td>246846</td>
<td>38.1</td>
</tr>
<tr>
<td>1973</td>
<td>581067</td>
<td>265101</td>
<td>45.6</td>
</tr>
<tr>
<td>1974</td>
<td>466939</td>
<td>251452</td>
<td>53.9</td>
</tr>
<tr>
<td>1975</td>
<td>382362</td>
<td>226012</td>
<td>59.1</td>
</tr>
<tr>
<td>1976</td>
<td>395786</td>
<td>243753</td>
<td>61.6</td>
</tr>
<tr>
<td>1977</td>
<td>362623</td>
<td>245257</td>
<td>67.6</td>
</tr>
<tr>
<td>1978</td>
<td>392781</td>
<td>242765</td>
<td>61.8</td>
</tr>
<tr>
<td>1979</td>
<td>460376</td>
<td>334362</td>
<td>72.6</td>
</tr>
<tr>
<td>1980</td>
<td>310066</td>
<td>260039</td>
<td>83.9</td>
</tr>
<tr>
<td>1981</td>
<td>223822</td>
<td>196352</td>
<td>87.7</td>
</tr>
<tr>
<td>1982</td>
<td>162728</td>
<td>145853</td>
<td>89.6</td>
</tr>
<tr>
<td>1983</td>
<td>191870</td>
<td>170775</td>
<td>89.0</td>
</tr>
<tr>
<td>1984</td>
<td>205410</td>
<td>183445</td>
<td>89.3</td>
</tr>
<tr>
<td>1985</td>
<td>205941</td>
<td>178935</td>
<td>86.9</td>
</tr>
</tbody>
</table>


Figure 5.2
Production & Utilization of Natural Gas

![Graph showing production and utilization of natural gas from 1971 to 1985.](image-url)
reserves provide a natural abode to the refining and petrochemical industries.

The establishment of petrochemical industry, thus, appears as rationale since Kuwait, despite being lacking of adequate indigenous human resource, is privileged with the access of cheap and abundant raw materials as well as fuel oil and gas which are prerequisites to take-off in this direction. The efforts made by Kuwait on these lines were unprecedented and made seriously particularly through its five year programme which commenced soon after the nationalization of oil industry. But they prove futile when the volume of a very few petrochemicals produced domestically is taken up for export and does not have an influential impact on the demand or supply in international market.

Hence it is desirable and suggested that Kuwait should take rapid but solid strides in order to expand the chain of petrochemical products domestically that it may turn out to be a concrete viable economic base. The chain of petrochemicals is large enough and,
therefore, provide Kuwait for a wide competitive filed where it can outcast the products even of industrially advanced countries.