2.1. ISLAMIC REPUBLIC OF IRAN

2.1.1. Physical Features

The Islamic Republic of Iran, a country, in South Western Asia, lying between latitude 25° N and 40° N and longitude 44° E and 63° E, is bounded North by the former U.S.S.R. and Caspian Sea, East by Afghanistan and Pakistan; South by the Persian Gulf and the Gulf of Oman; and West by Iraq and Turkey. In 1935 the then Iranian Government asked foreign governments to use "Iran" as the name of the state instead of "Persia". Although on October 25th 1949, the Iranian Government stated it would no longer insist on this, "Iran" remained in common use. The total area is 1,648,158 Sq. Km with density of 31.4 per Sq. Km. The length of borders with neighboring countries is shown in Table 2.1. (MAP 2.1).

(TABLE 2.1)

IR IRAN AND THE NEIGHBORING COUNTRIES

(Figures in Sq. Km.)

<table>
<thead>
<tr>
<th>Iran Pakistan</th>
<th>Iran Pakistan</th>
<th>Iran Pakistan</th>
<th>Iran Pakistan</th>
<th>Iran Pakistan</th>
<th>Northern Water Boundaries</th>
<th>Southern Water Boundaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>830</td>
<td>850</td>
<td>1740</td>
<td>470</td>
<td>1280</td>
<td>630</td>
<td>1880</td>
</tr>
</tbody>
</table>

Source: Statistical Centre of Iran, March 1986, P. 3.

2.1.2. Relief and Drainage

Most of Iran is an upland which consists of Central Plateau and a high mountainous fringe marking it off from surrounding lowlands. The fringing mountain chains are of considerable width in the west and south-west, called Zagros, and from an average elevation of
8,000-10,000 Ft. rise to 12,000-13,000 Ft. in several places. The Northern fringe is narrow in its Western Part. Valleys and depressions generally lose in elevation from the north west to the South east, descending from about 4,000-6,000 Ft. to 1,500 Ft. and even less than 1,000 Ft. The largest depressions are:

1) The Dasht-e-Lut
2) Southern Dasht-e-Lut
3) The Jaz Murian Basing
4) The Isfahan-Sirjan Valley.

Important rivers of the northern slopes are Aras, Safid Rud (which with its main branch, Qezel Owzan, completely separates the catchment basin of Lake Rezaiyeh, or Urmia, from the main basin of Iran), and the Atrak; of the Western and South Western slopes of Karkheh, Dez, Karun and Mandi of the interior the Qareh Su of Saveh, Rud-e-Qum, Zayandeh Rud of Isfahan, Kar Kalshur of Birjand and Kalshur of Khurasan.

2.1.3. Climate

The climate is subtropical and continental in character. The summer is long, hot and except for the humid coast lands, extremely dry. Northern winds prevail. Tehran (altitude 4,000 Ft. or 1,220 m) has a July mean temperature of 29 C (84 F). Daily maxima reach 43-46 C (110-115 F) in July and August, but nights are mostly cool. Above 6,000-7,000 Ft. the summers are pleasant, and the Iranians call this zone Sardisir, or the cool land; it attracts in summer not only the flocks but also many people from the hot regions, especially, the southern lowlands (the Garmisir, or warm land). Which suffer from fierce heat. Ahvaz in July and August has mean temperatures of 38 C (100 F) with maxima exceeding 49 C (120 F). The Gulf parts are slightly cooler but most of the time are oppressively humid.

The transitional seasons are normally short. Autumn is especially agreeable on the plateau while spring is delayed, cool, and wet in the northern and western uplands. In winter there is an inflow of cold, dry-air from Central Asia through the gaps of Khurasan. Other sources of intensely cold air are the North Western plateaus. Azerbaijan is probably the coldest province (the January mean temperature at Tabriz, 4,600 ft., is 29 F. with a minimum well below 0 F).
Frost, often severe, is experienced everywhere except in Garmsir, up to 4,000 ft. In winter wandering depression bring in mild and humid air from the Mediterranean eastward over Iran, and the clash of air masses causes heavy snowfalls in the north and west and rainstorms in the south. Precipitation in the South is strictly limited to the winter while in the northern and western uplands it rains until April and even May. These are the regions where cultivation is feasible upon rainfall alone. They usually receive over 12 inches (305 mm) whereas the higher parts of the Zagros receive 20-30 inches (508 to 762 mm). The Caspian slopes of the Elburz have an annual rainfall of more than 40 inches the Khurasan ranges barely 20 inches. The lowest of the arid interior basins, the great Kavir, Lut, and Seistan, receive less than 20 inches and at Bushire from below 2 inches to more than 26 inches. Permanent snow and glaciers can be found on the highest summits in the Elburz and Zagros mountains. Elsewhere the thaw begins in March or April, freeing the pastures for annual migration of the pastoral tribes and filling the streams with water for irrigation.
Soils are deep and fertile over extensive areas although subject to chronic erosion in places. The Caspian coast lands, the Mesopotamian plain and the Valleys of the interior are all endowed with comparatively fragile but cultivable soils. Land and water resources are not used to the full (Table 2.2). Only a fraction of total available land is tapped for agriculture, leaving scope for large scale reclamation at the extensive margin, while cultivation on existing agricultural land could be intensified through more widespread and effective use of water resources.

2.2. POPULATION AND LABOUR FORCE

According to the Fourth General Census, which took place in 1986, the population of Islamic Republic of Iran was estimated at 49,857,384 showing an increase of 4 per cent over the preceding year (Table 2.3). A review of the population of the country shows the urban population to be 26.9 million (54.3 per cent) and the rural population 22.9 million (45.7 per cent) Comparing with figures of 1985 the population of the urban and rural area increased 5.5 per cent and 2.5 per cent respectively, which indicates the continued trend of migration from rural to urban areas. The economically active population of the country during 1986 was estimated at over the preceding year. The total number of unemployed was 1.8 million in 1986.
The surface area of Iran is some 1,648,000 Km², which supports 56.15 million people (EIU estimate for 1990)² giving a population density of 34 per km². Population growth rates are disputed but it would seem most likely that Iran’s population boom took place later than those of other states in the region.

2.2.1. Population Growth and Life Expectancy

Intensive growth started in the late 1960s and 1970s when it is estimated that the population rose by some 3 per cent a year. In the ten year up to the 1986 census, annual average growth was 3.7 per cent. However, according to the latest figure published by the Government of IR Iran, following the steps taken by the Government to control the population growth, the annual average growth has reduced to 2.7 per cent in 1987³

**TABLE 2.3**

CHARACTERISTICS OF THE POPULATION

<table>
<thead>
<tr>
<th></th>
<th>1986</th>
<th>Percentage</th>
<th>1988</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td>49.8</td>
<td>100.00</td>
<td>53.2</td>
<td>100.00</td>
</tr>
<tr>
<td>- Urban</td>
<td>(26.9)</td>
<td>(54.01)</td>
<td>(29.6)</td>
<td>(55.70)</td>
</tr>
<tr>
<td>- Rural</td>
<td>(22.9)</td>
<td>(45.99)</td>
<td>(23.6)</td>
<td>(44.3)</td>
</tr>
<tr>
<td>Working Population</td>
<td>13.3</td>
<td></td>
<td>14.2</td>
<td></td>
</tr>
</tbody>
</table>

Population Aged Between 6 To 24 Years (1986)

6 To 10 Years 5,070,000
11 To 13 Years 2,540,000
14 To 17 Years 3,050,000
18 To 24 Years 4,145,000


The World Bank puts the fertility rate at 5.6, which is fairly high on the Third World Scale. Life expectancy is still low but improving: it stands at 60 years.
2.2.2. Education

In 1987, the literacy rate for the 6 year and over age group was about 65.3 per cent, 74.8 per cent for urban and 53.2 per cent for rural areas (Table 2.4).

(TABLE 2.4)
LITERACY RATE FOR THE POPULATION AGED 6 YEARS AND OVER (PER CENT)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE &amp; FEMALE</td>
<td>63.4</td>
<td>65.3</td>
<td>73.9</td>
<td>74.8</td>
<td>50.4</td>
<td>53.2</td>
</tr>
<tr>
<td>MALE</td>
<td>72.3</td>
<td>73.6</td>
<td>81.0</td>
<td>81.6</td>
<td>61.5</td>
<td>63.4</td>
</tr>
<tr>
<td>FEMALE</td>
<td>54.1</td>
<td>56.2</td>
<td>66.5</td>
<td>67.6</td>
<td>38.8</td>
<td>41.7</td>
</tr>
</tbody>
</table>


2.3. IRANIAN RIAL

The Rial is the basic unit of currency, ten Rials making a Toman, in which large sums are denominated except for official purposes. Performance of the Iranian Rial has been highly variable in recent years. It stood at IR 70 = $1 during much of the 1970s but began a protracted and at times spectacular collapse in 1981/82.

(TABLE 2.5)
ANNUAL AVERAGE OFFICIAL VALUE OF THE RIAL AGAINST THE US DOLLAR

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>78.33</td>
<td>83.60</td>
<td>90.03</td>
<td>78.76</td>
<td>71.46</td>
<td>68.68</td>
<td>72.91</td>
<td>68.10</td>
<td>71.21</td>
</tr>
</tbody>
</table>

Somewhat arbitrary revaluations steadied the official rate in 1984/85. By April 1992 the official rate\(^4\) was IR 60.00 = $1, but it should be noted that this is a wholly artificial exchange rate, and a growing volume of transactions is carried out by the open market at a rate between 10 and 15 times the official exchange rate (see Table 2.5).

2.4. GROSS DOMESTIC PRODUCT

Statistical series for national income of I.R. Iran began in 1959, when Gross Domestic Product stood at $3.69 bn, with agriculture making up 27 per cent of the total and oil a mere 11 per cent. After a period of economic stagnation in the early 1960s, a period of sustained economic expansion began during 1964 that lasted through to 1973. Indeed, the rate of growth accelerated steadily from an average 9.5 per cent in 1962-68 plan period to 11.8 per cent in the 1968-73 period as oil became the leading sector. The negative aspects of the "boom" years show up clearly in growth between 1973 and 1978, which dropped to an annual average of 6.9 per cent. The decline came mainly from the poor performance of the oil industry, where there was a fall of 0.7 per cent each year.

The impact of political changes in I.R. of Iran was seen in a 14.5 per cent fall in GDP in 1978/79. The Government decided to cut the oil production and export immediately to less than 3 million barrels per day from the previous level of 5.5 million barrels per day\(^5\). In addition, Iran-Iraq War contributed to a fall in GDP in 1980/81. A recovery was achieved in 1982-83 but a further drop in national Income began in 1986/87 in response to the falling oil price and wartime conditions (Table 2.6).

| (TABLE 2.6) TREND IN IR IRAN'S GROSS DOMESTIC PRODUCT | "Constant 1974/75 Prices"
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP billion Rials</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>3,413.8</td>
</tr>
<tr>
<td>% Real Change</td>
</tr>
<tr>
<td>12.4</td>
</tr>
</tbody>
</table>

2.4.1. Hydrocarbons and the Iranian Economy

The I.R. of Iran has undergone rapid and fundamental changes in its economic structure. During the years 1964-73 the changes were largely the result of promotional policies. The role of oil has remained critical in IR Iran's structure, peaking at some 50 per cent of GDP during the first oil adjustment of 1973-74. Oil and services combined contributed approximately 70-75 per cent of GDP in the second half of 1970s. I.R. of Iran, therefore, at the end of the Shah's reign, was more of an oil economy than it had been at the beginning. The new Islamic Republic Government has aimed its policies at a reduction in the importance of oil in the domestic economy, but the reality nonetheless has been a continuing oil dependence. The oil sector, remains an important determinant of growth trends in the Iranian economy by virtue of its major contribution to Gross Domestic Products (See Table 2.7 & 2.8). In 1976 the oil & gas contributed up to 38 per cent of GDP.
(TABLE 2.7)
GDP GROWTH RATES BY SECTOR (Constant 1974-75 Prices)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>1.9</td>
<td>11.3</td>
<td>7.9</td>
<td>-1.6</td>
<td>4.1</td>
<td>8.9</td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
<td>-56.9</td>
<td>-17.2</td>
<td>n.a.</td>
<td>0.8</td>
<td>-14.8</td>
<td>-3.6</td>
</tr>
<tr>
<td>Industry &amp; Mining</td>
<td>1.6</td>
<td>2.7</td>
<td>10.5</td>
<td>15.6</td>
<td>3.2</td>
<td>-2.3</td>
</tr>
<tr>
<td>Services</td>
<td>-5.5</td>
<td>1.9</td>
<td>2.8</td>
<td>18.6</td>
<td>2.1</td>
<td>2.5</td>
</tr>
</tbody>
</table>

*Source*: Central Bank of IR Iran, Various Economic Reports and Balance Sheets, 1979-86.

Nevertheless, the hydrocarbon exports would fetch $100 billion of the total $119 billion outlay for the First Five Year Post War Plan. This clearly indicates the influence and the importance of oil industry in rebuilding various sectors of the economy. (See Graph 2.1)

(TABLE 2.8)
ORIGINS OF GROSS DOMESTIC PRODUCT
(Constant 1974/75 Prices)
(PER CENT)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>14.3</td>
<td>14.4</td>
<td>21.0</td>
<td>22.0</td>
<td>19.5</td>
<td>16.0</td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
<td>17.3</td>
<td>12.9</td>
<td>7.0</td>
<td>8.0</td>
<td>16.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Industry &amp; Mining</td>
<td>19.4</td>
<td>20.3</td>
<td>22.0</td>
<td>23.0</td>
<td>16.8</td>
<td>13.0</td>
</tr>
<tr>
<td>Services</td>
<td>49.0</td>
<td>54.1</td>
<td>50.0</td>
<td>47.0</td>
<td>47.7</td>
<td>53.0</td>
</tr>
<tr>
<td>(GDP) Factor Cost</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

On the other hand, the natural gas plays a crucial role in the Iranian economy. IR Iran now exports about 3 billion cubic meter per year of gas to the former Soviet Union against which the former USSR will co-operate with IR Iran in more than 19 industrial and economic projects, including the expansion and construction of power stations, dams, railways and other infrastructural schemes. The National Iranian Gas Company (NIGC) has been studying ways to export gas to Europe via pipeline or LNG shipment.
2.5. OIL INDUSTRY IN IR IRAN

2.5.1. Nationalisation and the Consortium

From 1954 to March 1973 Iran's major oil fields were operated by the Iranian Oil Exploration and Producing Company for the Iranian Oil Producing Company for the Iranian Oil participants. The group which became known as the Consortium, comprised of:

1) British Petroleum (40%)
2) Royal Dutch Shell (14%)
3) Gulf (7%)
4) Mobil (7%)
5) Exxon (7%)
6) Standard Oil Of California (7%)
7) Compagne Francaise des Petroles (6%)
8) Iricon Agency (5%)

Iricon originally consisted of nine Independent American Companies, whose number was later reduced to six as a result of mergers. In 1954 the Consortium finally succeeded the Anglo-Iranian Oil Company which had operated in the area of Southern Iran until May 1951. When the oil industry was nationalised, refining activity at Abadan was supervised by the Iranian Oil Refining Company Iran's own National Iranian Oil Company (NIOC) was responsible for providing all non-basic facilities in the Consortium area and remained the sole owner of all fixed assets, though the Companies had rights to their use for the period of the 1954 agreement.

Until the Islamic Revolution, all the major and many of the Independent Oil Companies (Consortium) were active in exploration sector of Iranian oil industry. A variety of agreements had been signed between them and National Iranian Oil Company. The role of the Consortium was ended by a declaration by NIOC effective from March 1, 1979. The Joint Venture Companies were wound up in January 1980 and regrouped under the Iranian Offshore Oil Company of the Islamic Republic. By September 1981 IR Iran had canceled all the agreements with the foreign companies and NICO took over all operations, including the exploration/production work of the foreign oil companies.
2.5.2. Cost Of Oil Production

The marginal cost of oil production in most parts of I.R. of Iran is very low at regional and international standards and in certain areas it is in fact, among the lowest in the world. It is interesting to note that the average cost of crude oil production in the North Sea is around $7.50 per barrel(/b); for North America $ 9.00/b and OPEC Persian Gulf $2.00/b. At the same time due to limited physical constraints with little drilling efforts tremendous additional capacities will be realized. Therefore, given the easy drilling conditions and huge reserves base, it is possible to make the country capable of raising the production capacity substantially in a short span of time. IR Iran’s Ministry of Petroleum has a Development Plan (1990-94) calling for foreign currency investments totaling $14.5 billion in development of oil and gas reserves and to raise the production capacity.10
2.5.3. Estimated Reserves of Oil and Gas

The Islamic Republic of Iran is endowed with major crude oil reserves placed at 10.1 per cent of World reserves. On 1st January 1992, Oil & Gas Journal estimated the total crude oil reserves of IR Iran at 92.860 billion barrels. On the other hand the natural gas is of potentially great importance in Iran’s hydrocarbon sector. The I.R. of Iran possesses the second largest gas reservoir in the World and with some 600 trillion Cubic feet (tcf) or some 14 per cent of total world proven gas reserves ranks second only to the former Soviet Union\(^\text{11}\). If the combined oil and gas reserves are taken into consideration, I.R. of Iran may claim to be holders of the second largest energy reserves in the World. In other words, Iran’s gas reserves are 3.6 times the reserves of the United States or 3.4 times the reserves of the whole Western Europe\(^\text{12}\) (See Map 2.2).

**MAP 2.2**
THE MAIN SEDIMENTARY BASINS OF IRAN

2.5.4. Oil Producing Fields of IR Iran

The main producing fields are the Aga Jari/Karanj/ Maran/Paris complex together with Gachsaran, Bibi Hakimeh and Ahwaz, these traditionally provided some 95 per cent of crude (See Map 2.3). Aga Jari contains mainly light crudes while Gachsaran produces heavy crudes. According to some experts, "... as these oil fields are dependent almost exclusively on hydrostatic and/or gas pressure delay in gas injection programme might have resulted in loss of billion of barrels of oil reserves as a result of water flooding". The NICO, however, in recent years has initiated new gas injection programme, which involves oil fields of Gachsaran and Marun and in the next phase the Paris and Karanj oil fields.

MAP 2.3
ONSHORE ZAGROS SECTOR OIL AND GAS FIELD

2.5.5. Oil Export Facilities

The pattern of export pipelines handling Iranian crudes changes over time. Until the 1960s crude was dispatched to Abadan with crude and products exported from Abadan and Bandar Imam Khomeini [Mah Shahr]. Construction of Kharg Island terminal for the export of crude enabled Bandar Imam Khomeini to be used exclusively for product exports. In various stages six large diameter submarine pipelines were laid between the mainland pumping station at Ganaveh and Kharg, the last a 52 inch line in the 1970s. Kharg Island was given two main terminals, the first a jetty complex on the eastern coast and the second a sea island off the west coast where larger tanker could be loaded at high speed. Some 13 million barrels of storage capacity was set up on Kharg together with supporting facilities, air field and a small township.

In 1985, the Iran-Iraq War forced the Iranian authorities to move crude from the northern Persian Gulf by shuttle tankers to Sirri and Larak islands in the south, where international tanker traffic could move more freely and without incurring large insurance premiums. Two very large crude carries were brought in to service at Sirri as floating storage tanks served by up to 13 shuttle vessels. With the cease-fire in August 1988, the National Iranian Oil Company began to rebuild its damaged oil export facilities, concentrating mainly on the rehabilitation of Kharg Island.

2.5.6. Production and Exports of Oil

During the Anglo-Iranian oil crisis of 1951-53, the Iranian Oil production was severely disturbed. But I.R. of Iran was placed as the second largest oil producer in the Middle East during 1970s, with output averaging more than 5 million b/d. However, in 1979, following the Islamic Revolution, the Revolutionary Government committed itself to an output of less than 3 million b/d. (See Table 2.9 & Graph 2.2) But, it is to be noted that, in recent years the oil production has exceeded 3 million b/d.
(TABLE 2.9)
IR IRAN’S CRUDE OIL PRODUCTION
Thousand Barrels Per Day

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>1,908</td>
<td>5,350</td>
<td>2,215</td>
<td>2,310</td>
<td>2,275</td>
<td>2,846</td>
<td>3,109</td>
<td>3,312</td>
<td>3,500</td>
</tr>
</tbody>
</table>

Sources: OPEC Annual Statistical Bulletin, 1989, P. 15


(GRAPH 2.2)
IR IRAN’S CRUDE OIL PRODUCTION (1965-1992)

Source: Table 2.9
In 1975 the gross exports of crude oil and refined products was 4.6 million b/d, which was reduced substantially following the decision of the Revolutionary Government to cut the production by 50 Per cent. On the other hand, the commencement of the Iran-Iraq War had effected the exports of crude oil and refined products in 1980 (See Table 2.10). According to the statistics available the crude exports of I.R. Iran was reduced by 67 Per cent in 1980 when compared to its previous year\(^\text{18}\). The prices which I.R. of Iran actually received for its oil had been rather lower than the average or as officially listed, due to the extra high insurance and transport costs related to the war which were borne by Iran.

\textbf{(TABLE 2.10)}

<table>
<thead>
<tr>
<th>Year</th>
<th>IR IRAN'S GROSS EXPORTS OF CRUDE OIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>1,462</td>
</tr>
<tr>
<td>1970</td>
<td>3,309</td>
</tr>
<tr>
<td>1975</td>
<td>4,671</td>
</tr>
<tr>
<td>1980</td>
<td>796</td>
</tr>
<tr>
<td>1985</td>
<td>1,568</td>
</tr>
<tr>
<td>1986</td>
<td>1,454</td>
</tr>
<tr>
<td>1987</td>
<td>1,710</td>
</tr>
<tr>
<td>1988</td>
<td>1,696</td>
</tr>
<tr>
<td>1989</td>
<td>2,025</td>
</tr>
</tbody>
</table>

Following the Iraqi invasion of Kuwait on 2 August 1990, I.R. Iran’s oil exports in the 1991-92 fiscal year was estimated to rise to 2.43 million b/d from a total production of 3.3 million b/d. The export levels for the fourth quarter of 1990 stood at 1.98 million b/d, with domestic demand running at some one million b/d. The national demand is likely to remain fairly stable, as gas has increasingly been harnessed to satisfy local energy needs. By the end of 1995, it is expected that production capacity will rise to 4.5 million b/d, with export potential of 3.5 million b/d. The IR Iran is now working hard downstream and hopes to lower dependence on crude oil exports as the export share of refined products, petrochemicals, plastics and fertilizers is raised².

2.5.7. Refining & Petrochemicals

The Islamic Republic of Iran has the longest refining history in the Middle East. The giant Abadan refinery (which was damaged during the Iran-Iraq War) held the distinction of being the first oil refinery in Iran and between 1954 and 1957, ranked as the biggest in the world. The Abadan refinery was large by all standards, with a crude distillation capacity of 430,000 b/d, catalytic reformer of 24,000 b/d and catalytic cracker of 32,000 b/d, which together with an expansion programme completed immediately before the Revolution, gave a total capacity of 600,000 b/d. Abadan refinery was linked by hot and cold pipelines to Bandar Imam Khomeini [Mah Shahr], where there was a 48,000 b/d natural gas liquids refinery set up to process Aga Jari gas for LPG². The rehabilitation process of Abadan refinery was undertaken soon after the eight year Iran-Iraq War. According to the latest figure available Abadan refinery is processing about 280,000 barrels per day. Pipeline expansion based both on Abadan and on other areas will ease product distribution considerably.

The Tehran I with capacity of 125,000 b/d, has played a major role in domestic supply, especially after all the destruction of the unit at Abadan. Tehran II (115,000 b/d) and lube oil plant are part of the Tehran refining complex. Refineries at Shiraz (45,000 b/d), Tabriz (120,000 b/d) and Isfahan refining complex which has two plants, each with capacity of 150,000 b/d are augmented by topping plants at Bakhtaran (20,000 b/d) and Lavan (20,000 b/d)².

IR Iran had an arrangement with the Aden refinery for processing Iranian crude to make good any shortfalls within the domestic system. IR Iran also has continuing arrangements with
other international refiners (e.g., Singapore, C Itoh of Japan and Ssangyong of South Korea). In all I.R. Iran was importing around 200,000 b/d of oil products

2.5.8. Planned Refiners

The I.R. Iran has planned to increase its refining capacity in operation from 1.3 million b/d to 1.6 million b/d. The total capital budget of $5.7 billion has been allocated to be spent on Arak, Bandar Abbas and Isfahan refineries and Kangan Natural Gas Plant.

The upgrading of refining capacity is taken into consideration for all these planned refiners. The design of new plants at Arak and Bandar Abbas is aimed at a product plan dictated by local demand pattern. The 232,000 b/d Bandar Abbas plant, being built by Snamprogetti/Chiyoda under a $1.243 bn contract, is geared to turning out 65 per cent middle distillates. The Arak plant (with capacity of 150,000 b/d) will be similar, but with the supply of petrochemical feedstock an important addition.

Arak comes on stream in late 1992, Bandar Abbas early in 1994. In all eleven refineries will change I.R. Iran from a net importer of refined product to a net exporter by mid 1990s.

2.5.9. Petrochemical Industry

The development projects in the petrochemical sector is going on hand-in-hand with those in the oil, gas and refinery sectors. The Islamic Revolution in 1979 gave priority to the petrochemical industry. The wisdom being that petrochemical products for both domestic use and for export will reduce dependence on the export of crude oil and gas as a source of foreign exchange revenue. This is in addition to fertilizers, plastics and synthetic fibers provided for the country’s agricultural and industrial development, reducing the drain of foreign exchange to pay for the import of these commodities.

2.5.10. Petrochemical Expansion

Despite the fact that the petrochemical is a highly capital intensive, but at the same time to save over two billion dollars annual import bill on petrochemical products, the I.R. Iran has
planned to develop this industry substantially. During the First Five Year Plan period the total investment of $3.4 billion would be spent on this industry. It is anticipated that by the end of First Five Year Plan in 1994, the National Petrochemical Company of Iran (NPC) would reach the stage of self-sufficiency. According to the President of Iran’s National Petrochemical Company, plans call for an increase in petrochemical output from 3.5 million tons/year in 1988 to 9 million tons/year in 1993. This would be accomplished by completing the constructions of ten petrochemical plants and three new projects based on major industrial centers of Isfahan, Arak and Tabriz.

"Refinery expansion will, however, be no match for the export benefit to be gained from petrochemical expansion. For instance, capacity in the plastics and rubber sector is now 800,000 tons per year (t/y) and will hit 2.1 mt/y by 1995. Much of the required feedstock still has to be imported, costing almost $900 million per annum. Self-sufficiency in such feeds is expected from 1993, as a result of projects under-process.

The Arak petrochemical complex based on a 240,000 t/y ethylene cracker is expected to start-up by end of 1991. Balancing the Arak olefins-based complex will be the Isfahan BTX-based plants. Further ethylene crackers are being built at Tabriz, based on naphtha, and at Sarakhs, based on gas. Downstream plants will take production right down to finished goods.

The reconstruction project of the Bandar Imam Petrochemical Company has been taken-up by Technip for $1 billion, after its first contractor, Mitsui and its partners paid a compensation of US $910 million to National Petrochemical Company in 1990, for leaving the contract. The total cost of entire complex is expected to have cost some US $4.5 billion when it is completed.
2.5.11. Gas Pipeline Projects

The increased development and use of the IR Iran’s huge gas resources for both export and domestic consumption is one of the aims of Ministry of Petroleum Plan 1990-94. As the Map 2.3 depicts the National Iranian Gas Company (NIGC) during the said planning period is adding 3,000 Km. of low pressure transmission pipeline and 17,000 Km. of low pressure distribution line. The IGAT II pipeline which is one of the major pipeline construction projects starts from fields in the South, at Kangan, to Astara in the North. Also under construction is a 380 Km. (which is an extension of the 800 Km. 30 inch and 36 inch Sarakhs-Neka pipeline) 30 inch line between Rasht and Neka which will supply fuels to northern cities. A 370 Km. pipeline from west of Isfahan to Yazd is to be laid by 1994 (See Map 2.4)27.

(MAP 2.4)
I.R. IRAN’S GAS PIPELINE PROJECTS

2.6. UNITED ARAB EMIRATES

2.6.1. History

From Sha'am, 35 miles South-West of Ras Musam dam, for nearly 400 miles to Khor Al Odeid at the South-Eastern end of the Peninsula of Qatar, the coast, formerly known as the Trucial of the Gulf (together with 50 miles of the coast of the Gulf of Oman) belongs to the rulers of the Seven Trucial States. In 1820 these rulers signed a treaty prescribing peace with the British Government. This treaty was followed by further agreements providing for the suppression of the slave trade and by a series of other engagements, of which the most important are the Perpetual Maritime Truce (May 1853) and the Exclusive Agreement (March 1892). Under the latter the Sheiks, on half of themselves, their heirs and successors, undertook that they would on no account enter into any agreement or correspondence with any power other than the British Government, receive foreign agents, cede, sell or give for occupation any part of their territory save to the British Government.

British forces withdrew from the Persian Gulf at the end of 1971 and the treaties whereby Britain had been responsible for the defence and foreign relations of the Trucial States were terminated, being replaced on December 2, 1971 by a treaty of friendship between Britain and the United Arab Emirates.

On February 28, 1968, the Seven rulers of the U.A.E’s present member states, and those of Bahrain and Qatar, who later opted for separate independence, agreed in principle to form a federation of Arab Emirates.

The U.A.E. comprises of seven emirates. They are:

1) Abu Dhabi (Federal Capital)
2) Dubai
3) Sharjah (Merged with State of Kalba in 1952)
4) Ajman
5) Umm Al Qaiwain
6) Ras Al Khaimah (Joined in Feb. 1972), and
7) Fujairah.
2.6.2. Area and Population

The Emirates are bounded North by the Persain Gulf and Oman, East by the Gulf of Oman, South and West by Saudi Arabia, North-West by Qatar. The area of these states is approximately 32,300 Sq. miles (83,657 Sq. Km). According to the 1985 national census the total population, including both citizens and non-citizens was 1,622,464 which was reached to 1.70 million in 1990.

(TABLE 2.11)
POPULATION OF THE SEVEN EMIRATES
(1985 Census)

<table>
<thead>
<tr>
<th></th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abu Dhabi</td>
<td>670,125</td>
</tr>
<tr>
<td>Ajman</td>
<td>64,318</td>
</tr>
<tr>
<td>Dubai</td>
<td>419,104</td>
</tr>
<tr>
<td>Fujairah</td>
<td>54,425</td>
</tr>
<tr>
<td>Ras Al Khaimah</td>
<td>116,470</td>
</tr>
<tr>
<td>Sharjah</td>
<td>268,722</td>
</tr>
<tr>
<td>Umm Al Qaiwain</td>
<td>29,229</td>
</tr>
<tr>
<td><strong>Total U.A.E.</strong></td>
<td><strong>1,622,393</strong></td>
</tr>
</tbody>
</table>


A large number of expatriates constitute a major component of the population in U.A.E. Most of those expatriates belong to India, Bangladesh, Pakistan, Sri Lanka, Thailand and the Philippines. Various Arab expatriate who come primarily from Palestine, Lebanon, Egypt, Jordan, Syria, Sudan and Morocco are employed in different economic sectors.

According to the International Bank for Reconstruction and Development (The World Bank) the United Arab Emirates with a population of 1,277,000, enjoyed the highest per capita income in the world in 1984. The per capita income of the UAE was 22,300 US Dollars, followed by Qatar, with a per capita income of 20,600 US Dollars for its 1984 estimated population of 292,000, Switzerland with 15,990 US Dollars for its 6.57 million population was placed at the third rank. However, the per capita of the UAE was registered at $ 17,669 in 1989.
2.6.3. Climate

The country experiences desert conditions, with rainfall both limited and erratic. The period May to November is generally rainless, while the wettest months are February and March. The amount of rainfall varies from place to place. The eastern emirates of Ras Al-Khaimah and Fujairah have abundant rainfall which may amount to as much as thirty inches a year, but in the region of the Abu Dhabi emirates the annual rainfall does not exceed twelve inches. Humidity is very high along the coast.

The summer months are both very hot and humid with temperatures ranging between 38 and 47 degree centigrade in the middle of the day. Nowadays the almost universal use of air-conditioning has made the hot summer months far more tolerable.

2.7. POLITICAL STRUCTURE

The United Arab Emirates has a two-tier Governmental system. Each of the individual emirates has its own Government, ranging in size and complexity depending upon the respective size. Each Ruler retains, under the terms of the provisional federal constitution, certain residual functions, including the right of control over land ownership and over oil and gas resources. In most other spheres, however, such as education, immigration, police, defence, electricity and water, agriculture and the social services, federal institutions have assumed responsibility.

The highest federal body is the Federal Supreme Council, whose members are the seven Rulers or their designated deputies. This body elects from amongst its members the President and the Vice President, who serve for five year renewal terms. Since independence, the post of President has been filled by the Ruler of Abu Dhabi, H.H. Sheikh Zayed bin Sultan al Nahyan, and till recently the post of Vice president by the Ruler of Dubai, late H.H. Sheikh Rashid bin Saeed Al Maktoum. The present Vice-President is H.H. Sheikh Maktoum bin Rashid Al Maktoum. The President appoints the Prime Minister. The President and Prime Minister then appoint federal cabinet. Each cabinet since independence has included members from each of the Emirates.
A third federal body of importance is the Federal National Council, a Consultative Parliament, with forty members. Eight each are from Abu Dhabi and Dubai, six each from Sharjah and Ras Al Khaimah, and four each from the remaining three emirates.

The Emirate of Abu Dhabi, the largest in terms of population, also has an Executive Council, acting as a local cabinet, which is chaired by Sheikh Khalifa bin Zayed al Nahyan Crown Prince and Deputy Supreme Commander and nominated National Consultative Council. In other emirates, each major urban centre has a Municipal Council.

2.8. PROFILES OF THE SEVEN EMIRATES

2.8.1 Abu Dhabi

The Emirate of Abu Dhabi is the largest of the seven components of the UAE with an area of around 26,000 square miles out of the country’s total of approximately 30,000 Square miles. Today it is estimated to have a population over 800,000.

Around 1760, the nomadic Beni Yas tribe, migrating to the coast, discovered sweet water on Abu Dhabi island, and made their first permanent township there.

Abu Dhabi’s territory stretches, on sea-coast, from the base of the Qatar peninsula in the west to the border of the emirate of Dubai near Ghantut in the north east, and onland, stretches south to the desert area of oases known as the Liwa, and east to the ancient oasis complex known to history as the Buraimi oasis, but more familiarly known today as Al-Ain, the name of the largest town there, which is part of Abu Dhabi emirate.

Abu Dhabi is the largest oil producer, among the four emirates endowed with oil resources. The first oil refinery was built at Umm an Nar island which is also part of emirate.

The largest population centre in the emirate is, naturally, the city of Abu Dhabi itself, which is also the federal capital of the UAE, with a population of some 400,000. All the departments of the Government of Abu Dhabi and number of UAE federal ministries are situated at Abu Dhabi. The headquarters of the emirate’s oil operating companies, and the main
government oil firm, the Abu Dhabi National Oil Company, ADNOC are located in Abu Dhabi. The other population centres in the emirate include the industrial town of Ruwais-Jebel Dhanna, in the west of the emirate, Medinate Zayed, in the desert on the way to Liwa, and a string of smaller towns along the highways to Al Ain and Dubai.

2.8.2. Dubai

The Emirate of Dubai, is the second largest of the seven comprising the United Arab Emirates. It covers an area of around 1,000 square miles with a population of (1985 Census) 419104, nearly all living in Dubai town and part.

Centered around the famous Creek, or Khor, Dubai and its twin town of Deira, on the other side of the Creek, has long been a centre for commerce in the Gulf.

The emirate of Dubai has earned the reputation of being one of the most progressive commercial centres in the Middle East. One of the largest harbour in the Middle East was established at Jebel Ali. The opening of a Free Trade Zone at the beginning of 1985 attracted a number of industrial Companies. There are variety of industries in Jebel Ali, ranging from an aluminum smelter to a gas plant, and from a cable factory to a major power plant.

The Dubai International airport, opened in 1960s, handles up to 8.5 million passengers a year.

2.8.3. Sharjah

Sharjah Comprises a main section covering the coastal strip, on which the town of Sharjah itself is located, and stretching inland to the oasis of Dhaid, and a number of small enclaves on the UAE’s Gulf of Oman coast. The most important are Khor Fakkan, Kalba and Khor Kalba, and part of the town of Dibba, which is shared with both Fujairah and the Sultanate of Oman. The Saja onshore gas and condensate field with an average daily production of around 60,000 barrels of condensate has been providing a boost the Sharjah’s economy. Sharjah now has its own gas liquefaction plant, which is providing gas to the Emirates General Petroleum Corporation for the fuelling of power stations throughout the northern emirates, and to Jebel Ali. The port of
Hamriyyah, part of the emirate, and the land terminal for the Saja’s field, has become an important industrial centre.

2.8.4. Ras Al Khaimah

Ras Al Khaimah once known as Julfar, occupies the extreme north eastern coastline of the United Arab Emirates, close to strategic Straits of Hormuz, with another important inland section straddling the Central Hajar Mountain range that runs down the centre of the country.

It is one of the main UAE’s agricultural centres. The discovery of the small offshore Saleh oil field has provided the emirate with an additional source of revenue enabling the Government to promote development of a modern infrastructure. The search for oil and gas centuries, both onshore and offshore. While there are other parts of the Musandam Peninsula, in neighboring Oman, which could possibly be tapped to provide a longer life for the local oil industry.

2.8.5. Umm Al Qaiwain

It is a wedge shaped state occupying about 300 Square miles between Ajman and Ras Al Khaimah. Unlike all of the other seven emirates except Abu Dhabi, Al Qaiwain with a total population of 29,229 is a single piece of territory. Umm Al Qaiwain stretches inland to the oasis of Falaj Al Mu’alla, named after the emirates ruling family. Many of the people are still dependent on the traditional forms of employment, such as fishing and date cultivation. Offshore exploration for oil and gas during late 1970s discovered a sub-sea gas field which has yet to be developed, while exploration shore has been unsuccessful. The hope that oil may be discovered onshore remains, since the emirate’s territory lies close to the Saja’a gas and condensate field in Sharjah emirate. The establishment of a Free Trade Zone in the port, however, has brought new business, and new hopes, to the emirate.

2.8.6. Ajman

The Emirate of Ajman with the population of 64,318 is the smallest of the seven members of the UAE federation, with an area of only 100 Square miles most of which is made up of a
portion of territory on the Gulf coast immediately to the north of Sharjah. There are also a couple of tiny inland enclaves in the Hajar Mountains, Masfut and Manama. Ajman has not so far been successful in the search for oil and gas resources, although foreign companies still hold concessions over both onshore and offshore areas. Ajman is the site of an important dock yard run by Arab Heavy Industries.

2.8.7. Fujeirah

The Emirate of Fujeirah is located in the eastern region, to the east of Sharjah and Ras Al Khaimah, extending over a distance 90 Kilometers long approximately, along the Gulf of Oman, and bordered to the north by Ras Al Khaimah and the Sultanate of Oman, and to the South by Kalba, which is part of Sharjah, and the Sultanate of Oman.

The area of the Emirate is 1,165 Square Kilometers, equivalent to 1.5 per cent of the country’s total area. The physical feature is basically formed of rough mountains, containing in between them and Gulf of Oman, the most fertile lands, known as Al Batinah plains, extending over a distance 32 Kilometers in width and getting narrower towards the edge of the sea. The known Valleys in the area are Seejai and Haam.

2.9. OIL INDUSTRY

2.9.1. Origins

The origins of the UAE oil industry stretch back to the nineteen thirties, when the London based Iraq Petroleum Company, (IPC), grouping BP, Shell, Total, Exxon, Mobil and Partex (the Gulbenkain family interests), first displayed an interest in the Southern Gulf. Abu Dhabi’s concession agreement was signed with an IPC subsidiary in January 1939, over half a century ago, and the same foreign shareholders still hold 40 per cent minority interest in the Abu Dhabi Company for Onshore Oil Operation Company, ADCO, one of the World’s major oil producing Companies.

Exploration began after the Second World War, although the first commercial oil field was not discovered until 1958. Abu Dhabi’s oil exports began from offshore in 1962 and from
onshore in 1963. Dubai, the second largest producer, discovered oil in the 1960s, followed by Sharjah and only a few years ago, Ras Al Khaimah. The search continues throughout the United Arab Emirates

\*( TABLE 2.12)\*

**PARENT COMPANIES' PERCENTAGE EQUITY IN COMPANIES HOLDING PRODUCING RIGHTS IN THE UNITED ARAB EMIRATES, 1989.**

<table>
<thead>
<tr>
<th>Companies</th>
<th>BP</th>
<th>Total/CFP</th>
<th>Exxon</th>
<th>Mobil</th>
<th>Shell</th>
<th>Govt. Or National Co.</th>
<th>Other Foreign Cos.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADCO</td>
<td>24.00</td>
<td>--</td>
<td>4.75</td>
<td>4.75</td>
<td>9.50</td>
<td>55.00</td>
<td>2.00</td>
</tr>
<tr>
<td>ADMA</td>
<td>14.67</td>
<td>13.33</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>60.00</td>
<td>12.00</td>
</tr>
<tr>
<td>TOTAL</td>
<td>--</td>
<td>51.00</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>49.00</td>
</tr>
<tr>
<td>AMERADA HESS</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>100.00</td>
</tr>
<tr>
<td>ADOC</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>25.00</td>
<td>75.00</td>
</tr>
<tr>
<td>DPC</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>100.00</td>
<td>--</td>
</tr>
<tr>
<td>BUTTES</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>100.00</td>
</tr>
<tr>
<td>ZADCO</td>
<td>--</td>
<td>50.00</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>50.00</td>
<td>--</td>
</tr>
</tbody>
</table>


ADCO : Abu Dhabi Company for Onshore Oil Operations
ADMA : Abu Dhabi Marine Areas Ltd.
TOTAL/CFP : Compagnie Francaise des Petroles
AMERADA HESS : Amerada Hess Corporation
ADOC : Abu Dhabi Oil Company Ltd.
DPC : Dubai Petroleum Company
BUTTES : Buttes Gas & Oil Company
ZADCO : Zakum Development Company

2.9.2. Oil & Gas Reserves & Production

The United Arab Emirates oil reserves on January 1992 were estimated at 98.100 billion barrels, of which almost 94 per cent of these reserves are situated in Abu Dhabi. Other
estimates indicate that beneath the land surface, and offshore, there are more than 200 billion barrels of crude oil\textsuperscript{39}. The U.A.E. is also endowed with a large gas reserves estimated at almost 199.3 trillion cubic feet (tcf)\textsuperscript{40}. The installed sustained production capacity of the U.A.E. is over three million barrels a day.

The Emirate of Abu Dhabi which currently, produces around two-thirds of the country's daily oil output has the largest oil resources, sufficient for more than two hundred years at present rates of production. The total crude oil output during 1991 was 2,360 thousand b/d out of which 1,885 thousand barrel was produced by Abu Dhabi and the remaining by the Emirates of Dubai and Sharjah. (See Tables 2.13 & 2.14).

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|c|c|c|c|}
\hline
\hline
Abu Dhabi & 1,403 & 1,345 & 788 & 1,058 & 1,145 & 1,470 & 1,707 & 1,885 \\
\hline
Dubai & 254 & 349 & 351 & 382 & 380 & 431 & 435 & 435 \\
\hline
Sharjah & 38 & 10 & 64 & 45 & 40 & 35 & 40 & 40 \\
\hline
Total & 1,695 & 1,704 & 1,203 & 1,485 & 1,565 & 1,936 & 2,182 & 2,360 \\
\hline
\end{tabular}
\caption{UAE'S PETROLEUM PRODUCTION (Thousand Barrels Per Day)}
\end{table}

\textit{Sources: The Petroleum Economist, August 1991, P. 42.}

It may be noted that OPEC in November 1989, allocated 1,095 million b/d to the U.A.E. but the actual output exceeded the ceiling\textsuperscript{41}. However, the UAE decided to cut production by 300,000 b/d so as to avoid a drop in reservoir pressure which could cause long term damage to the emirates' oil fields, particularly those of Abu Dhabi.
(TABLE 2.14)

PARENT COMPANIES' ESTIMATED GROSS SHARE OF CRUDE OIL PRODUCTION IN THE UNITED ARAB EMIRATES
(Thousand Barrels Per Day)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL PRODUCTION</td>
<td>1,057</td>
<td>1,309</td>
<td>1,418</td>
<td>1,510</td>
<td>1,858</td>
</tr>
<tr>
<td>BP</td>
<td>150</td>
<td>186</td>
<td>201</td>
<td>214</td>
<td>263</td>
</tr>
<tr>
<td>TOTAL-CFP</td>
<td>137</td>
<td>152</td>
<td>155</td>
<td>167</td>
<td>205</td>
</tr>
<tr>
<td>EXXON</td>
<td>21</td>
<td>26</td>
<td>28</td>
<td>30</td>
<td>37</td>
</tr>
<tr>
<td>MOBIL</td>
<td>21</td>
<td>26</td>
<td>28</td>
<td>30</td>
<td>37</td>
</tr>
<tr>
<td>SHELL</td>
<td>42</td>
<td>52</td>
<td>56</td>
<td>60</td>
<td>74</td>
</tr>
<tr>
<td>GOVT.OR NATIONAL CO.</td>
<td>517</td>
<td>640</td>
<td>694</td>
<td>739</td>
<td>909</td>
</tr>
<tr>
<td>OTHER</td>
<td>169</td>
<td>227</td>
<td>256</td>
<td>270</td>
<td>333</td>
</tr>
</tbody>
</table>

Following the formation of Supreme Petroleum Council (SPC), on June 5 1988, the Directors of the Abu Dhabi National Oil Company (ADNOC) were consolidated into a single organization. The SPC is responsible for formulating oil and gas policy in the Emirate and overseeing the operations of the country’s oil and gas industries. ADNOC, was set-up by the Government in November 27 1971, to operate in all areas of the oil industry, both at home and abroad. The responsibility of exploiting Abu Dhabi’s hydrocarbon resources was entrusted to ADNOC. Key areas of Abu Dhabi, maintaining the production capacity of the producing fields without damaging the reservoirs and developing the mere complex structures in the country. Today, ADNOC, conducts its business through nine Directorates (See Figure 2.1).

(Figure 2.1)
ABU DABI NATIONAL OIL COMPANY DIRECTORATES

The Exploration and Production Directorate is responsible for oil and gas exploration and production activities, both in the sole-risk areas and the joint venture concessions, through three main operating Companies:

Abu Dhabi Company For Onshore Operations (ADCO), Abu Dhabi Marine Operating Company (ADMA-OPCO) and, Zakum Development Company (ZADCO).

In addition, Exploration and Production Directorate co-ordinates the activities of various oil field support service companies in which ADNOC has majority share holdings.

The Hydrocarbon Processing Directorate is responsible for ADNOC’s refining and gas processing operations. The Directorate operates two ADNOC owned refineries at AL Ruwais and Umm Al Nar and monitors the operations of Abu Dhabi Gas Liquefaction Company (ADGAS), Abu Dhabi Gas Industries (GASCO) and Ruwais Fertilizer Industries (FERTIL).

The Marketing Directorate markets crude oil from ADNOC’s equity shares in ADCO, ADMA-OPCO and ZADCO and LPG from ADNOC’s equity share in GASCO.

The other Directorates are:
Planning & Co-ordination, Projects, Personnel, Finance, Administration, and Data Processing.

2.9.4. ADNOC’s Joint Ventures and Subsidiaries

* ADCO is responsible for production onshore, including the three mile wide coastal strip below high water. Five oil fields have been discovered and developed at Bab, Bu Hasa, Asab, Sahil and Shah. At Bab field, oil capacity is planned to increase from 60,000 b/d to around 250,000. ADCO has contracted Brown & Root to handle preliminary engineering on water-injection schemes for Bab, as well as for the neighboring fields on Bu Hasa and Sahil, which together make up the Murban complex. 

53
ADNOC, BP, Shell, Total-CFP, Mobil, Exxon, and Partex share ownership.

ADNOC owns 60.00%, BP 9.50%, Shell 9.50%, Total-CFP 9.50%, Mobil 4.75%, Exxon 4.75%, and Partex 2.00%.

* ADMA-OPCO, involved in offshore operations, made the first commercial oil discovery in Abu-Dhabi, at Umm Shaif, in 1958, followed five years later by the discovery of Zakum, ranked among the ten largest oil fields in the world.

ADNOC 60.00% BP 14.67% Total-CFP 13.33% Japan Oil Development Company (JODCO) 12%.

* ZADCO was established to develop the Upper Zakum field, with ADNOC and JODCO sharing the concession in the ratio of 88:12. Work was well advanced on the drilling of up to 100 new wells to boost the oil production capacity of Upper Zakum to 500,000 b/d from its present capacity of 350,000 b/d.

ADNOC 50% Total-CFP 50%

* ADNOC and JODCO have also developed the Umm Al Dalkh (equity crude 88:12) and Satah (equity crude 60:40) fields and will develop the Jarnain and Dalma fields (equity crude 60:40).

* ADGAS was established to recover the associated gas, then being flared, from Umm Shaif and Lower Zakum. The majority of production is committed to Tokyo Electric Power Company. It is planned to double production of LNG to 4.6 million tonnes per year (mt/y) at a cost of $1.6 billion. LPG production will rise from 750,000 t/y to one million t/y. ADGAS
has signed a contract with a Japanese company to build a $1 billion production line at its Das Island plant, which would boost output to 6 million tons a year.

Operations Shareholding:
ADNOC 51%
Balance held by a number of industry partners.

* GASCO was established in 1978 to handle associated gas from onshore oil fields. GASCO operates an NGL plant at the Bab field which it plans to expand in tandem with the field's expansion plans. A similar plant at Bu Hasa is to be upgraded to increase the percentage liquid yield.

Operations Shareholding:
ADNOC 68% Balance held by various industry partners.

* FERTIL Fertilizer Industries was established in 1980 as a joint venture between ADNOC (66.67%) and Total-CFP (33.33%).

* National Drilling Company (NDC) was established as a joint venture in 1972 and became a wholly owned subsidiary of ADNOC in 1978. Activities span all drilling operations in exploration, development, work over and water wells, both onshore and offshore.

* National Petroleum Construction Company (NPCC) was incorporated in 1973 as a joint venture between ADNOC (70%) and Consolidated Contractors International Company (30%) to construct and fabricate facilities for the oil industry. NPCC now has a steel fabrication yard, a modern corrosion and concrete pipe coating facility and an offshore service base.

* Abu Dhabi National Oil Company for Distribution (ADNOC-FOD) was set up in 1973 as a wholly owned subsidiary of ADNOC to trade and market refined oil products locally. It operates a network of some 70 filling stations in Abu Dhabi and Northern Emirates.

* Abu Dhabi National Tankers Company (ADNATCO) was incorporated in 1975 as a
wholly owned subsidiary of ADNOC to operate its own, charter and re-charter crude and petroleum product tankers to meet ADNOC and other oil companies’ requirements.

* Abu Dhabi Petroleum Ports Operating Company (ADPPOC) was incorporated in 1979 as a joint venture between ADNOC (60%) and LAMNALCO Ltd. (40%) to operate the oil terminals and ports of Jebel Dhanna, Ruwais, Umm Al Nar, Zirku, Mubarazz and Das island.

* National Marine Services (NMS) was incorporated in 1973 between ADNOC (60%) and Jackson Marine Corporation (40%) to own, operate and charter specialised marine craft to service the offshore petroleum industry in Abu Dhabi.

* Abu Dhabi Drilling Chemicals And Products (ADDCAP) was incorporated in 1975 as a joint venture between ADNOC (70%) NL Industries Incorporated (30%) to produce a range of drilling chemicals at Sadiyat island grinding plant.

Besides the Companies in the ADNOC Group a number of other firms have continued production in the offshore areas of Abu Dhabi. For example, the Abu Dhabi Oil Company, (Japan) Ltd., (ADOC) produce oil from Mubarak field, the Amerada Hess Company operates the Arzana field, the French state oil Company, TOTAL, operates the Abu el Bukhoosh field and the Bunduq field (Production Capacity 32,000 b/d) which straddles the maritime border between Abu Dhabi and Qatar, is operated by the Bunduq Oil Company.
Under the terms of the concession agreements with the Oil Operating Companies, ADNOC, representing the Government of Abu Dhabi, retains ownership of all associated and non-associated gas\(^5\) (See Map 2.5).

(Map 2.5)

**MAJOR OIL COMPANIES OPERATING IN ABU DHABI**

2.9.5. Dubaï's Oil Industry

The Emirate of Dubaï, is the second largest producer with a production of (1992) 400,000 b/d\(^1\). The operations of the four main offshore oil fields of Fateh (commenced as the first offshore producer of Dubaï in 1966), Falah, South West Fateh and Rashid are supervised by the Dubai Petroleum Company, (DPC) under the guidance of the Government of Dubaï. The onshore operations, on the other hand are managed by the Atlantic Richfield Company, ARCO who holds the concession covering the onshore Margham gas and condensate field in a consortium with the British Company, Britoil. Production from the Margham field is exported through a loading facility at the industrial port of Jebel Ali. Surplus gas is being re-injected. Elsewhere in the emirate, a number of other companies are engaged in exploration activity, with concessions being operated by SEDCO, Britoil Oil and Minerals, MAPCO, and the consolidated International Petroleum Corporation, CIPC, formed in mid 1985 from a merger of three Companies in the Lundin group\(^2\).

2.9.6. Oil Industry in Sharjah

The Emirate of Sharjah ranks third in importance after Abu Dhabi and Dubaï as regards reserves, production and exports. In 1972, the Crescent Oil Company drilled its first oil well in the Mubarak field which marked the beginning of oil production in Sharjah Emirate. Since then the daily production capacity of the Mubarak field was 50,000 b/d which fell sharply to 10,000 b/d or less in recent years\(^3\). The actual production of Sharjah was almost 28,000 b/d in 1990\(^4\). Crystal Oil Company acquired an onshore oil concession in an 850 Square mile areas of Sharjah in January 1974. The Company was to complete, within a year all the preliminary geophysical operations to determine the area's oil potential and select drilling locations.

The discovery of the Saja’s gas and condensate field has enabled the emirate to carry-out its developmental expenditure. Production of condensate began in 1962, and has been raised to around 60,000 b/d from Saja’s and the adjacent Al Mouvayed structure. Various geological programmes are being carried out in onshore by the American firm AMOCO.
The Sharjah Liquefaction Company, SHALCO and AMOCO jointly operate a 440 million cubic feet a day gas liquefaction plant which came on stream in 1985. The annual production rate is 230,000 tonnes of propane, 170,000 tonnes of butane, and 220,000 tonnes of light oil. The SHALCO is owned 60 Per cent by the Sharjah Government and forty per cent by C Itoh of Japan, who will market the propane and butane. AMOCO markets the light oil\textsuperscript{55}.

It would be appropriate now to turn to the evolution and current status of oil industry in the context of its role and significance in the global economy.
REFERENCES

1 Benton, William, (1970), Encyclopedia Britannica, USA.
3 Kayhan Ilavi, Issue No. 975, Tehran, April 1, 1992, (Persian), P. 10.
4 Ibid., P. 10.
6 Yarjani, J., (1990), Iran's Oil and Gas Production Capacity and Refining in the Overall Economic Development Strategy and the First Five Year Plan, A Paper Presented to the International Conference held by The Japan Cooperation Center For The Middle East, Tokyo, on March 1-2, 1990, P. 2.
13 Ibid., P. 122-3.
16 Ibid., P. 193.
18 Country Profile-Iran, 1990-91, op. cit., PP. 30-1.
26 Ibid., P. 15.
33 The United Arab Emirates, (1990), Abu Dhabi:Ministry Of Information And Culture, Department Of Information, PP. 12.
34 Ibid., PP. 12-14.
35 "The United Arab Emirates", (1990), op. cit., PP. 105-132.


53 Ibid., P. 141.
